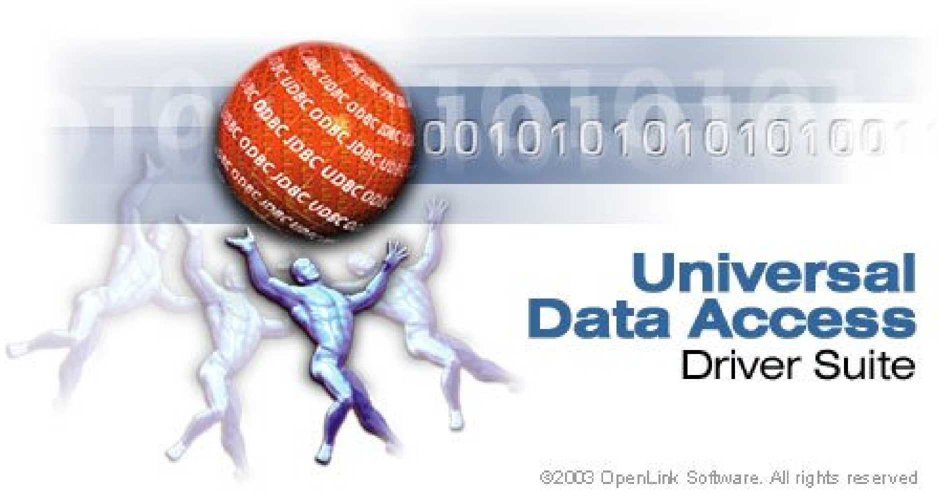

OpenLink ODBC Driver (Lite Edition) Documentation

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1 OpenLink ODBC Driver (Lite Edition) Documentation

1.1 OpenLink Software Documentation Team <`docs@openlinksw.com`>

`<docs@openlinksw.com>`

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2 Preface

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2.1 Conventions

A note on the typographical conventions that have been used in this text:

This is the normal font type used for ordinary text.

```
This monospaced font is used to describing program code.
```

```
This monospaced font is used to describe screen output, differentiated from code if required.
```

2.1.1 This See Also:

is a tip used for cross-referencing meterial either within the documentation, or externally.

2.1.2 This Note:

is a note used for revealing a point of interest or special feature

Special formatting is used to highlight `functions()` and their *`parameters`* above the rest of the text.

Important keywords are *emphasised* using bolding (or strong character typing) and text that is

2.1.3 Important

very important and must be noticed

is displayed in a traditional red warning color

2.2 Copyright

3 Chapter 1. Overview

Abstract
A very brief introduction to ODBC. A quick taster that might inspire users that may recall previous experiences but never knew.

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3.1 OpenLink ODBC Driver (Single-Tier Edition) Introduction

3.1.1 About ODBC

Open Database Connectivity (ODBC) is a Microsoft standard for database access. It provides a mechanism for desktop-based tools (word processors, spreadsheets, report writers, Internet/Intranet tools, for example) to transparently access data sources, such as databases. OpenLink Software provides the drivers you need to access your data sources from an ODBC compliant application.

3.1.2 How ODBC Works

A typical single-tier installation may consist of a database server, and a client that comprises the client networking provided by the database engine vendor and the OpenLink Lite ODBC driver. The client components need to be installed on every PC that is going to access the data. The ODBC driver must be accompanied by an application, such as Microsoft Office, which will use the driver to access and manipulate the data.

The OpenLink drivers can be used with, among others, the following software packages:

- Microsoft Excel
- Microsoft Word
- Microsoft Access
- Crystal Report Writer
- Microsoft FrontPage98 (web page development tool)
- Visual Basic, Visual C++
- All Visual Studio ADO components

All standard Microsoft Office applications use the Microsoft Query tool to access data. This package must be installed in order for ODBC drivers to work. Microsoft queries can be embedded in documents and spreadsheets and easily reused and modified.

Crystal Report Writer is a stand-alone reporting tool that enables you to write and graph reports. It employs a "click through" user interface.

3.1.3 What You Can Do With ODBC

Everyone can do something different with ODBC. Here are just a few ideas:

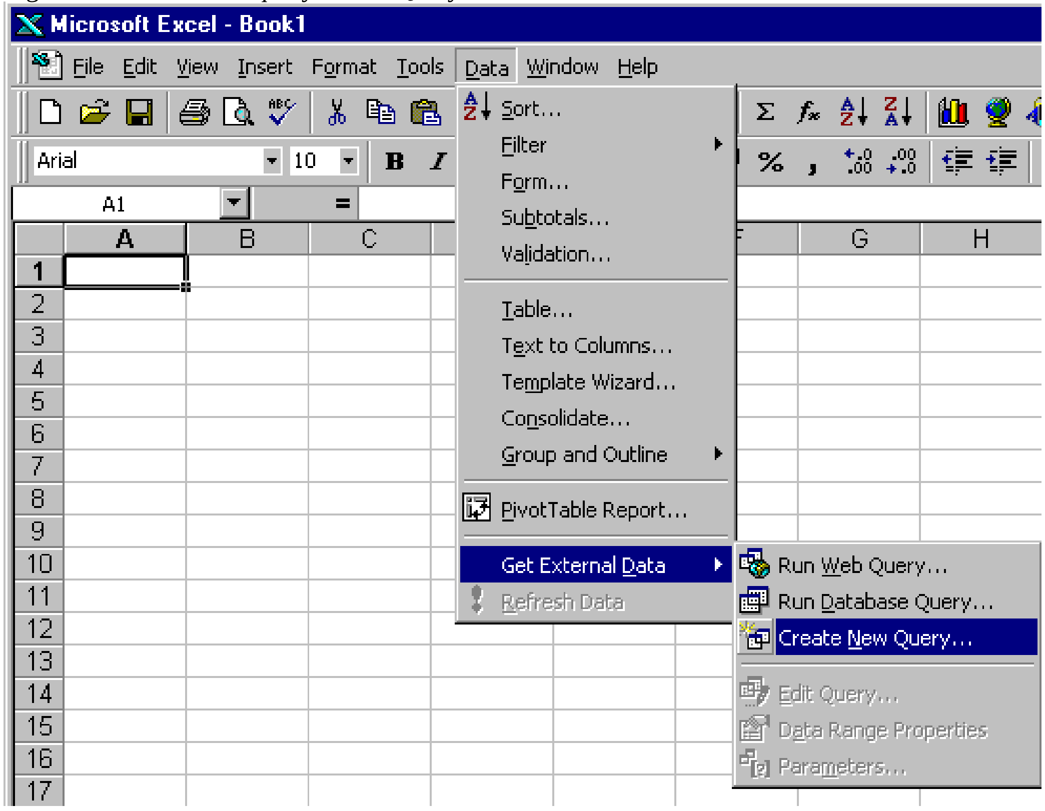
- Customize reports directly in Microsoft Excel
- Create (e-)mailing lists in Microsoft Word
- Write and design reports in Crystal Reports
- Create custom reporting tools or data monitoring tools (like CorVu's Executive Alert) through applications written in Visual Basic, C++, Java, etc.
- Render on-line information using data driven web content.
- And much more.....

3.2 Using ODBC on a PC

This section demonstrates how ODBC works through the PC product Microsoft Excel. This procedure may vary depending on your version of Excel. These instructions specifically explain Microsoft Excel 97.

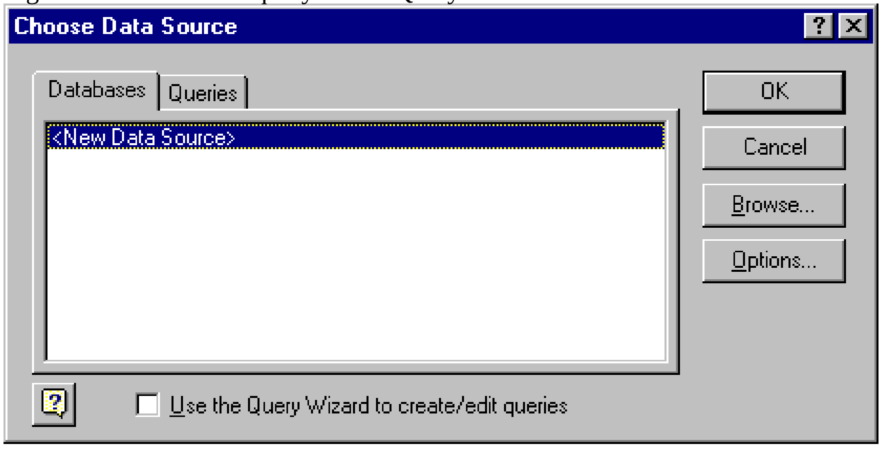
- Open a blank worksheet in Excel.
- Select Data, then select the Get External Data option.
- Select Create New Query.

Figure 1.1. Create new query in MS Query



- Double-click New Data Source.

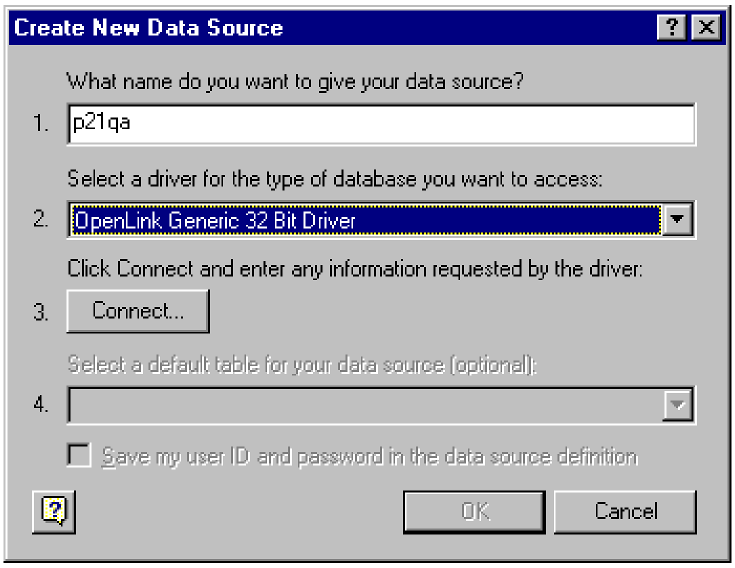
Figure 1.2. Create new query in MS Query



Make sure that you have not checked the Use Query Wizard option.

- Enter a name for the Data Source.
- Set the driver type to the OpenLink Lite Driver for the database you wish to access.
- Click Connect.

Figure 1.3. Creating a new query using MS Query


Create New Data Source

What name do you want to give your data source?

1. p21qa

Select a driver for the type of database you want to access:

2. OpenLink Generic 32 Bit Driver

Click Connect and enter any information requested by the driver:

3. Connect...

Select a default table for your data source (optional):

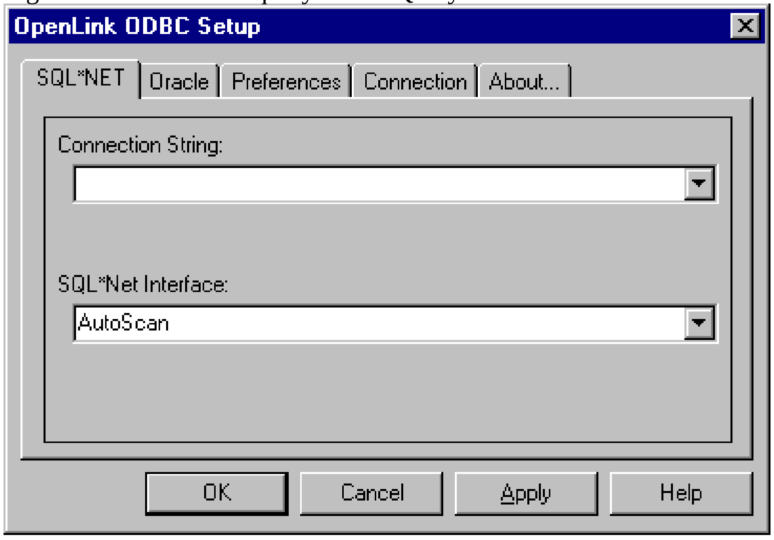
4.

Save my user ID and password in the data source definition

OK Cancel

- The system takes you to the Setup Dialog for the OpenLink Lite driver you are using. The example shown is the setup dialogue for OpenLink Lite for Oracle. For details on filling in the setup dialogue for the driver you are using refer to the User Guide installed with the driver.

Figure 1.4. Create new query in MS Query


OpenLink ODBC Setup

SQL*NET | Oracle | Preferences | Connection | About...

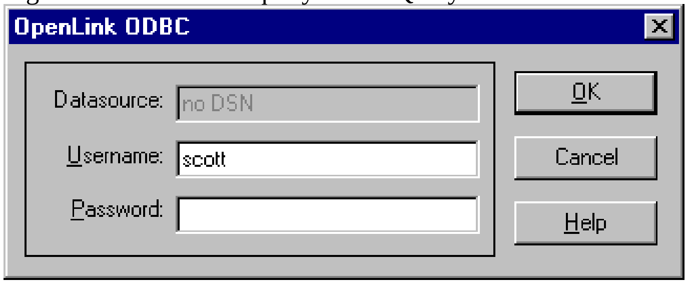
Connection String:

SQL*Net Interface: AutoScan

OK Cancel Apply Help

- When you are satisfied you have correctly filled in the setup dialog click OK. The OpenLink login dialog is then displayed.

Figure 1.5. Create new query in MS Query


OpenLink ODBC

Datasource: no DSN

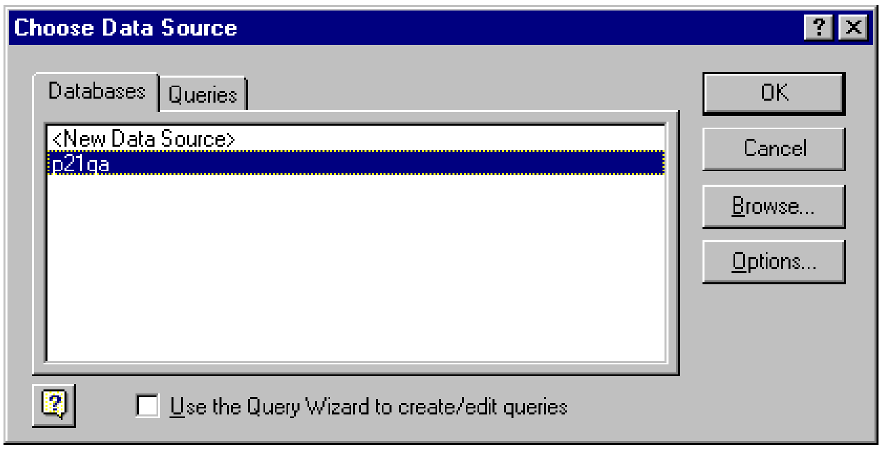
Username: scott

Password:

OK Cancel Help

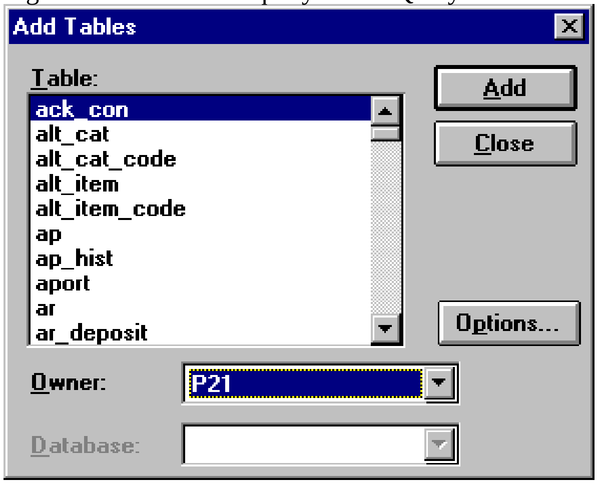
- Enter a valid username and password.
- Click OK. The system takes you back to the Creating a Data Source screen.
- Click OK. This saves the data source you just created.

Figure 1.6. Create new query in MS Query



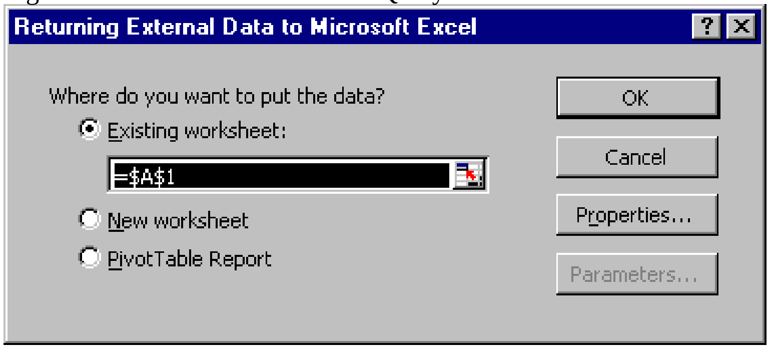
- Double-click the data source you just created. This will take you to the database tables.

Figure 1.7. Create new query in MS Query



- Scroll down the table list and highlight the table containing the data you require. Click Add.
- Click Close to close the Add Tables dialog box. The MS Query screen displays.
- Scroll to the field you want. Highlight this field and double-click.
- Click File on the MS Query menu bar. Select the Return Data to Microsoft Excel option.
- Confirm the destination area. Click OK.

Figure 1.8. Click on file in the MS Query menu bar



- The system takes you back to the OpenLink ODBC Login screen. Supply your username and password. Click OK.
- Your data is now in your Excel spreadsheet.

3.3 Finding Further Information About ODBC & Utilities

The Microsoft Data Access SDK is the primary source of information, instruction and utilities on using data access technologies such as ODBC. Its tools, samples, and documentation are designed to help developers create solutions for their data access needs. For the latest news and updates about the data access technologies, go to the Microsoft Data Access Web site http://www.microsoft.com/data/

The MSDASDK contains a complete programmers reference guide to ODBC as well as other data access technologies.

An online version is available at the MSDN site http://msdn.microsoft.com/

Direct API testing applications are also available in the MSDASDK.

4 Chapter 2. New Features in OpenLink UDA

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4.1 New Features in OpenLink UDA v6.0

The following are new features in the Universal Data Access Suite version 6.0:

1. Oracle:

   Real Application Cluster (RAC) Support

   Oracle Native Connection-Pooling

   Direct Connectivity to Oracle without Net8|9|10 or SQL*Net (Single Tier Drivers)
2. Ingres / OpenIngres:

   Ingres Native ADO.Net Provider
3. Generic, cross-database features:

   a. Distributed Transaction Support
   b. PAM, LDAP & Active Directory support
   c. Support for XML Types

4.2 New Features in OpenLink UDA v5.2

The following are new features of the Universal Data Access Suite version 5.2:

6 4-bit ODBC Drivers for Windows, Linux, FreeBSD, Solaris, AIX, HP-UX, Tru64 Linux, IRIX across Itanium, Opteron, PA-RISC, IBM Risc, and PowerPC processors

Addition of S SL support to the existing data encryption functionality in our Multi-Tier Drivers

New ADO.NET managed providers for all supported databases

New ODBC.NET provider that facilitates compatability between ADO.NET clients and third-party ODBC Drivers

Enhanced ODBC-JDBC Bridge Driver that provides JDBC connectivity to any ODBC or ADO.NET client application

JDBC-to-ODBC Bridge Driver that provides ODBC connectivity to Java Application

A compatibility layer for Microsoft InfoPath that provides connectivity to non SQL Server and ACCESS databases via ODBC

JDBC 3.0-compliant Drivers for version 1.5 of the Java Virtual Machine and SDK

5 Chapter 3. OpenLink ODBC Driver (Single-Tier Edition) System Requirements and Basic Instructions

Abstract
System requirements and basic installation instructions for OpenLink Single-Tier Drivers for ODBC.

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5.1 Installing OpenLink Single-Tier Drivers for ODBC

There are five basic steps to install the product:

1. Satisfy all prerequisites as listed in System Requirements section of this chapter.
2. Download the desired OpenLink Single-Tier Driver for ODBC from OpenLink's web site - details are in the Downloading OpenLink Lite ODBC Drivers section of this chapter.
3. Save the license file that was emailed to you.
4. Install OpenLink Single-Tier Driver for ODBC on your ODBC Application Host - details are in Installation Guide chapter of this manual.
5. Configure the OpenLink Single-Tier Driver for ODBC - details are in Data Source Configuration Guide chapter of this manual.
6. To extend your trial, purchase a permanent license through the OpenLink Web site. Details are in Downloading OpenLink Lite ODBC DriversChapter 6 of this manual.

5.2 System Requirements

5.2.1 Software Requirements

You must have the following software to use OpenLink Single-Tier Drivers for ODBC:

- One or more ODBC compliant application(s).
- A supported database server.
- The client networking software provided by the database vendor, installed on each client ODBC Application Host. This is not necessary to use the OpenLink Single-Tier Drivers for SQL Server, MySQL, PostgreSQL, or Virtuoso.
- The OpenLink Lite ODBC Driver corresponding to the database client networking version and/or database server, also installed on each client ODBC Application Host.
- A valid license file for each required OpenLink Driver.

5.2.2 Hardware Requirements

You must have the following hardware to use OpenLink Single-Tier Drivers for ODBC:

- A TCP/IP network connection to the database server, with a working connection using the client networking components, if present.
- An ODBC Application Host running an operating system that is supported by OpenLink Lite ODBC Drivers. Currently this is Mac OS X 10.1.2 or later, Windows 95/98/ME/NT/2000/XP, Linux & Unix of the major brands. Check the OpenLink website http://www.openlinksw.com to verify availability of support for an operating system.

The ODBC client applications you want to use may have their own hardware or software requirements, which must also be satisfied. For example, Microsoft Office may require a minimum of 64Mb of RAM.

5.3 Downloading OpenLink Single-Tier Drivers for ODBC

If you intend to use the OpenLink Lite ODBC Drivers with Microsoft Office 97, this will require the use of an older release of the OpenLink Driver which is compatible, but no longer available for general download. Please contact technical support(technical.support@openlinksw.com) for details on how to obtain these drivers.

Using your Internet browser, access the OpenLink Software web site nearest you. The web address is:

North and South America: http://www.openlinksw.com

Europe, Africa: http://www.openlinksw.co.uk

Asia, Australia: http://www.openlinksw.com.my

1. From the OpenLink homepage, click the "Software Availability and Download" link in the left-hand menu.
2. Click the Data Access Download button.
3. If this is your first download from OpenLink, or you are not certain which product you need, please select the first button, for Wizard-based product selection. If you are sure you know exactly what you need, select the second button, for direct product selection.

   The remainder of these instructions will focus on Wizard-based selection. Depending on your responses, you may receive fewer or more questions in your own visit.
4. Answer the three initial questions:

   a. Indicate which type of connectivity you require, if you know.

   b. Select the Operating System(s) on which your ODBC and/or JDBC Client Application(s) will run. You may select as many as apply.

   c. Select the database which holds the data.
5. Indicate the data access technologies with which you have experience or familiarity, if any.
6. Indicate any other data access drivers which you have evaluated or will be evaluating for this installation.
7. Input your email address. If you have registered as an OpenLink user before, input your password. If not, proceed to the Registration Form.
8. Select download links from those presented. If your browser is not set up with a default download location, you may be prompted to choose where to save the file(s). Pay careful attention to the instructions on this screen, as some installations may require several files, on one or more machines.
9. Once the download is complete, you may exit your web browser.
10. Save the license file that is automatically emailed to you. It will be needed during the install.

6 Chapter 4. OpenLink ODBC Driver (Single-Tier Edition) Installation

Abstract
A run-through guide to installing the OpenLink Single-Tier Drivers for ODBC.

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6.1 OpenLink License Manager Usage Notes

6.1.1 Background

As of UDA release 6.0 and above, OpenLink have moved the handling of licenses from individual products into a specific License Manager process. This takes the form of an executable, (`oplmgr'), from which all OpenLink commercial products request licenses via network connections.

6.1.2 Single-Tier

OpenLink UDA Single-Tier is a single driver installed on the client only.

For releases 6.0, the oplmgr process was started automatically by the driver on first connection. As of release 6.1, this behaviour has changed; in order to facilitate use of License Manager process for administering licenses of all OpenLink products simultaneously on the same machine, the license-manager must be started explicitly started in advance of services that will use it. The release 6.1 installers now check if a License Manager (oplmgr) process is already running and if not start their own local instance.

6.1.3 Multi-Tier

OpenLink UDA Multi-Tier drivers comprise at least 3 components: a generic client installed on client machines, all of which contact a central request broker which spawns an RDBMS-specific database agent to connect to the specific database requested. The request-broker asks the license-manager for licenses for every connection requested.

For UDA release 6.0, the oplmgr process was started automatically by the request-broker (oplrqb). As of release 6.1, this behaviour has changed. In order that you should only need one license-manager per server, handling licenses for a variety of products (particularly combinations of Multi-Tier and OpenLink Virtuoso Universal Server), the license-manager must now be explicitly started before other services requiring it. The release 6.1 installers now check if a License Manager (oplmgr) process is already running and if not start their own local instance.

6.1.4 How to stop/start the OpenLink License Manager

The license manager takes the following commandline options:

```
      bash$ oplmgr --help
      OpenLink License Manager
      Version 1.2.2 as of Thu Feb 15 2007 (Release 6.0 cvsid 00084).
      Compiled for Linux 2.4.20-46.9.legacysmp
(i686-generic-linux-glibc23-32)
      Copyright (C) OpenLink Software.
      Usage:
      oplmgr [-shrutp] [+start] [+stop] [+reload] [+user arg] [+chroot arg]
      [+pidfile arg]
      +start     start the license manager
      +stop      stop the license manager
      +reload    force a configuration reload
      +user      run as the specified user
      +chroot    perform a chroot to the specified directory
      +pidfile   pid file to use for server operation
```

We recommend that you create an /etc/init.d/ script that runs `oplmgr +start' on boot-up.

6.1.5 Environment Variables

The OpenLink License Manager will search through directories in the OPL_LICENSE_DIR variable or failing that, the PATH environment variable, for files matching *.lic.

OpenLink recommends you use /etc/oplmgr/ to store your licenses; each product installation will include a copy of the oplmgr executable in its respective 'bin' directory, such that if this is the only OpenLink product on the system, it can be manually started and used for processing licenses with an appropriate OPL_LICENSE_DIR value. A generic system startup script is also being developed for Unix systems to enable the License Manager process to be automatically started on machine boot. If found, product installers will automatically append this to your OPL_LICENSE_DIR variable.

6.1.6 OpenLink License Manager Networking Considerations

The OpenLink License Manager sends and receives using the multicast IP address 224.0.0.24 on port 60001/udp to communicate between components and other license-managers that might be on your network. In the event that it cannot establish this multicast communication, it may cease allocating licenses, so in the event of license allocation-related errors, please check your firewall configuration permits this traffic.

6.2 Windows (32-bit)

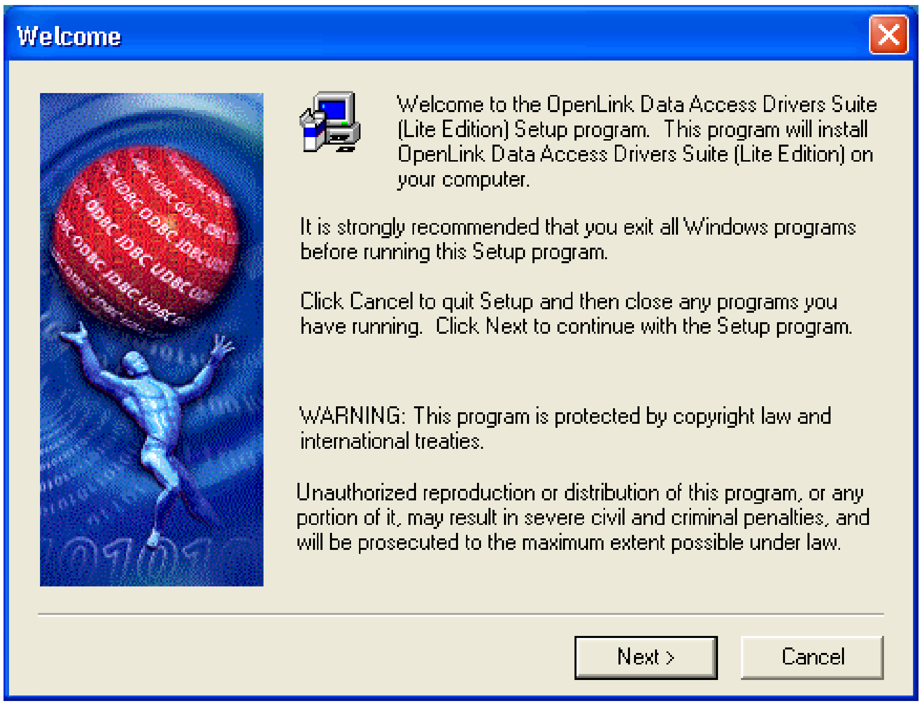
The OpenLink Single-Tier Driver for ODBC is distributed in a single zip file. Unzip the contents of the zip file to a temporary directory such as c:\temp\openlink_install.

Execute the installer program called setup.exe

Figure 4.1. setup.exe

The installer will unpack and verify the contents of the installer files, and display a 'Welcome' message as follows. Press the 'Next >' button to continue.

Figure 4.2. Welcome Screen



Welcome to the OpenLink Data Access Drivers Suite (Lite Edition) Setup program. This program will install OpenLink Data Access Drivers Suite (Lite Edition) on your computer.

It is strongly recommended that you exit all Windows programs before running this Setup program.

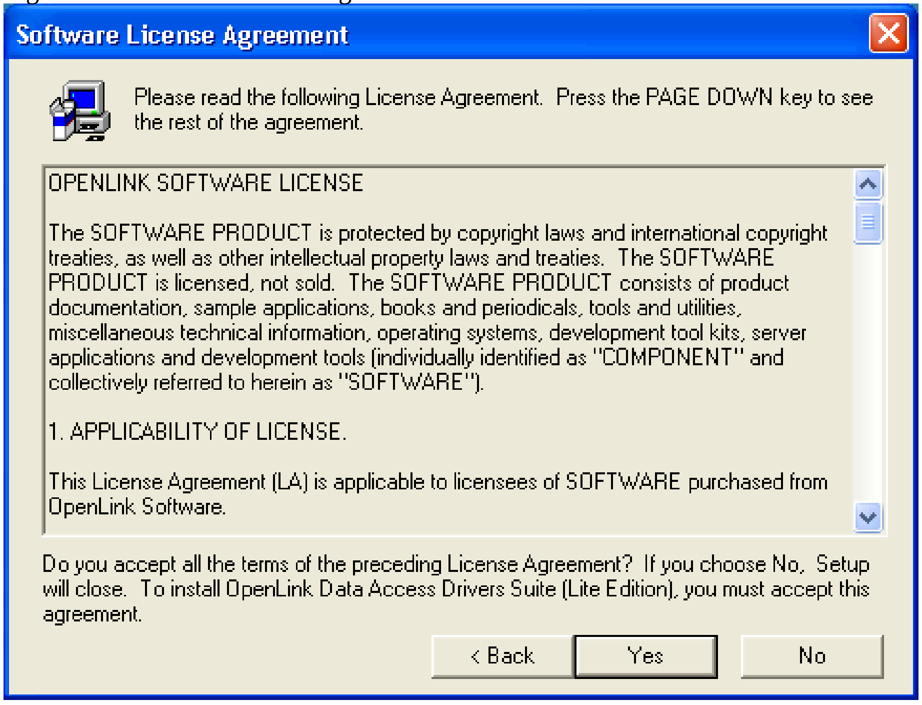
Click Cancel to quit Setup and then close any programs you have running. Click Next to continue with the Setup program.

WARNING: This program is protected by copyright law and international treaties.

Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under law.

The next screen will display the License Agreement for installation and use of the OpenLink Lite Driver product. Please read this. If you agree, then press the 'Yes' button to continue the installation.

Figure 4.3. Software License Agreement



Please read the following License Agreement. Press the PAGE DOWN key to see the rest of the agreement.

OPENLINK SOFTWARE LICENSE

The SOFTWARE PRODUCT is protected by copyright laws and international copyright treaties, as well as other intellectual property laws and treaties. The SOFTWARE PRODUCT is licensed, not sold. The SOFTWARE PRODUCT consists of product documentation, sample applications, books and periodicals, tools and utilities, miscellaneous technical information, operating systems, development tool kits, server applications and development tools (individually identified as "COMPONENT" and collectively referred to herein as "SOFTWARE").

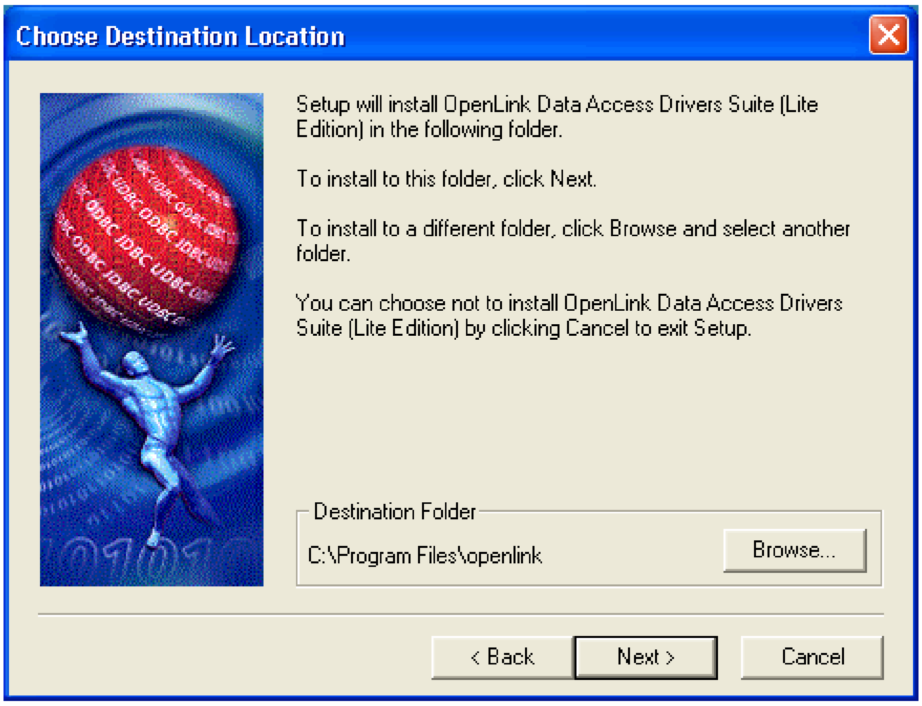
1. APPLICABILITY OF LICENSE.

This License Agreement (LA) is applicable to licensees of SOFTWARE purchased from OpenLink Software.

Do you accept all the terms of the preceding License Agreement? If you choose No, Setup will close. To install OpenLink Data Access Drivers Suite (Lite Edition), you must accept this agreement.

You will then be asked change the Destination Folder if the default location is not desired. Use the 'Browse' button and proceeding pop-up to navigate to the installation directory of your choosing. Press the 'Next>' button to continue.

Figure 4.4. Choose Destination



Choose Destination Location

Setup will install OpenLink Data Access Drivers Suite (Lite Edition) in the following folder.

To install to this folder, click Next.

To install to a different folder, click Browse and select another folder.

You can choose not to install OpenLink Data Access Drivers Suite (Lite Edition) by clicking Cancel to exit Setup.

Destination Folder

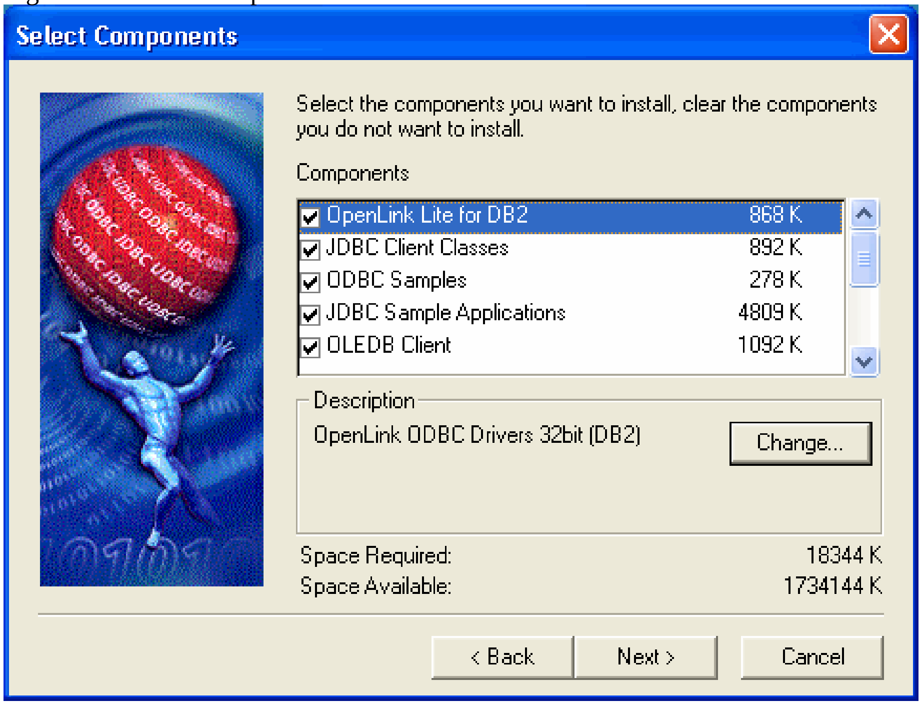
C:\Program Files\openlink

The next screen allows you to choose the components and alter the sub-components that will be installed onto your computer.

By default all components will be installed. If you wish to alter the list either uncheck the check box or refine the sub-components by selecting the group and pressing the 'Change' which will take to you the sub-components selection screens (listed below).

When you are satisfied that you are installing the necessary components press the 'Next >' button to continue the installation.

Figure 4.5. Select Components



Select Components

Select the components you want to install, clear the components you do not want to install.

Components

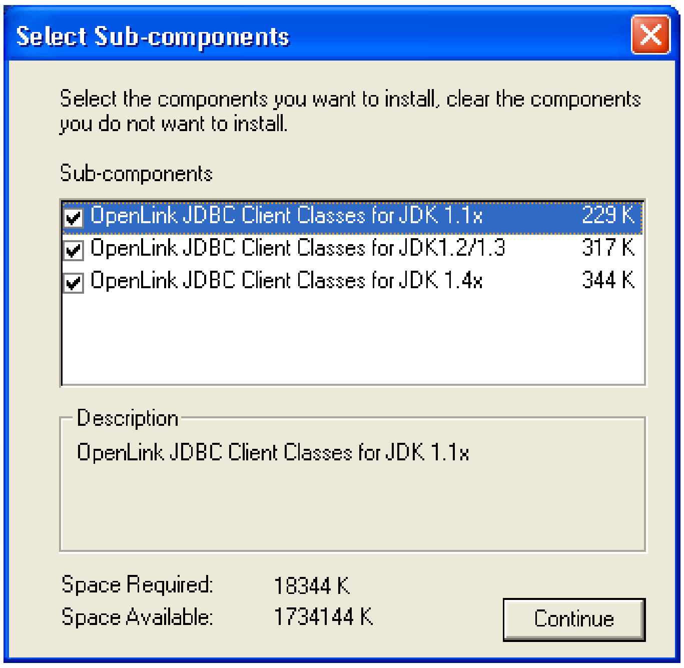
✓ OpenLink Lite for DB2	868 K
✓ JDBC Client Classes	892 K
✓ ODBC Samples	278 K
✓ JDBC Sample Applications	4809 K
✓ OLEDB Client	1092 K

Description

OpenLink ODBC Drivers 32bit (DB2)

Space Required: 18344 K
Space Available: 1734144 K

Figure 4.6. Configurable JDBC Client Classes Sub-Components



Select Sub-components

Select the components you want to install, clear the components you do not want to install.

Sub-components

☑ OpenLink JDBC Client Classes for JDK 1.1x	229 K
☑ OpenLink JDBC Client Classes for JDK1.2/1.3	317 K
☑ OpenLink JDBC Client Classes for JDK 1.4x	344 K

Description

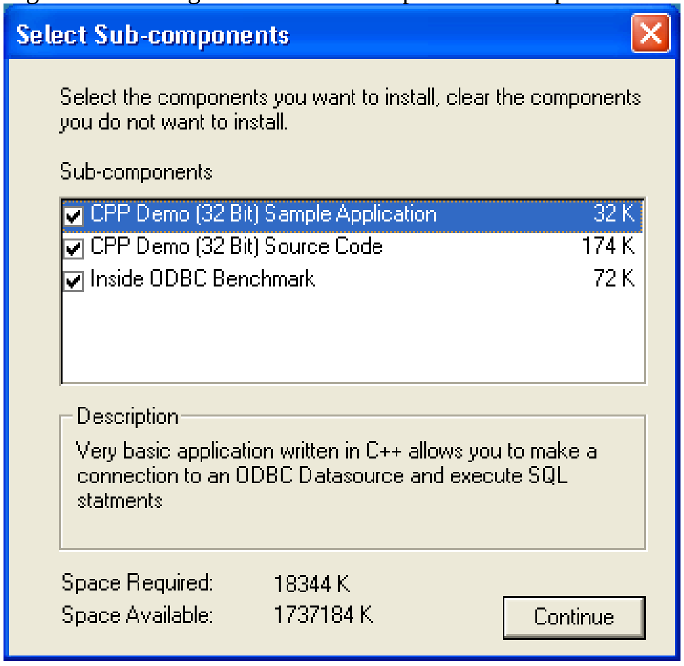
OpenLink JDBC Client Classes for JDK 1.1x

Space Required: 18344 K

Space Available: 1734144 K

Continue

Figure 4.7. Configurable ODBC Samples Sub-Components



Select Sub-components

Select the components you want to install, clear the components you do not want to install.

Sub-components

☑ CPP Demo (32 Bit) Sample Application	32 K
☑ CPP Demo (32 Bit) Source Code	174 K
☑ Inside ODBC Benchmark	72 K

Description

Very basic application written in C++ allows you to make a connection to an ODBC Datasource and execute SQL statments

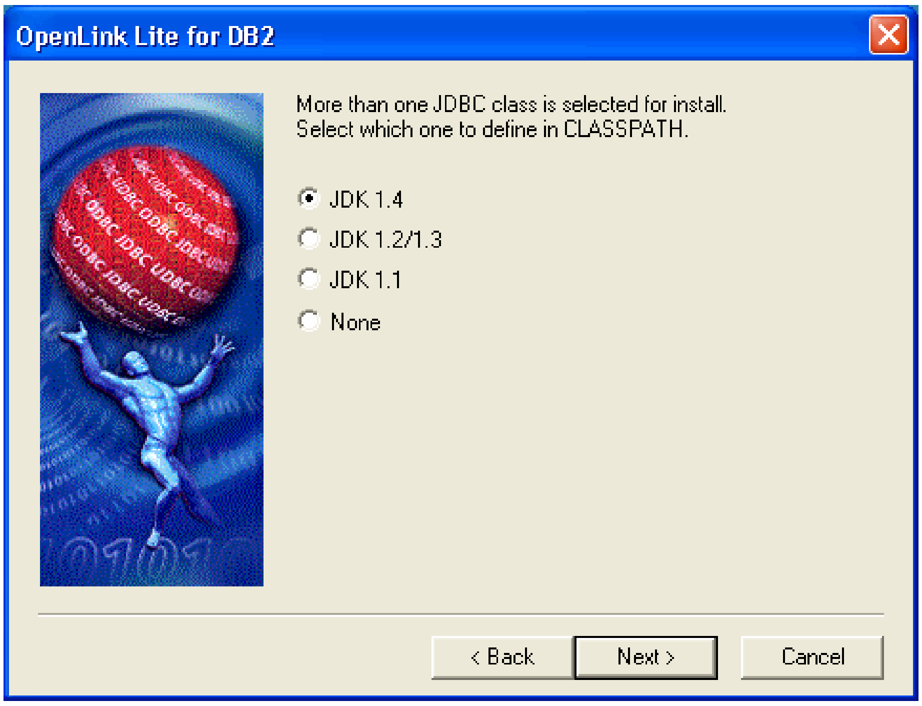
Space Required: 18344 K

Space Available: 1737184 K

Continue

If JDBC Components have been selected, then you must choose which JDK environment to use. The installer will then make changes to the CLASSPATH so that the Java interpreter can find the OpenLink JDBC Driver.

Figure 4.8. Choose JDK support



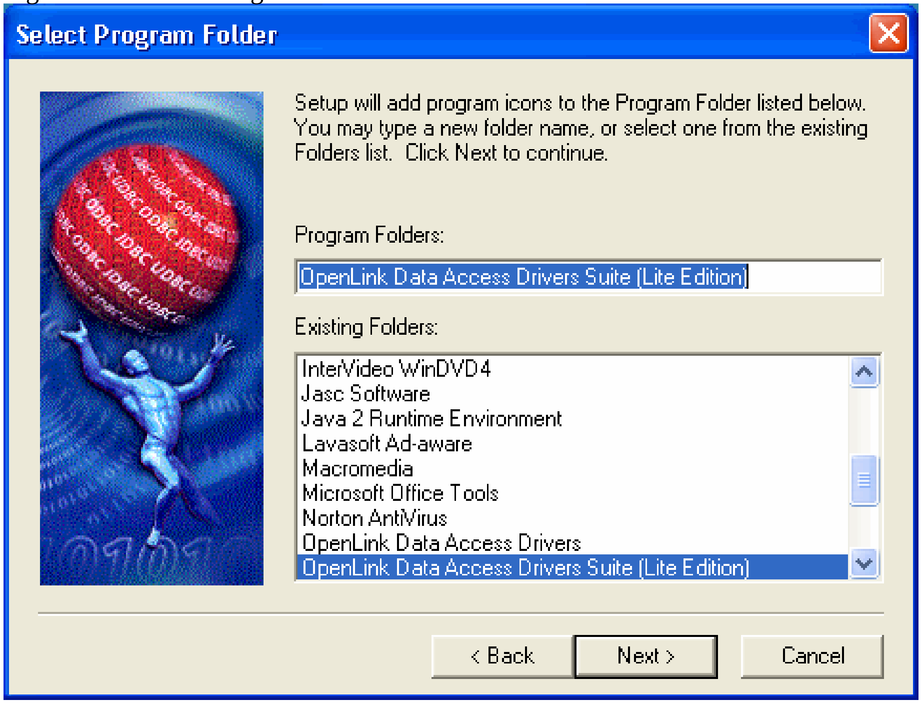
OpenLink Lite for DB2

More than one JDBC class is selected for install.
Select which one to define in CLASSPATH.

- [✓ JDK 1.4]
- JDK 1.2/1.3
- JDK 1.1
- None

Change or accept the default name for the Program Folder name to be used in the 'Start' menu into which the installer will place shortcuts to components.

Figure 4.9. Choose Program Folder



Select Program Folder

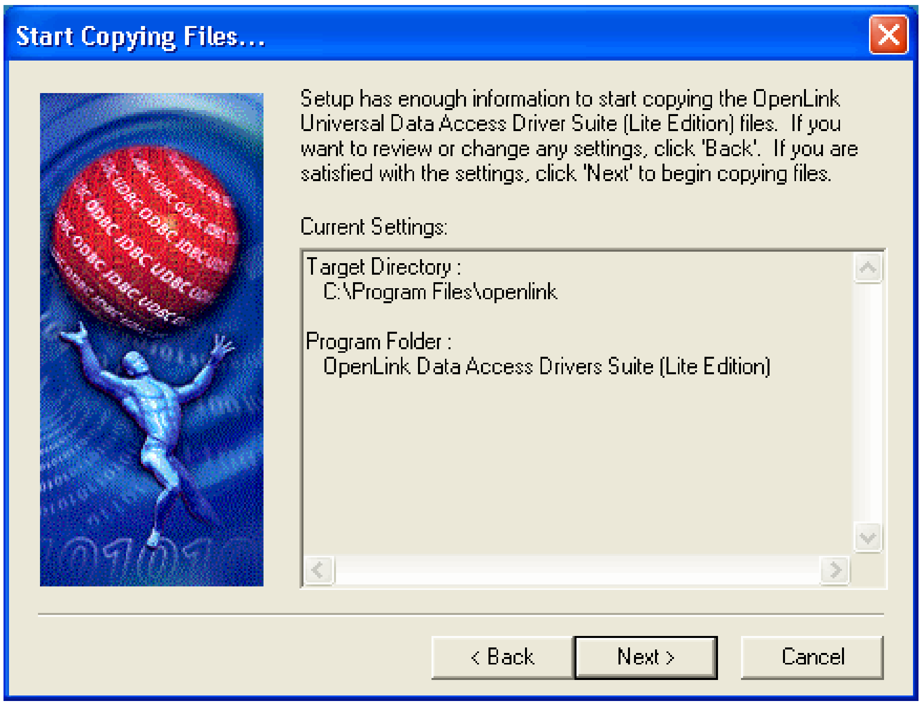
Setup will add program icons to the Program Folder listed below. You may type a new folder name, or select one from the existing Folders list. Click Next to continue.

Program Folders:
OpenLink Data Access Drivers Suite (Lite Edition)

Existing Folders:
InterVideo WinDVD4
Jasc Software
Java 2 Runtime Environment
Lavasoft Ad-aware
Macromedia
Microsoft Office Tools
Norton AntiVirus
OpenLink Data Access Drivers
OpenLink Data Access Drivers Suite (Lite Edition)

The final confirmation screen will appear. Press the '< Back' button to make changes or press the 'Next >' button to continue and start installing files to your computer.

Figure 4.10. Start copying files...



Setup has enough information to start copying the OpenLink Universal Data Access Driver Suite (Lite Edition) files. If you want to review or change any settings, click 'Back'. If you are satisfied with the settings, click 'Next' to begin copying files.

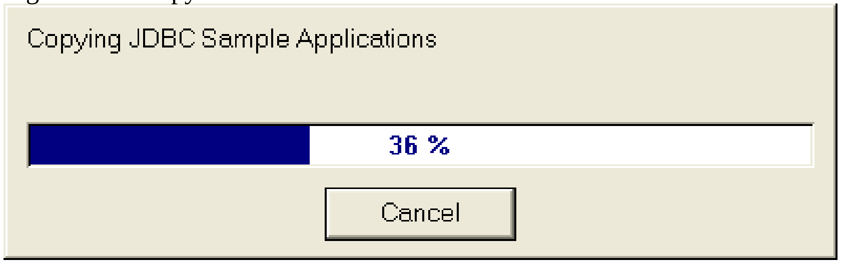
Current Settings:

Target Directory :
C:\Program Files\openlink

Program Folder :
OpenLink Data Access Drivers Suite (Lite Edition)

A progress indicator will follow the copying of the files.

Figure 4.11. Copy of files

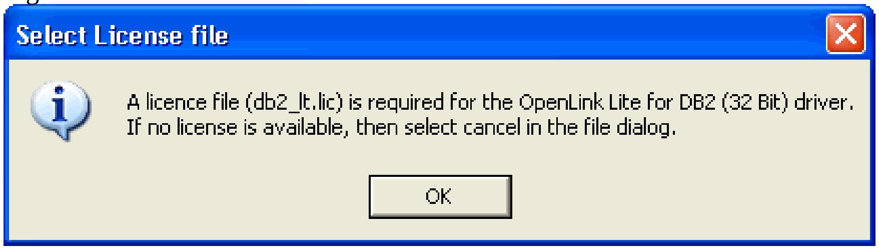


Copying JDBC Sample Applications

36 %

If a license file is not located in the required directory, you will be prompted for the location so that it may be copied into place.

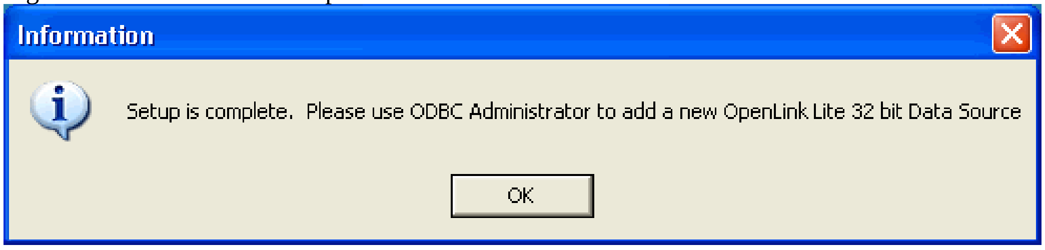
Figure 4.12. Get License



A licence file (db2_lt.lic) is required for the OpenLink Lite for DB2 (32 Bit) driver.
If no license is available, then select cancel in the file dialog.

You are reminded to use the ODBC Administrator to configure a data source. Refer to the Windows Data Source Configuration Chapter for more information.

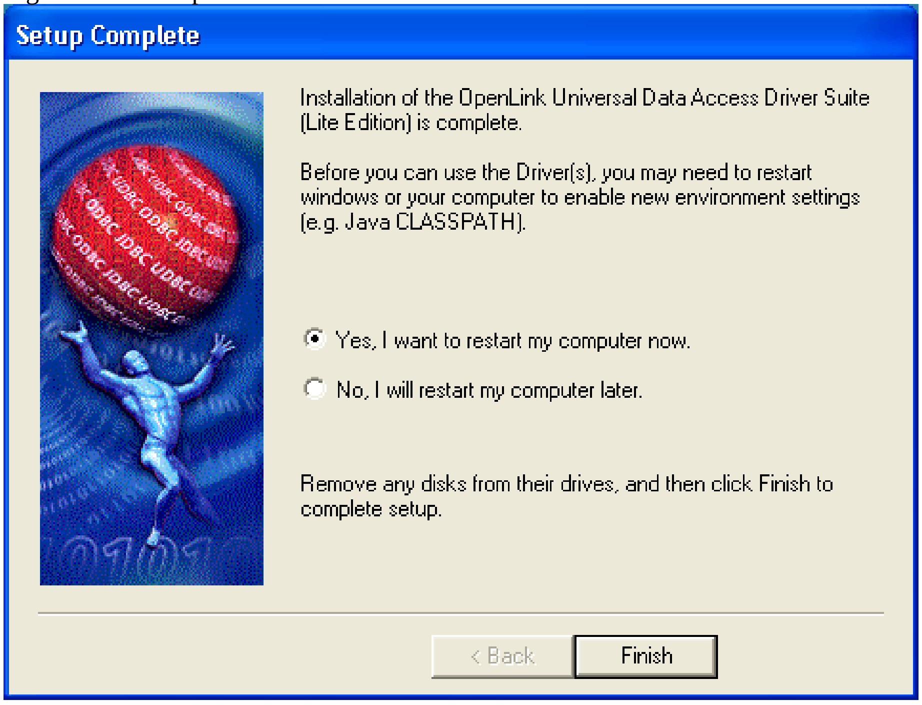
Figure 4.13. Data Source Setup



Setup is complete. Please use ODBC Administrator to add a new OpenLink Lite 32 bit Data Source

Finally you will be asked to restart your computer. This is recommended to make sure that locked files are replaced, and the environment is updated.

Figure 4.14. Completion Screen



Setup Complete

Installation of the OpenLink Universal Data Access Driver Suite (Lite Edition) is complete.

Before you can use the Driver(s), you may need to restart windows or your computer to enable new environment settings (e.g. Java CLASSPATH).

[✓ Yes, I want to restart my computer now.]

No, I will restart my computer later.

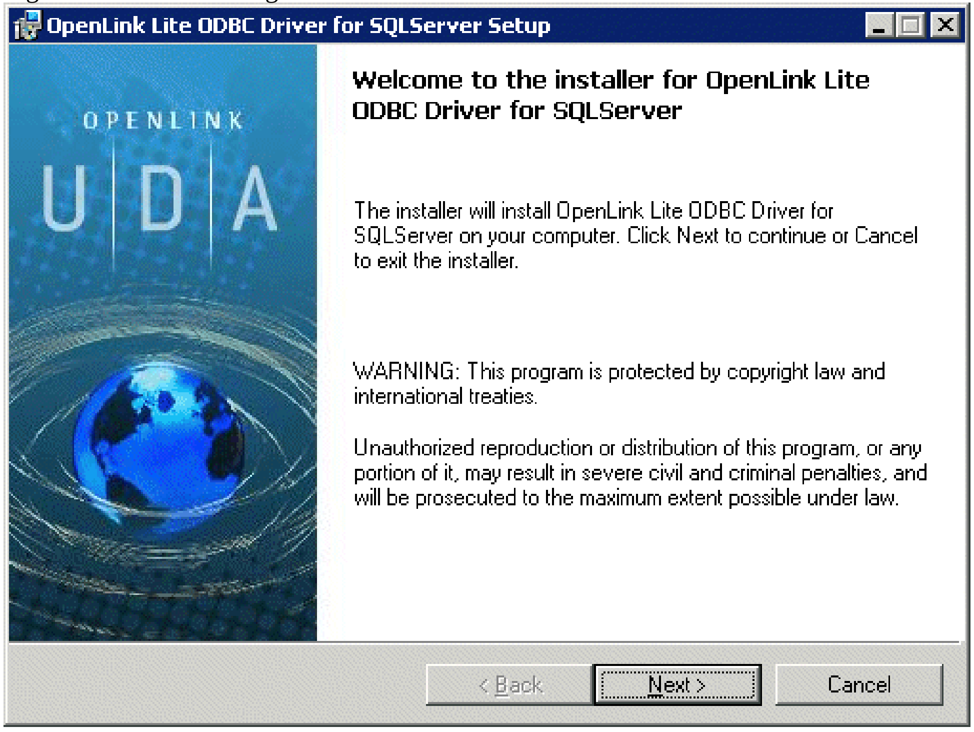
Remove any disks from their drives, and then click Finish to complete setup.

You have now successfully installed your copy of the OpenLink Universal Data Access Driver Suite (Lite Edition).

6.3 Windows (64-bit)

The OpenLink Single-Tier Driver for ODBC is distributed in a single windows msi file. Simply run the required installer wal5xxxx.msi or wil5xxxx.msi for Opteron (AMD64) and Itanium (IA64) respectively, which will display the following Welcome message:

Figure 4.15. win64inst1.gif



OpenLink Lite ODBC Driver for SQLServer Setup

Welcome to the installer for OpenLink Lite ODBC Driver for SQLServer

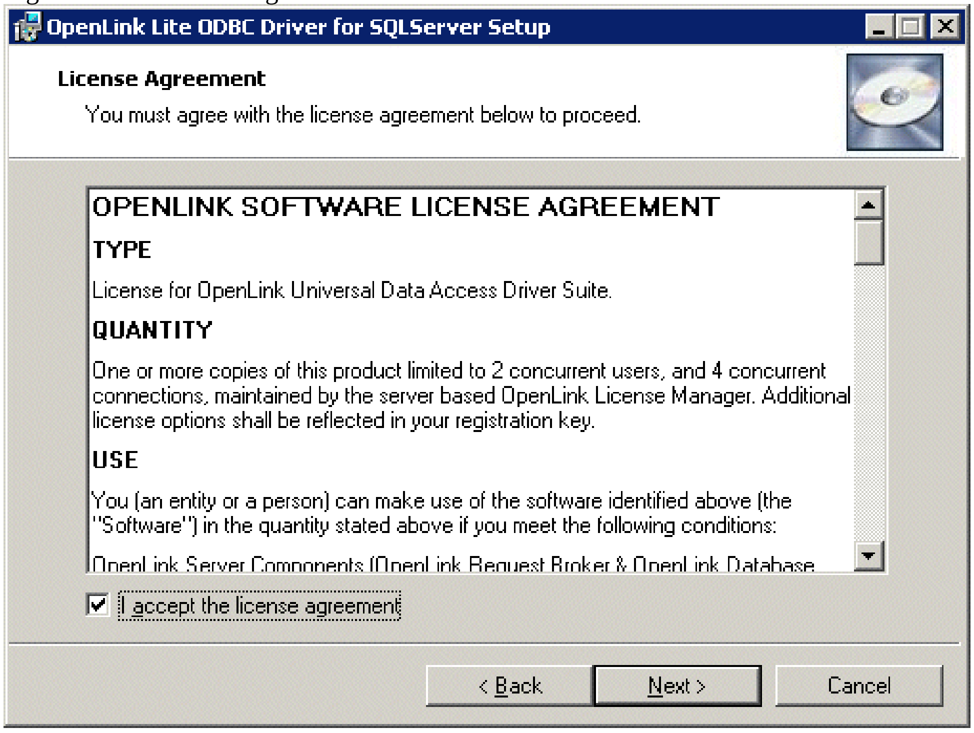
The installer will install OpenLink Lite ODBC Driver for SQLServer on your computer. Click Next to continue or Cancel to exit the installer.

WARNING: This program is protected by copyright law and international treaties.

Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under law.

The next screen will display the License Agreement for use with the OpenLink Lite Driver product. Please read this. If you agree, then select the accept checkbox and continue:

Figure 4.16. win64inst2.gif



OpenLink Lite ODBC Driver for SQLServer Setup

License Agreement

You must agree with the license agreement below to proceed.

OPENLINK SOFTWARE LICENSE AGREEMENT

TYPE

License for OpenLink Universal Data Access Driver Suite.

QUANTITY

One or more copies of this product limited to 2 concurrent users, and 4 concurrent connections, maintained by the server based OpenLink License Manager. Additional license options shall be reflected in your registration key.

USE

You (an entity or a person) can make use of the software identified above (the "Software") in the quantity stated above if you meet the following conditions:

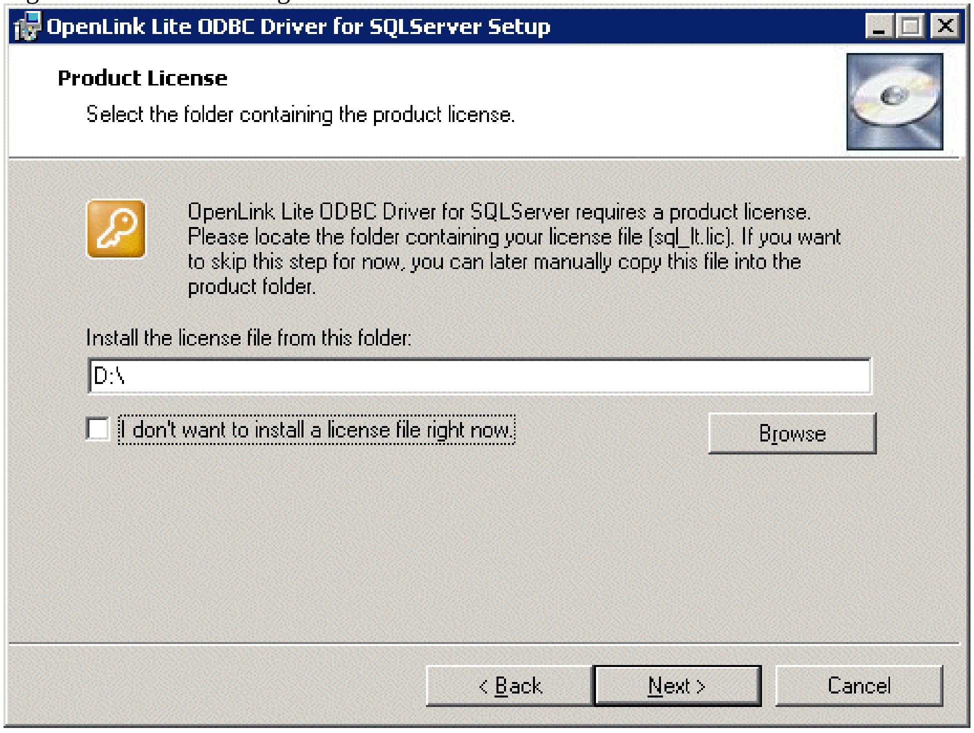
OpenLink Server Components (OpenLink Request Broker & OpenLink Database

[✓] I accept the license agreement

< Back | Next > | Cancel

The next screen will prompt you the location of the folder containing a valid license file for the required driver. Should the license file not be available at the time of installation then select the check box provided to by pass this stage and continue the installation:

Figure 4.17. win64inst2a.gif



OpenLink Lite ODBC Driver for SQLServer Setup

Product License

Select the folder containing the product license.

OpenLink Lite ODBC Driver for SQLServer requires a product license. Please locate the folder containing your license file (sql_lt.lic). If you want to skip this step for now, you can later manually copy this file into the product folder.

Install the license file from this folder:

D:\

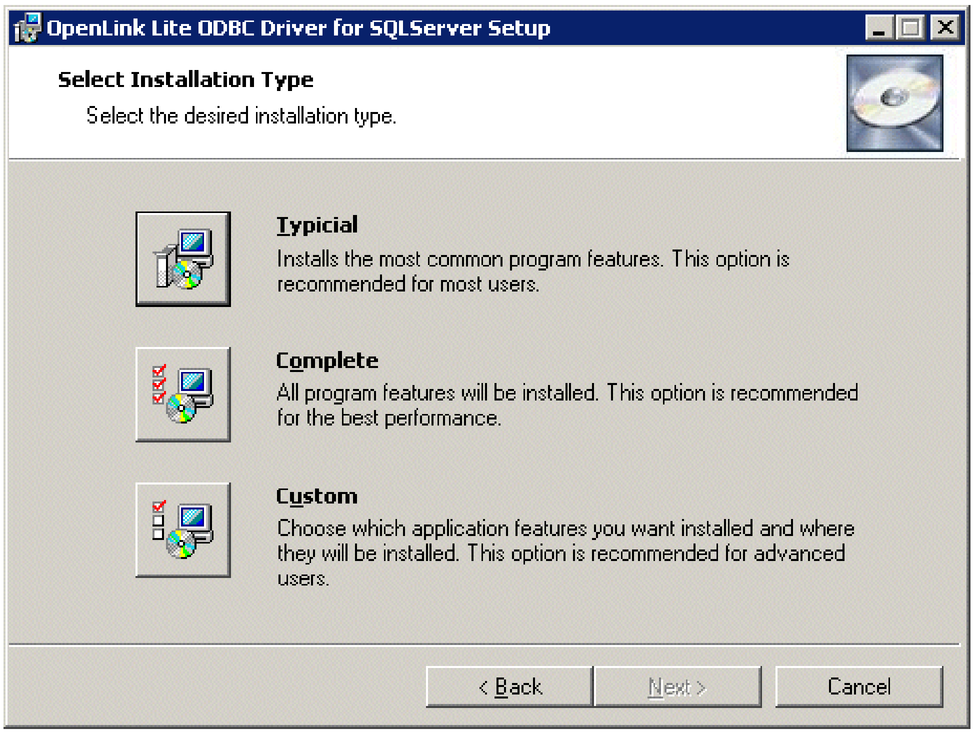
[ ] I don't want to install a license file right now.

Browse

< Back | Next > | Cancel

Chooses the type of installation to perform, noting that typical and complete will immediately install the default or complete components respectively, otherwise select the custom option which also the compenents to be installed to be chosen:

Figure 4.18. win64inst3.gif


OpenLink Lite ODBC Driver for SQLServer Setup

Select Installation Type

Select the desired installation type.

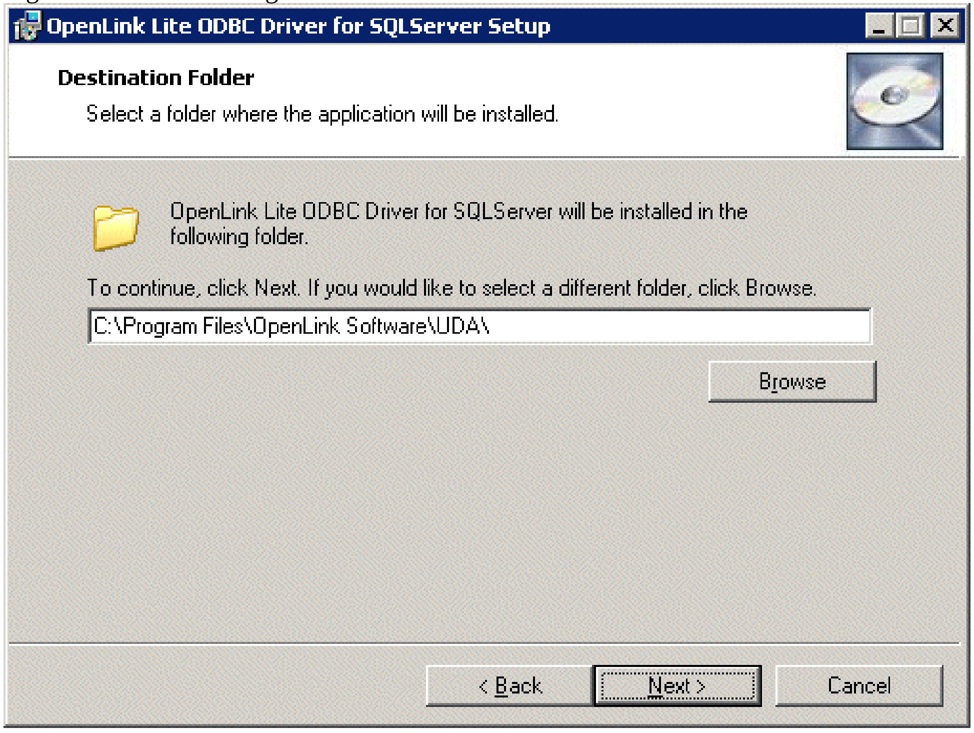
Typicial
Installs the most common program features. This option is recommended for most users.

Complete
All program features will be installed. This option is recommended for the best performance.

Custom
Choose which application features you want installed and where they will be installed. This option is recommended for advanced users.

Assuming you chosen the custom installation option you will then be promptied with the option to change the installation directory if required:

Figure 4.19. win64inst4.gif


OpenLink Lite ODBC Driver for SQLServer Setup

Destination Folder

Select a folder where the application will be installed.

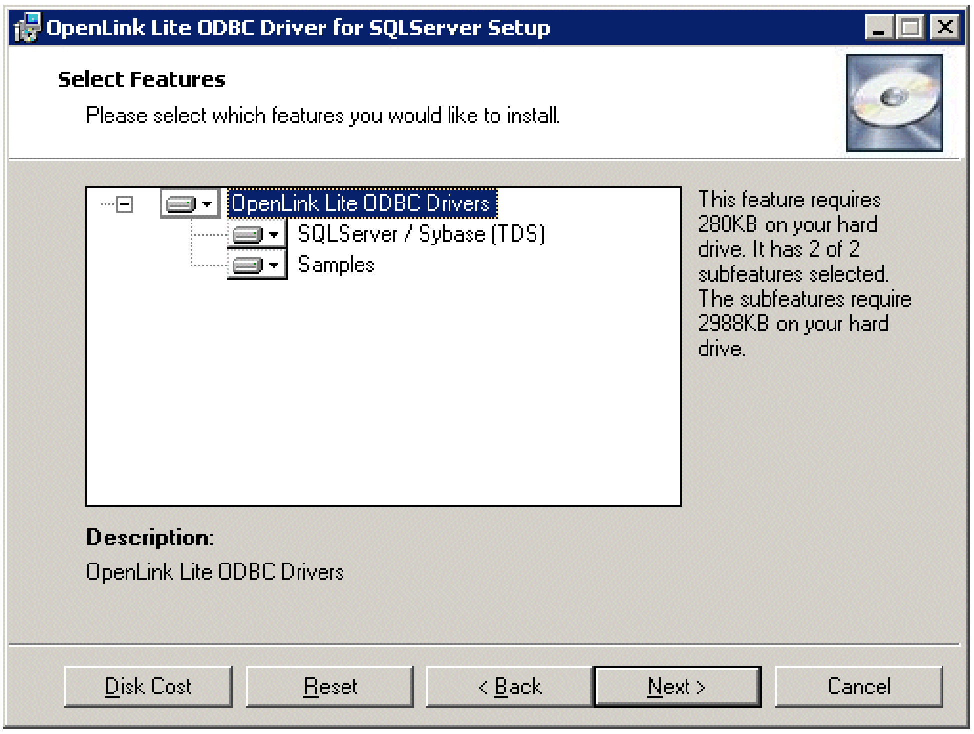
OpenLink Lite ODBC Driver for SQLServer will be installed in the following folder.

To continue, click Next. If you would like to select a different folder, click Browse.

C:\Program Files\OpenLink Software\UDA\

Next you have presented with the option to choose which components are to be installed:

Figure 4.20. win64inst5.gif



OpenLink Lite ODBC Driver for SQLServer Setup

Select Features

Please select which features you would like to install.

- OpenLink Lite ODBC Drivers
  - SQLServer / Sybase (TDS)
  - Samples

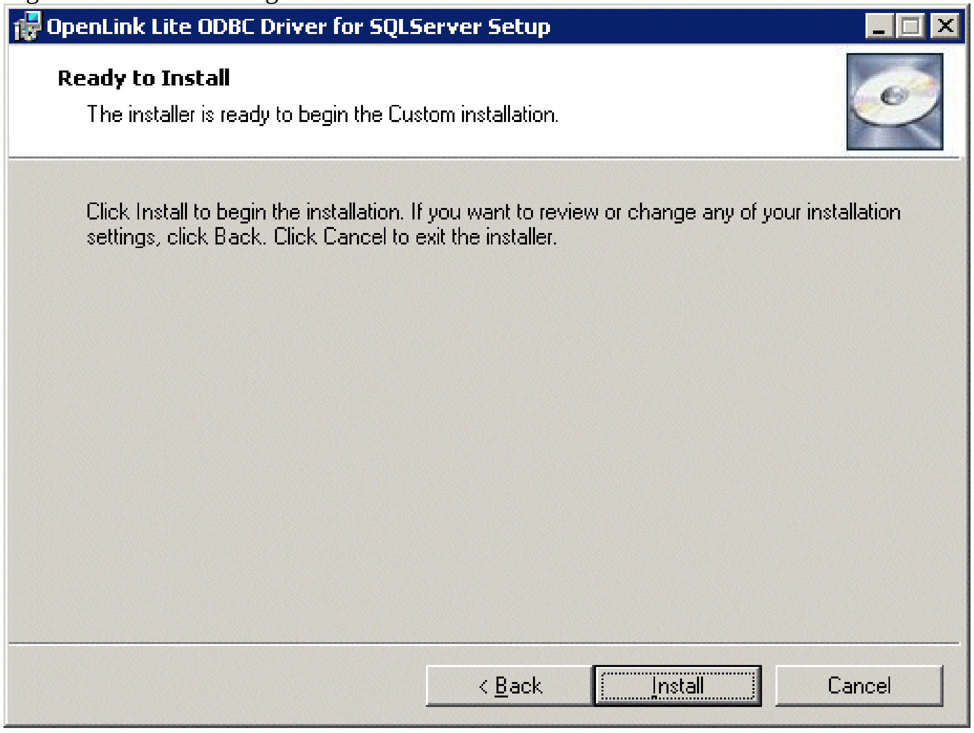
This feature requires 280KB on your hard drive. It has 2 of 2 subfeatures selected. The subfeatures require 2988KB on your hard drive.

Description:

OpenLink Lite ODBC Drivers

A final confirmation screen is displayed for review prior to performing the installation:

Figure 4.21. win64inst6.gif



OpenLink Lite ODBC Driver for SQLServer Setup

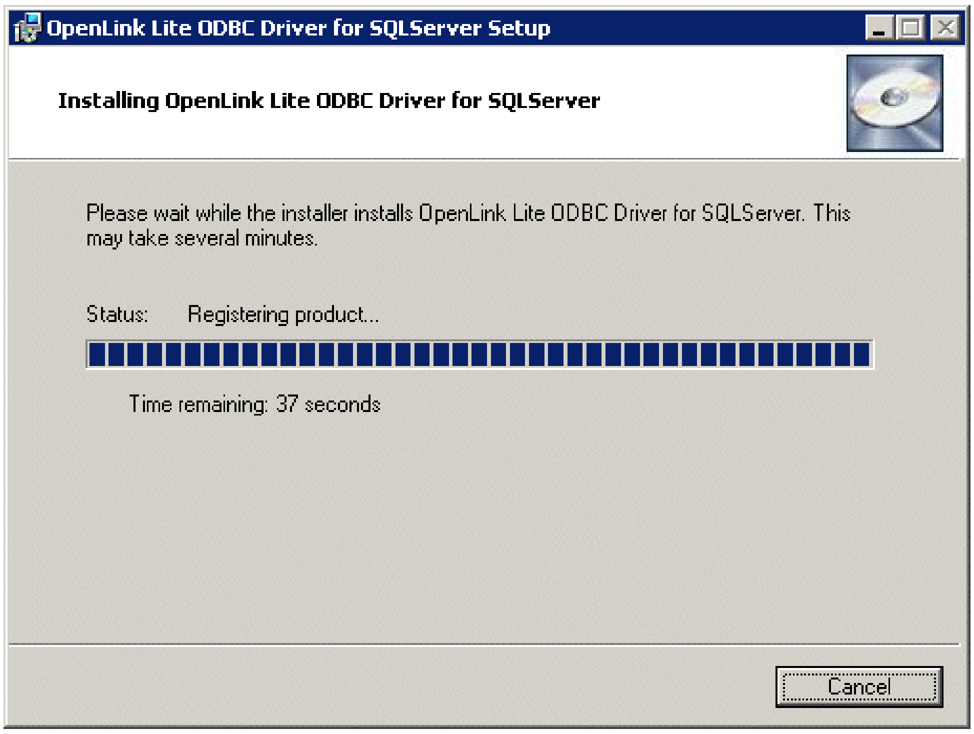
Ready to Install

The installer is ready to begin the Custom installation.

Click Install to begin the installation. If you want to review or change any of your installation settings, click Back. Click Cancel to exit the installer.

The installer status bar is then displayed indicating the progress and status of the the installation:

Figure 4.22. win64inst7.gif


OpenLink Lite ODBC Driver for SQLServer Setup

Installing OpenLink Lite ODBC Driver for SQLServer

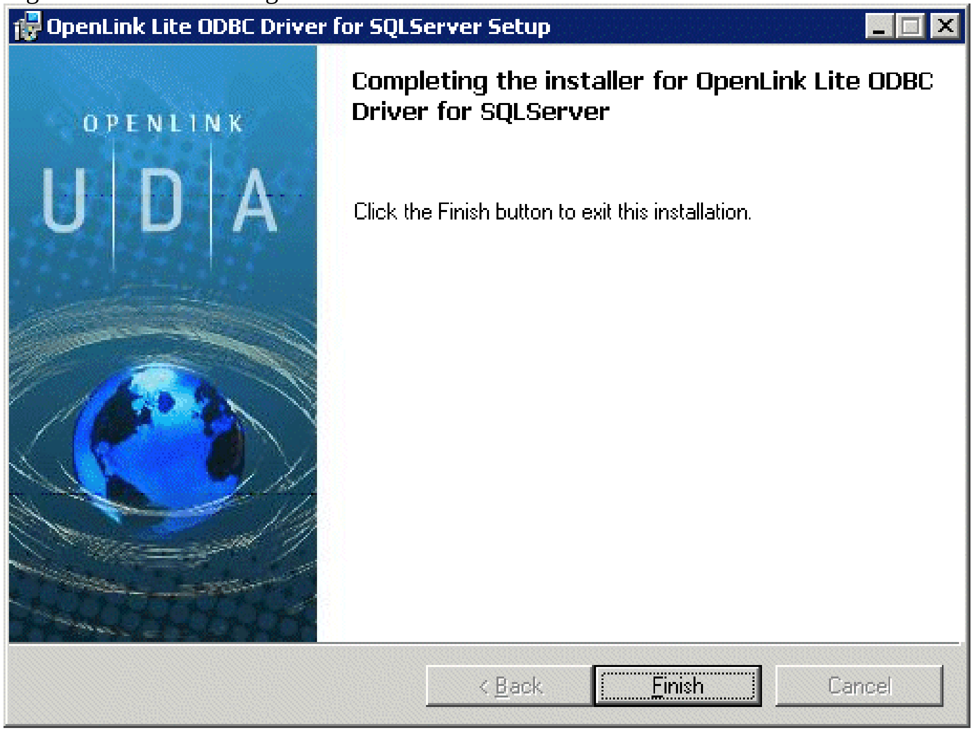
Please wait while the installer installs OpenLink Lite ODBC Driver for SQLServer. This may take several minutes.

Status: Registering product...

Time remaining: 37 seconds

If the installation is successful a final dialog with be displayed indicating this:

Figure 4.23. win64inst8.gif


OpenLink Lite ODBC Driver for SQLServer Setup

Completing the installer for OpenLink Lite ODBC Driver for SQLServer

Click the Finish button to exit this installation.

6.4 UNIX & Linux

The OpenLink Single-Tier Drivers for ODBC for Unix may be installed within an existing Multi-Tier installation, or in a separate environment.

If the Lite Drivers are installed within an (existing/new) Multi-Tier installation, then the Lite Drivers use the normal Admin Assistant which is started up as part of the broker. There are no special Admin Assistant pages just for Lite.

If the Lites are installed in their own directory, the HTTP-based iODBC Administrator package provides a standalone version of the Multi-Tier Admin Assistant with a shortened menu structure containing only the items relevant to Lite.

When installing the Lite packages, the install.sh script does the following:

1. Registers the driver to bin/odbcinst.ini
2. Creates a sample data source in bin/odbc.ini
3. If appropriate environment settings are found, e.g., INFORMIXDIR, they are added to the bin/openlink.ini file automatically.
4. If appropriate environment settings are found, e.g., INFORMIXDIR, lib directories are added to the LD_LIBRARY_PATH setting in openlink.sh. *Please note that your LD_LIBRARY_PATH must point to the location of any shared libraries required by the Database Vendors communication layer in order for the OpenLink Lite driver to load.*

Once the Lite driver is installed you can proceed to create data sources. You can either edit the configuration files by hand or use a web based interface to configure them. Refer to the Unix Data Source Configuration section for more information.

Example 4.1. Sample Installation
Here is an example run of the installer:

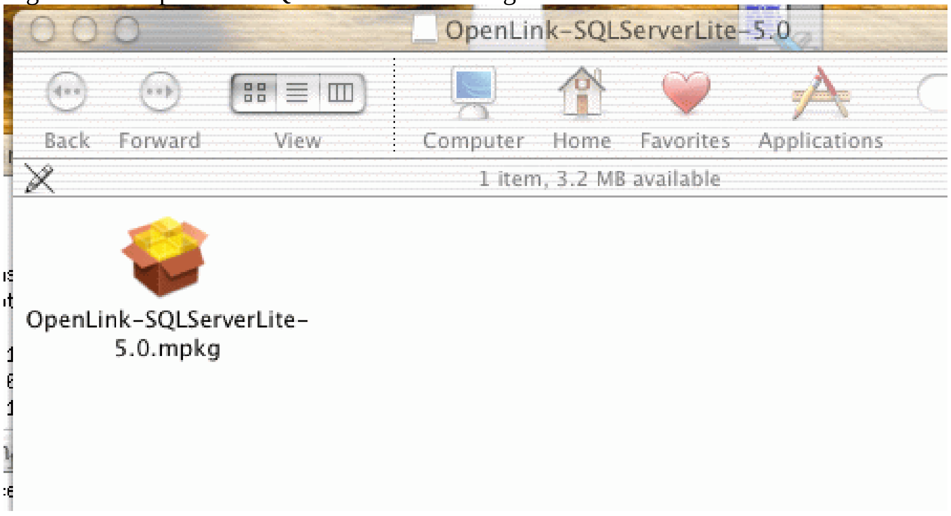
```
$ ls -l
total 318
-rwxr-xr-x    1 openlink openlink    31478 Nov 15 16:59 install.sh
-rw-rw-r--    1 openlink openlink   289089 Nov 15 16:59 sql_lt.taz
$ ./install.sh
Extracting (sql_lt.taz) ...
Adding OpenLink SQL Server Lite Driver to odbcinst.ini ...
Adding sql_lite to odbc.ini ...
Creating scripts ...
Enter the name of the user that will own the
programs [ENTER=Use Current User Settings]  :
Enter the name of the group that will own the
programs [ENTER=Use Current Group Settings] :
Changing ownership ...
End of installation
$ ls -lR
.:
total 323
drwxrwxr-x    2 openlink openlink     1024 Nov 15 16:59 bin
-rwxr-xr-x    1 openlink openlink    31478 Nov 15 16:59 install.sh
drwxrwxr-x    2 openlink openlink     1024 Nov 15 16:37 lib
-rwxr-xr-x    1 openlink openlink      861 Nov 15 16:59 openlink.csh
-rwxr-xr-x    1 openlink openlink      951 Nov 15 16:59 openlink.sh
drwxrwxr-x    3 openlink openlink     1024 Nov 15 16:37 scripts
-rw-rw-r--    1 openlink openlink   289089 Nov 15 16:59 sql_lt.taz
./bin:
total 37
-rw-r--r--    1 openlink openlink     1413 Nov 15 16:37 freetds.conf
-rwxr-xr-x    1 openlink openlink    26800 Nov 15 16:37 inifile
-rw-rw-r--    1 openlink openlink      335 Nov 15 16:59 odbc.ini
-rw-rw-r--    1 openlink openlink      220 Nov 15 16:59 odbcinst.ini
-rw-rw-r--    1 openlink openlink     5008 Nov 15 16:59 openlink.ini
./lib:
total 657
-rwxr-xr-x    1 openlink openlink      781 Nov 15 16:37 sql_st_lt.la
-rwxr-xr-x    1 openlink openlink   667268 Nov 15 16:37 sql_st_lt.so
./scripts:
total 1
drwxrwxr-x    2 openlink openlink     1024 Nov 15 16:37 SQLServer
./scripts/SQLServer:
total 1
-rw-r--r--    1 openlink openlink      883 Nov 15 16:37 oplrvc.sql
```

6.5 Mac OS X

The OpenLink Single-Tier Driver for ODBC for Mac OS X is distributed in a single disk image (.dmg) file, which contains a Macintosh Installer mpkg.

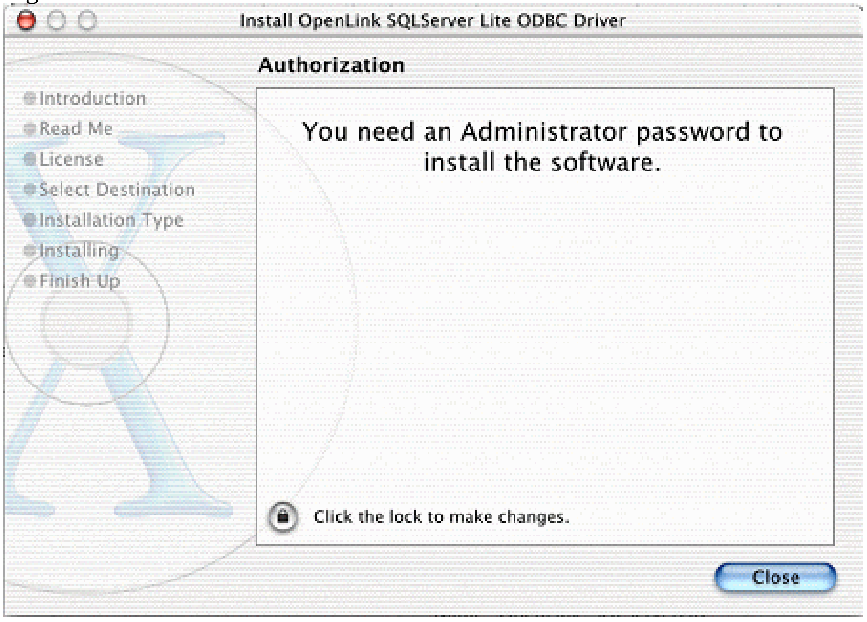
Double-click the mpkg to start the installation process. This example shows images based on the OpenLink Single-Tier SQL Server Driver Installer; slightly different options may be presented with different Driver Installers, but the general idea is the same.

Figure 4.24. OpenLink-SQLServerLite-5.0.dmg



You must have an Administration username and password to install the OpenLink Single-Tier Driver for ODBC. Click on the padlock, and enter your Mac OS X Username and Password.

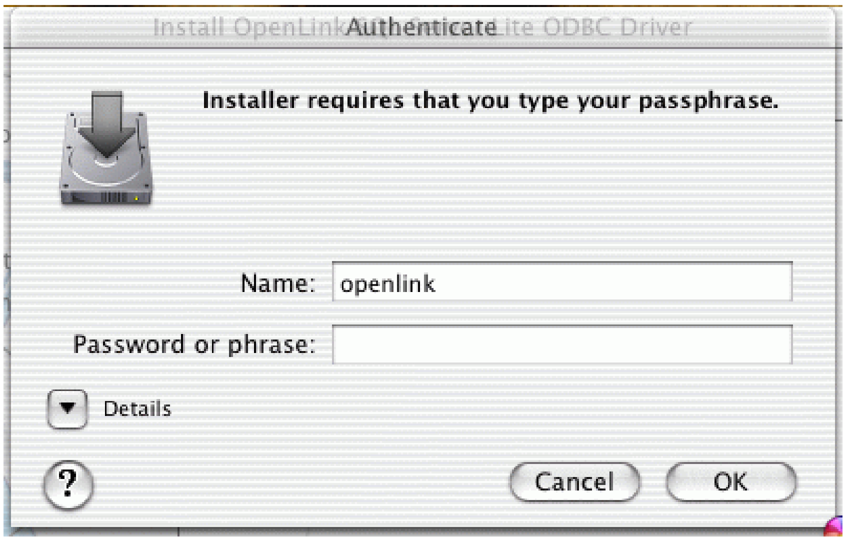
Figure 4.25. Authorization



You need an Administrator password to install the software.

Click the lock to make changes.

Figure 4.26. Authentication


Authenticate

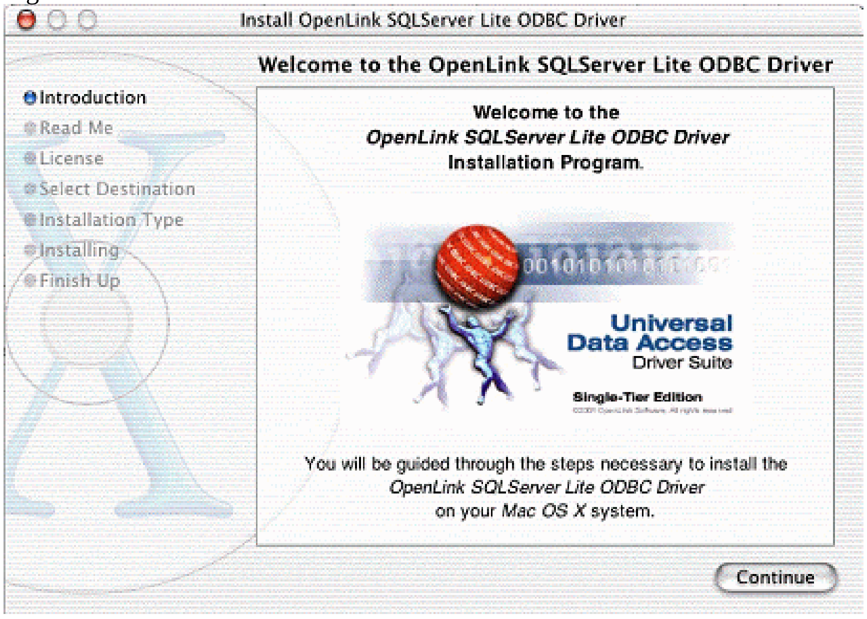
Installer requires that you type your passphrase.

Name: openlink

Password or phrase:

The installer will display a "Welcome" message. Click "Continue".

Figure 4.27. Welcome


Install OpenLink SQLServer Lite ODBC Driver

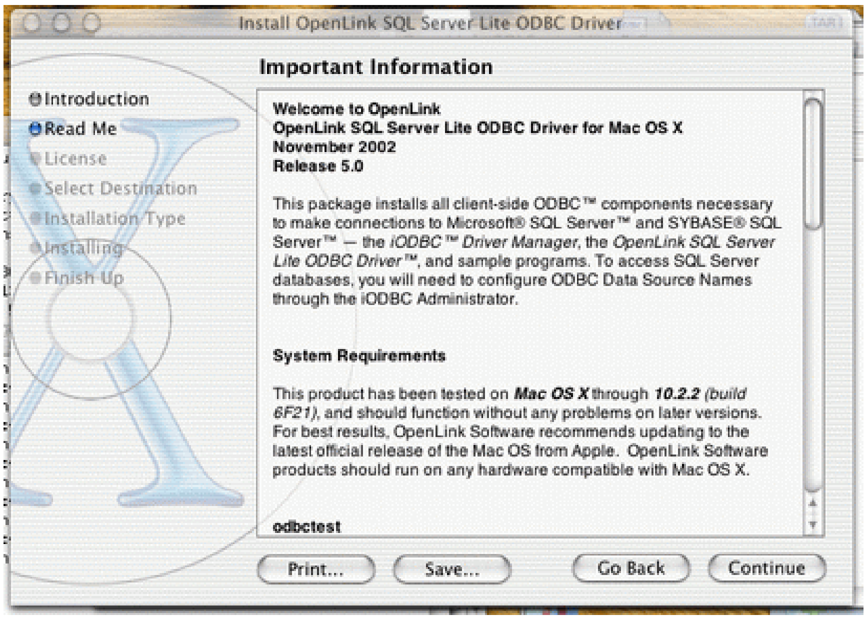
Welcome to the OpenLink SQLServer Lite ODBC Driver

Welcome to the *OpenLink SQLServer Lite ODBC Driver* Installation Program.

You will be guided through the steps necessary to install the *OpenLink SQLServer Lite ODBC Driver* on your *Mac OS X* system.

The next screen will display the Read-Me file, including any last- minute updates to these documents. Please read carefully, and click "Continue" when finished.

Figure 4.28. Read Me



Welcome to OpenLink
OpenLink SQL Server Lite ODBC Driver for Mac OS X
November 2002
Release 5.0

This package installs all client-side ODBC™ components necessary to make connections to Microsoft® SQL Server™ and SYBASE® SQL Server™ — the *iODBC™ Driver Manager*, the *OpenLink SQL Server Lite ODBC Driver™*, and sample programs. To access SQL Server databases, you will need to configure ODBC Data Source Names through the iODBC Administrator.

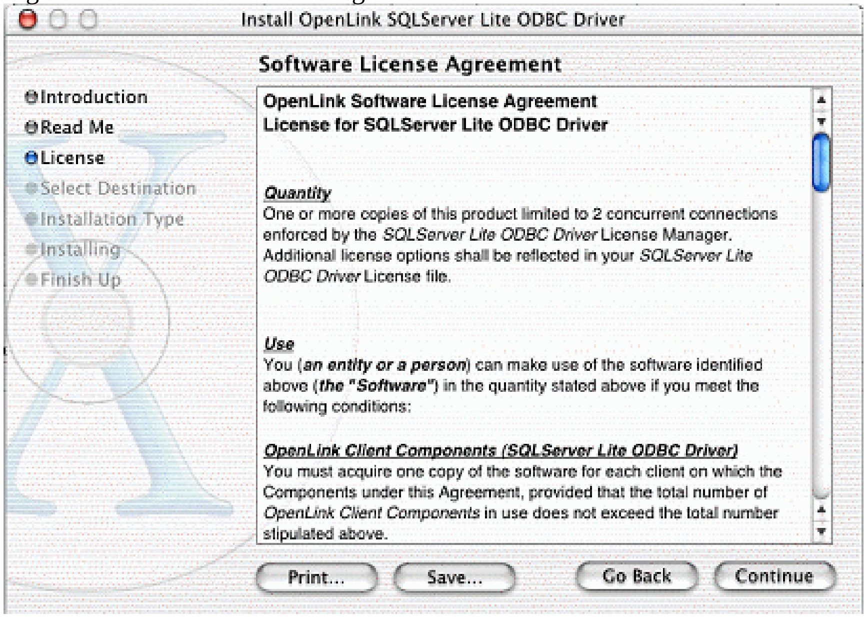
System Requirements

This product has been tested on ***Mac OS X*** through ***10.2.2*** *(build 6F21)*, and should function without any problems on later versions. For best results, OpenLink Software recommends updating to the latest official release of the Mac OS from Apple. OpenLink Software products should run on any hardware compatible with Mac OS X.

odbctest

The next screen will display the License Agreement for the OpenLink Single-Tier Driver for ODBC. Please read, and click "Continue".

Figure 4.29. Software License Agreement



OpenLink Software License Agreement
License for SQLServer Lite ODBC Driver

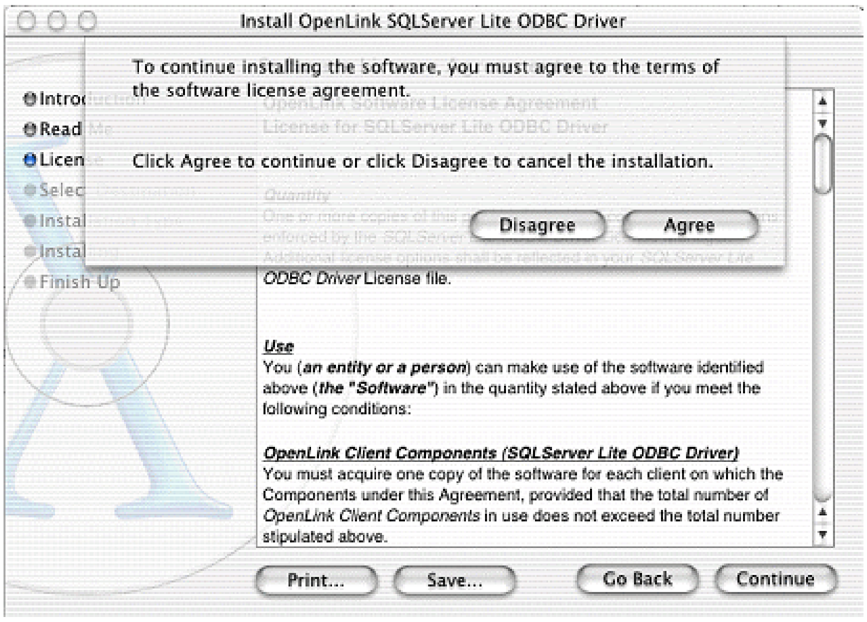
Quantity
One or more copies of this product limited to 2 concurrent connections enforced by the *SQLServer Lite ODBC Driver* License Manager. Additional license options shall be reflected in your *SQLServer Lite ODBC Driver* License file.

Use
You (***an entity or a person***) can make use of the software identified above (***the "Software"***) in the quantity stated above if you meet the following conditions:

OpenLink Client Components (SQLServer Lite ODBC Driver)
You must acquire one copy of the software for each client on which the Components under this Agreement, provided that the total number of *OpenLink Client Components* in use does not exceed the total number stipulated above.

You will be prompted to "Agree" to continue the installation, or "Disagree" to abort.

Figure 4.30. Agree or Disagree to Licensing



To continue installing the software, you must agree to the terms of the software license agreement.

Click Agree to continue or click Disagree to cancel the installation.

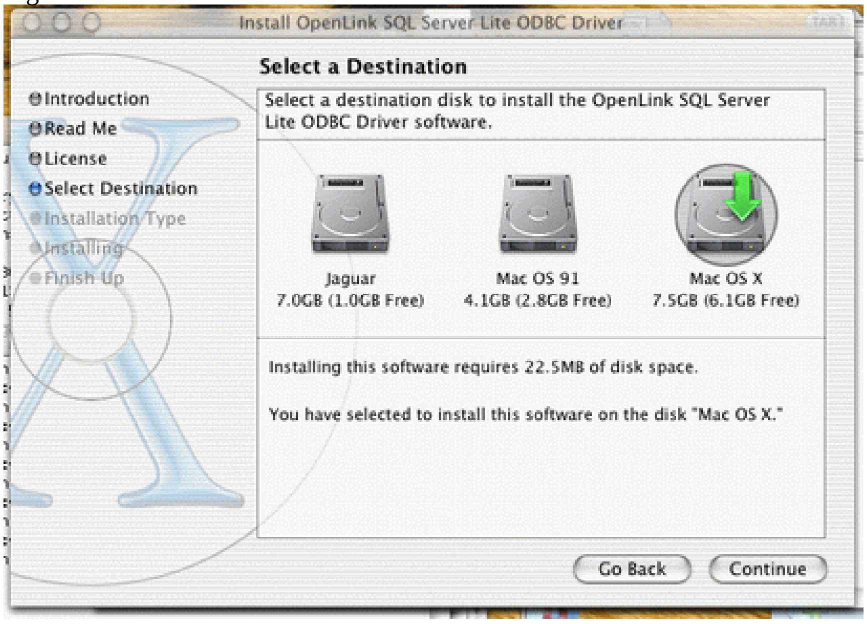
ODBC Driver License file.

Use
You (an entity or a person) can make use of the software identified above (the "Software") in the quantity stated above if you meet the following conditions:

OpenLink Client Components (SQLServer Lite ODBC Driver)
You must acquire one copy of the software for each client on which the Components under this Agreement, provided that the total number of OpenLink Client Components in use does not exceed the total number stipulated above.

You will be asked to select a Destination Volume. Generally, this should be your Mac OS X boot volume. Click on the desired disk icon, and then click "Continue".

Figure 4.31. Choose Destination



Select a destination disk to install the OpenLink SQL Server Lite ODBC Driver software.

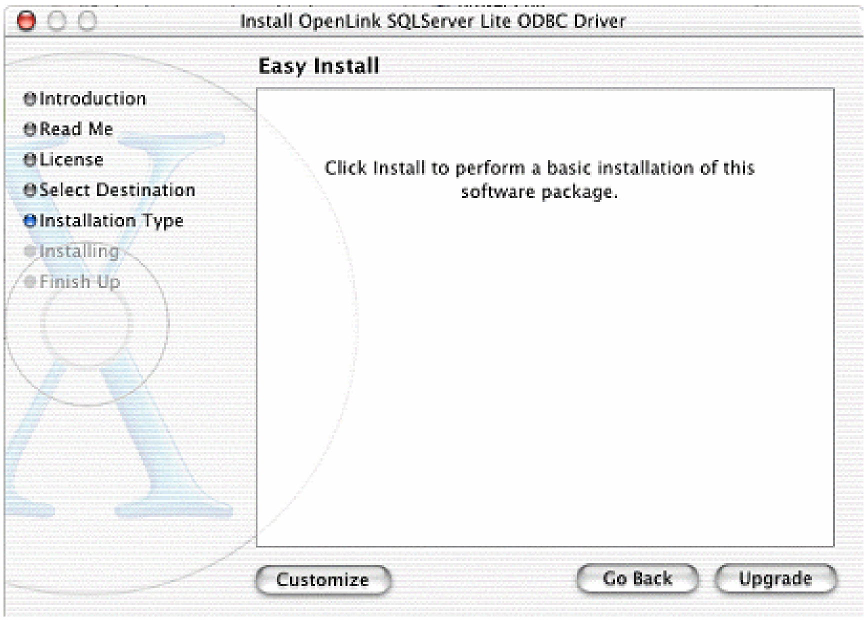
Installing this software requires 22.5MB of disk space.

You have selected to install this software on the disk "Mac OS X."

You may now choose the Easy Install, or if you are an experienced user, you may Customize which components are installed. OpenLink generally recommends the Easy Install.

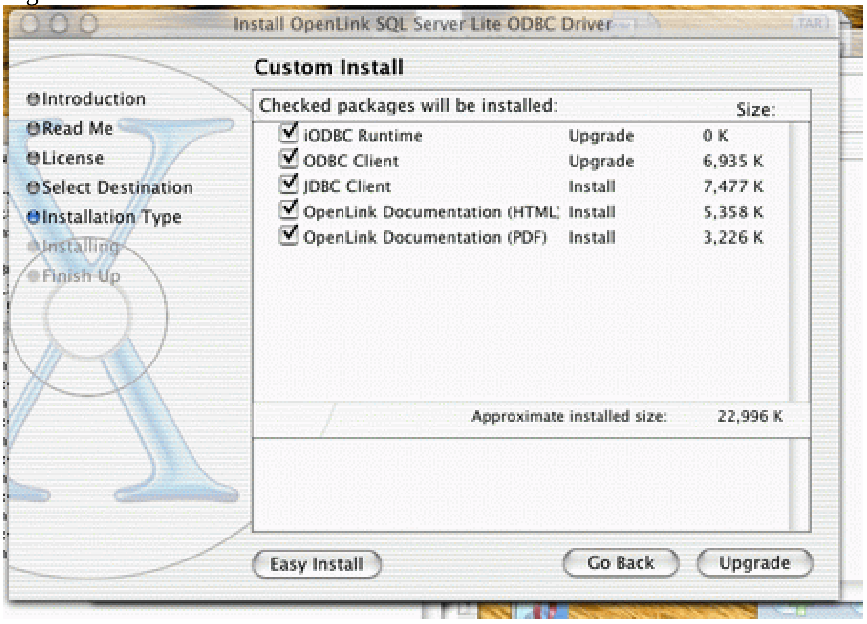
If you have installed OpenLink or iODBC components in the past, click "Upgrade" to continue; otherwise, click "Install".

Figure 4.32. Easy Install



Click Install to perform a basic installation of this software package.

Figure 4.33. Custom Install



Checked packages will be installed:

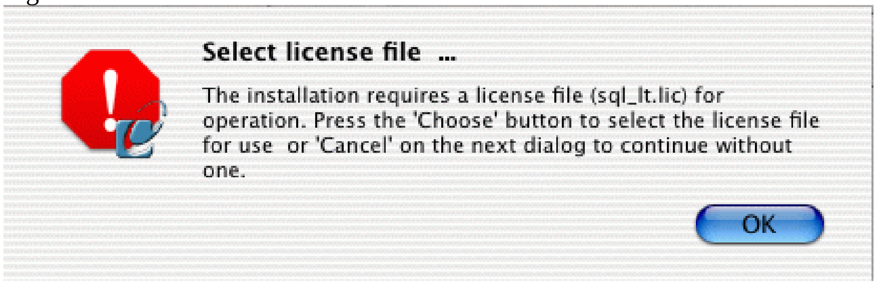
		Size:
✓ iODBC Runtime	Upgrade	0 K
✓ ODBC Client	Upgrade	6,935 K
✓ JDBC Client	Install	7,477 K
✓ OpenLink Documentation (HTML)	Install	5,358 K
✓ OpenLink Documentation (PDF)	Install	3,226 K

Approximate installed size: 22,996 K

You will be shown a graphical progress bar as Installation progresses, followed by System Optimization.

You will be need to locate the license file.

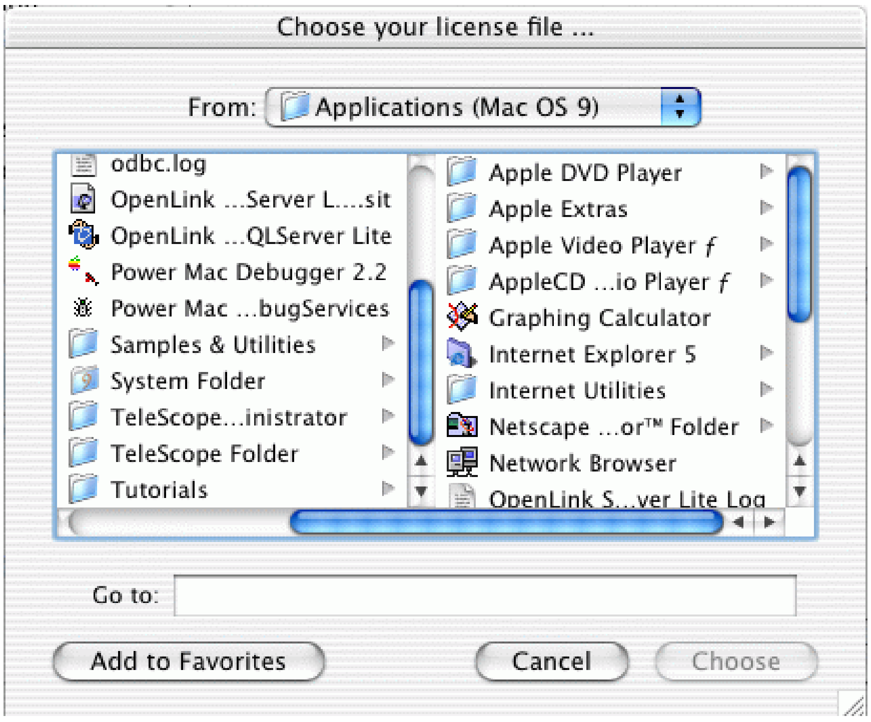
Figure 4.34. Select license file



Select license file ...

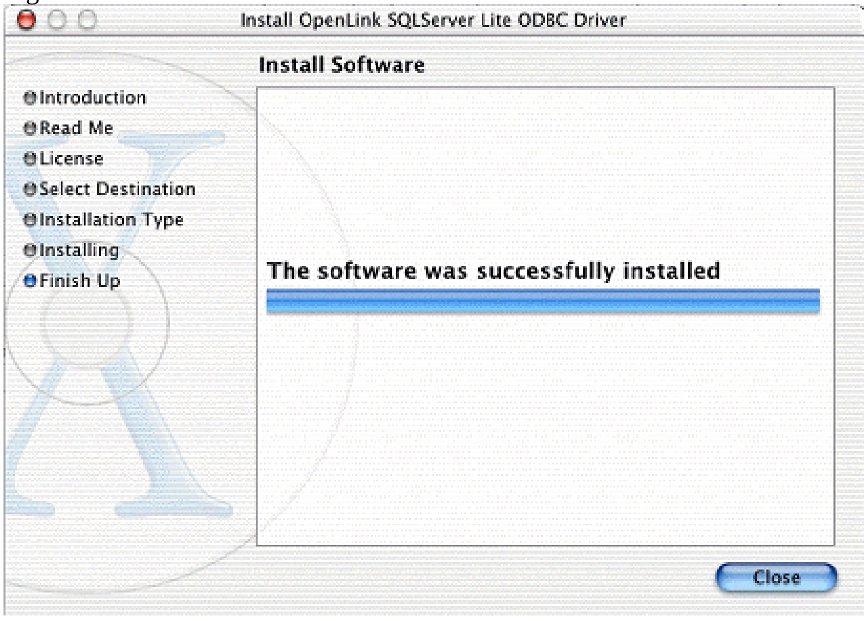
The installation requires a license file (sql_lt.lic) for operation. Press the 'Choose' button to select the license file for use or 'Cancel' on the next dialog to continue without one.

Figure 4.35. Browse for License file



When the process is complete, you will be told that the software was successfully installed. Click "Close" and your new database driver for ODBC is ready for use!

Figure 4.36. Installation Successful



The software was successfully installed

Use the iODBC Administrator to configure a data source. Refer to the Mac OS X Data Source Configuration Chapter if you need more information.

6.6 Product Licensing

6.6.1 Initial License

When you obtain a Data Access Driver from the OpenLink Web Site, a license file will automatically be emailed to you. Please ensure the email address you have provided is correct. If you obtained the Data Access Driver from a CD, you need to apply for an evaluation license through our WEB site, or by contacting one of our offices. The standard license will provide 30days to evaluate the product.

6.6.2 How to apply the License

The easiest way is to let the installer place the file in the correct location. However if the license file is not present during the install, then you will need to apply it manually. In this case, to use the license file, simply place it in one of the following locations:

- Place the license file in the default location for your Operating System.

  For Linux and Unix - $OPENLINK/bin.

  For Windows - The lite32 directory beneath the target directory of your choice. By default this will be C:\Program Files\OpenLink\lite32.

  For Mac OS X - /Library/Application Support/openlink/bin

  For Mac OS 9 or earlier - the Preferences folder, within the System Folder.
- Alternatively, you may define the environment variable OPL_LICENSE_DIR to specify the directory in which all OpenLink license files can be found. (Does not apply to Mac OS 9 or earlier.)
- Finally, license files may reside in any directory included in the PATH environment variable of the host machine. (Does not apply to Mac OS 9 or earlier.)

License errors are returned through the normal SQLError API call.

If your Lite Driver fails to register properly, then your license may be corrupt or invalid. Please check the name and version of the Driver from the About Tab, and contact OpenLink Software for assistance.

Note that only the first license file found for a particular product is examined.

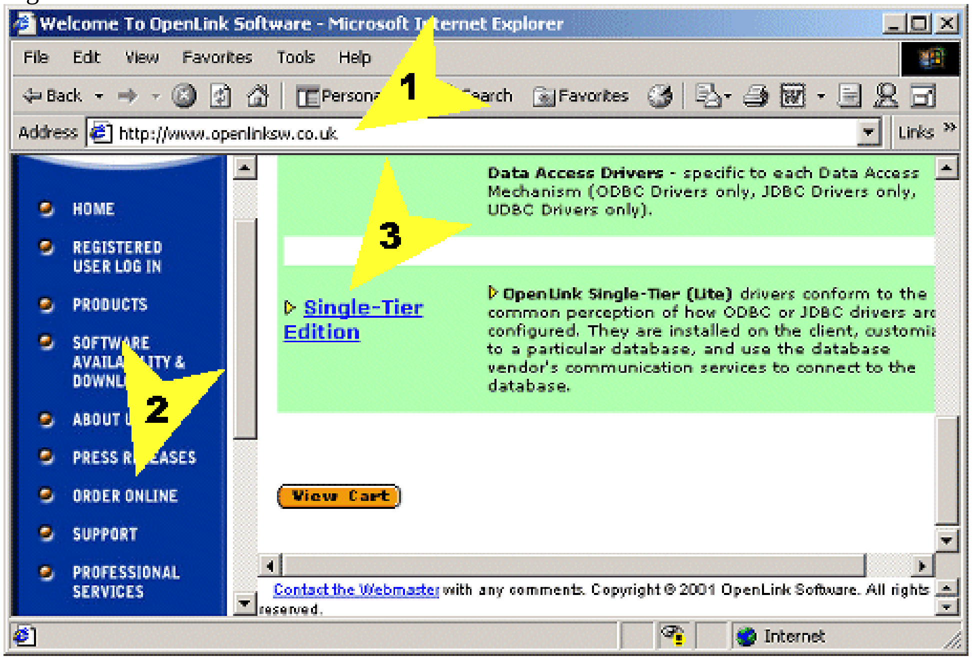
6.6.3 Upgrading the License

You may purchase a permanent license key online via the Internet. To purchase a key follow these instructions:

1. Use an Internet browser to connect to one of the following web sites:

   - ♦ North and South America: http://www.openlinksw.com
   - ♦ Europe, Africa: http://www.openlinksw.co.uk
   - ♦ Asia, Australia: http://www.openlinksw.com.my

   Figure 4.37. Online order


Welcome To OpenLink Software - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Personal Search Favorites
Address http://www.openlinksw.co.uk
Links
1
HOME
REGISTERED USER LOG IN
PRODUCTS
SOFTWARE AVAILABILITY & DOWNLOADS
ABOUT US
PRESS RELEASES
ORDER ONLINE
SUPPORT
PROFESSIONAL SERVICES
2
3
Single-Tier Edition
View Cart
Internet

Data Access Drivers - specific to each Data Access Mechanism (ODBC Drivers only, JDBC Drivers only, UDBC Drivers only).

OpenLink Single-Tier (Lite) drivers conform to the common perception of how ODBC or JDBC drivers are configured. They are installed on the client, customi to a particular database, and use the database vendor's communication services to connect to the database.

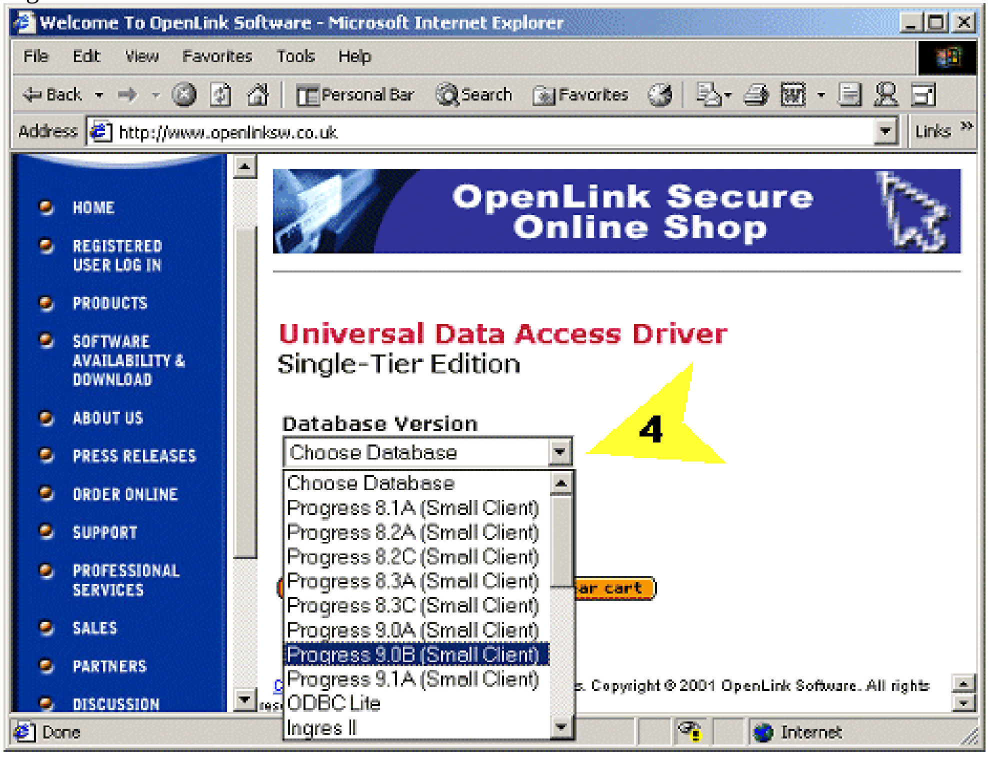
Contact the Webmaster with any comments. Copyright © 2001 OpenLink Software. All rights reserved.

2. Select the ORDER ONLINE menu link from the left side of the web page.

   A new web pages appears listing links to different online forms for varying products.

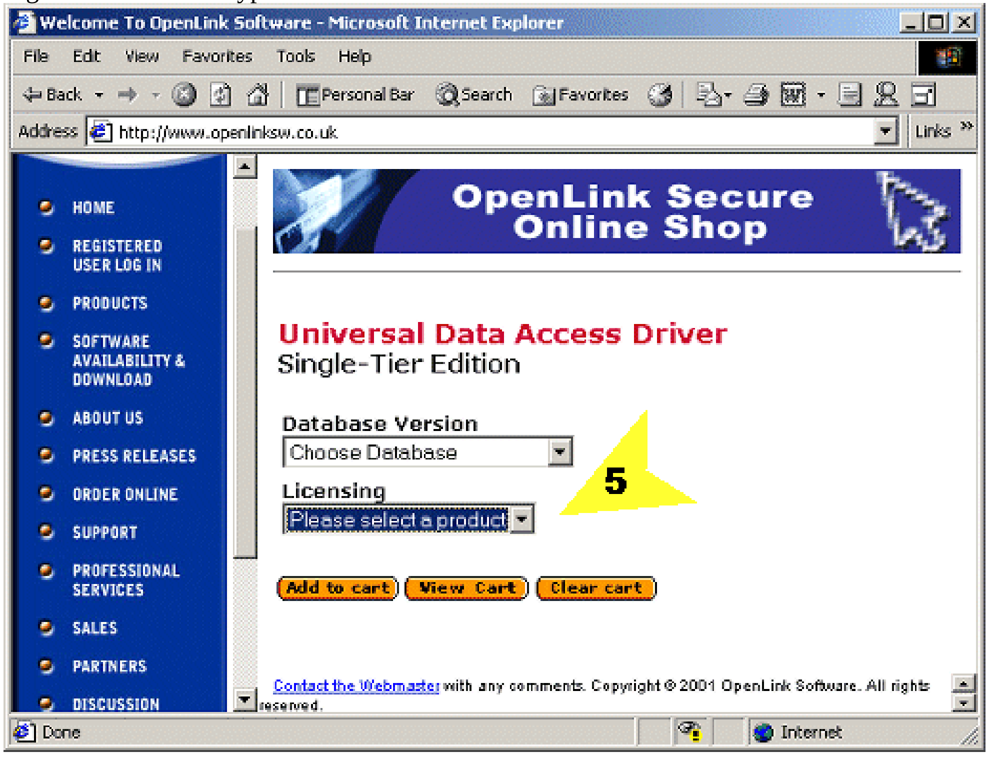
3. Choose the link to the correct product.
4. Choose the database type you require for your license

Figure 4.38. License database selection


Welcome To OpenLink Software - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Personal Bar Search Favorites
Address http://www.openlinksw.co.uk
Links
HOME
REGISTERED USER LOG IN
PRODUCTS
SOFTWARE AVAILABILITY & DOWNLOAD
ABOUT US
PRESS RELEASES
ORDER ONLINE
SUPPORT
PROFESSIONAL SERVICES
SALES
PARTNERS
DISCUSSION
OpenLink Secure Online Shop
Universal Data Access Driver
Single-Tier Edition
Database Version
Choose Database
Choose Database
Progress 8.1A (Small Client)
Progress 8.2A (Small Client)
Progress 8.2C (Small Client)
Progress 8.3A (Small Client)
Progress 8.3C (Small Client)
Progress 9.0A (Small Client)
Progress 9.0B (Small Client)
Progress 9.1A (Small Client)
ODBC Lite
Ingres II
4
ar cart
Copyright © 2001 OpenLink Software. All rights
Done
Internet

5. Choose the type of license required to meet your needs.

Figure 4.39. License type selection


Welcome To OpenLink Software - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Personal Bar Search Favorites
Address http://www.openlinksw.co.uk
Links
HOME
REGISTERED USER LOG IN
PRODUCTS
SOFTWARE AVAILABILITY & DOWNLOAD
ABOUT US
PRESS RELEASES
ORDER ONLINE
SUPPORT
PROFESSIONAL SERVICES
SALES
PARTNERS
DISCUSSION
OpenLink Secure Online Shop
Universal Data Access Driver
Single-Tier Edition
Database Version
Choose Database
Licensing
Please select a product
5
Add to cart
View Cart
Clear cart
Contact the Webmaster with any comments. Copyright © 2001 OpenLink Software. All rights reserved.
Done
Internet

6. Follow the on screen instructions for completing the license purchase.

In the event that you are unable to use the online ordering system, then please contact sales@openlinksw.com to obtain a permanent license key.

6.6.4 See Also

1. Oracle Connection Pooling Support

6.7 Oracle 10g Instant Client: Connection String Formats

The Oracle 10g Instant Client can be used in OpenLink single-tier and multi-tier environments. In a three-tier configuration, an OpenLink Oracle 10g agent residing on the middle-tier can use the Instant Client to connect to an Oracle instance on the third tier.

Instant Client allows you to run applications *without installing the standard Oracle client* (SQL*Net or Net8) or having an ORACLE_HOME. It supports two basic connection string formats:

- //host:[port][/service name]
    - e.g. //dbase-server-5:4321/ORDERS
- an Oracle Net keyword-value pair such as

```
(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp) (HOST=dlsun242)
    (PORT=5521)) (CONNECT_DATA=(SERVICE_NAME=bjava21)))
```

Naming methods that require a configuration file (such as tnsnames.ora or sqlnet.ora) for name translation can also be used if the environment variable TNS_ADMIN is set to point to the directory containing the file.

6.7.1 OpenLink Single-Tier Connections using Instant Client

Examples of accepted connection parameters settings are shown below.

6.7.1.1 Defining a DSN using the OpenLink Single Tier DSN Configuration Wizard

1) Using a local NET service name TNS_ADMIN must point a directory containing to a tnsnames.ora file to allow translation of the local NET service name to an Oracle connect descriptor.

Table 4.1.

Connection String:	O10G-TAF
Login ID:	scott
Password:	tiger

2) Using a connect URL string

Table 4.2.

Connection String:	//192.168.203.11:1521/O10G
Login ID:	scott
Password:	tiger

3) Using an Oracle NET connect descriptor

Table 4.3.

Connection String:	(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=192.168.203.11)(PORT=1521))(CONNECT_DATA=(SERVICE_
Login ID:	scott

Password:	tiger

All the above forms for the 'Connection String' field can also be appended to the Login ID using an '@' separator. The password can be supplied separately, or appended to the Login ID string using '/' as a separator.

4) Using a local NET service name appended to Login ID TNS_ADMIN must point a directory containing to a tnsnames.ora file to allow translation of the local NET service name to an Oracle connect descriptor.

Table 4.4.

Login ID:	scott@O10G-TAF
Password:	tiger

5) Using a connect URL string appended to Login ID

Table 4.5.

Login ID:	scott/tiger@//192.168.203.11:1521/O10G
Password:	&<blank>

6) Using an Oracle NET connect descriptor appended to Login ID

Table 4.6.

Login ID:	scott@(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=192.168.203.11)(PORT=1521))(CONNECT_DAT
Password:	tiger

6.7.2 Oracle Instant Client Related Links

Oracle documentation: connection string formats

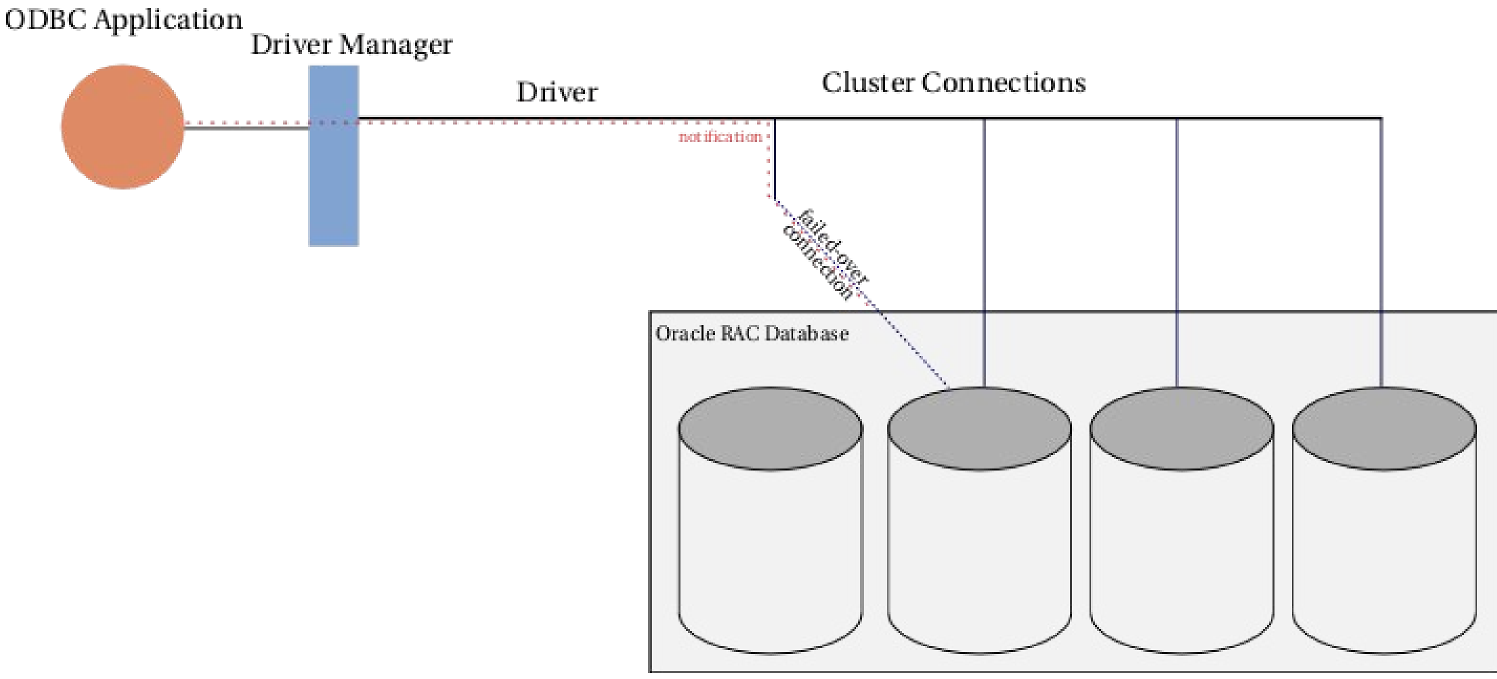
Oracle 10g Instant Client

6.8 Oracle Real Application Cluster (RAC) / TAF Support

6.8.1 What it is

Transparent Application Failover (TAF) is a protocol within Oracle whereby, if a connection to a database node fails, it can be re-established against an alternative node.

Figure 4.40. ora_rac.png



Once a broken connection has failed-over, an application can continue without any special action on its part. However, TAF does not restore all facets of a connection. For instance, TAF does not:

- restore active transactions - any active transactions are rolled back at the time of failure because TAF cannot preserve active transactions after failover: the application instead receives an error message until a ROLLBACK is submitted;
- restore session properties set using 'ALTER SESSION';
- maintain the state of server-side program variables, such as PL/SQL package states.

If any of these situations apply to a failed connection, an application may need to take action following failover to return the connection fully to the desired state. In order to do this, the application may request to be notified when failover has occurred. The OpenLink Lite Driver for Oracle 10g and the OpenLink Generic Multi-Tier Client provide this facility through TAF event notifications.

The Oracle 10g Lite Driver and Multi-Tier Agent also allow configuration of the failover retry interval and the maximum number of failover retries, in the event that failover is not successful on the first attempt.

6.8.2 What you have to do to use it

6.8.2.1 Configuration

6.8.2.1.1 Lite

To use OpenLink's TAF event notification features or configure the failover retry parameters, you must enable OpenLink's TAF support. In the case of the Oracle 10g Lite Driver for Windows, this is done by checking the 'Enable TAF' checkbox in the driver's 'Single Tier DSN Configuration' dialog box, accessible through the 'Configure' button in the ODBC Data Source Administrator.

6.8.2.1.2 TAF Retry Configuration

When OpenLink's TAF support is enabled, in the event that a failover attempt fails, the Lite driver or Multi-Tier agent will instruct Oracle to retry. By default, the maximum number of failover attempts is 10 and the interval between retry attempts is 10 seconds. The default values can be overridden.

If using the Oracle 10g Lite Driver for Windows, enter the new values in the 'Max. Retries' and 'Retry Interval' text fields. For the Oracle 10g Lite Driver for Unix or the Multi-Tier Oracle 10g agent, override the defaults by setting the environment variables OPL_TAF_MAX_RETRIES and OPL_TAF_RETRY_INTERVAL. The retry settings operate independently of TAF event call-backs. When OpenLink's TAF support is enabled, they are effective irrespective of whether an application registers an event call-back.

6.8.2.2 Programmatic Considerations

OpenLink ODBC drivers notify ODBC applications that failover has occurred using two mechanisms: event call-backs and SQLSTATEs.

6.8.2.2.1 TAF Event Notification: Call-backs

An application can register a failover call-back routine by setting the proprietary connection attribute SQL_ATTR_EVENT_CALL-BACK (1280) on an open connection. The routine's address is supplied as the value of SQLSetConnectAttr ?'s *ValuePtr* argument. The same call-back routine can be registered for more than one connection. The call-back routine's signature must take the form:

```
void (*call-back) (oplevent_t oplEvent, SQLHANDLE handle, SQLUSMALLINT
eventInfo)
```

where:

- *oplEvent:* is an integer indicating the type of event which took place.
- *context:* is an application-supplied ODBC handle identifying the context the event is taking place in.
- *eventInfo:* is an unsigned integer code providing more information about the event. The values returned depend on the type of event. 0 signifies 'no further information available'

oplEvent is of type oplevent_t, an enumerated type enumerating the types of events reported to event call-backs. oplevent_t is defined as follows:

```
typedef enum {
 OPL_EV_NONE = 0, OPL_EV_FAILOVER_SUCCESS = 16, OPL_EV_FAILOVER_ABORT = 17 }
 oplevent_t;
```

At the moment, only failover events are supported through the OPL_EV_FAILOVER_xxx event class. Other types of event may be supported in the future using this call-back mechanism. OPL_EV_FAILOVER_SUCCESS indicates that failover was successful, OPL_EV_FAILOVER_ABORT that failover was aborted.

context is the ODBC handle (HDBC) of the connection for which the application wishes to receive event notifications. This handle should be supplied to the ODBC driver when the call-back is registered, using another Oracle-specific connection attribute, SQL_ATTR_EVENT_CONTEXT (1281). If this attribute is not set, the call-back receives SQL_NULL_HANDLE for the *handle* argument. (If other event types are supported in the future, this attribute may accept other types of ODBC handle, e.g. handles of type SQL_HANDLE_STMT, depending on the scope of the event.)

eventInfo is reserved for future use. All failover events currently return 0.

6.8.2.2.2 TAF Event Notification: SQLSTATEs

As well as an ODBC application being informed of failover through a call-back routine, it also receives notification through SQLSTATEs. After failover completes, the first ODBC call to return, on the affected connection, can return one of two proprietary SQLSTATES, IM500 or IM501:

- IM500 denotes successful failover completion. If the ODBC call generated no other errors, the call returns SQL_SUCCESS_WITH_INFO with SQLSTATE IM500 and is accompanied by the informational message "Failover completed". As usual, the SQLSTATE and diagnostic message can be retrieved using SQLGetDiagRec ?();

- IM501 ("Failover aborted") indicates failover was unsuccessful. A function returning this SQLSTATE returns with return code SQL_ERROR.

If the ODBC call returning the failover SQLSTATE fails for some reason, a diagnostic record holding the failover SQLSTATE and message is appended to any diagnostic records already generated by the failing call. In this case, even if failover was successful, a SQLSTATE IM500 may be accompanied by a function return code of SQL_ERROR. For instance, if a transaction was open at the time failover took place, SQLExecute may return SQL_ERROR with two diagnostic records, for example:

- DiagRec ? #1 Native error: 25402 SQLSTATE: HY000 Message: [OpenLink][ODBC][Oracle Server]ORA-25402: transaction must roll back
- DiagRec ? #2 Native error: 0 SQLSTATE: IM500 Message: [OpenLink][ODBC][Oracle Server]Failover completed.

Note: Failover notification using TAF-specific SQLSTATEs cannot be used independently of failover call-backs. The use of these SQLSTATEs is only triggered when an application registers a failover call-back.

6.8.3 Related Links

- Oracle
- TAF in Oracle 10g
- OCI FAQs

  (including TAF)
- Oracle 9i RAC/TAF

7 Chapter 5. OpenLink ODBC Driver (Single-Tier Edition) Configuration

Abstract
How to configure ODBC Data sources (DSNs). How to configure DSNs for the individual OpenLink Lite Drivers.

Table of Contents

7.1 Windows Data Source Configuration

7.1.1 Creating ODBC Data Sources

7.1.1.1 Windows ODBC Data Sources

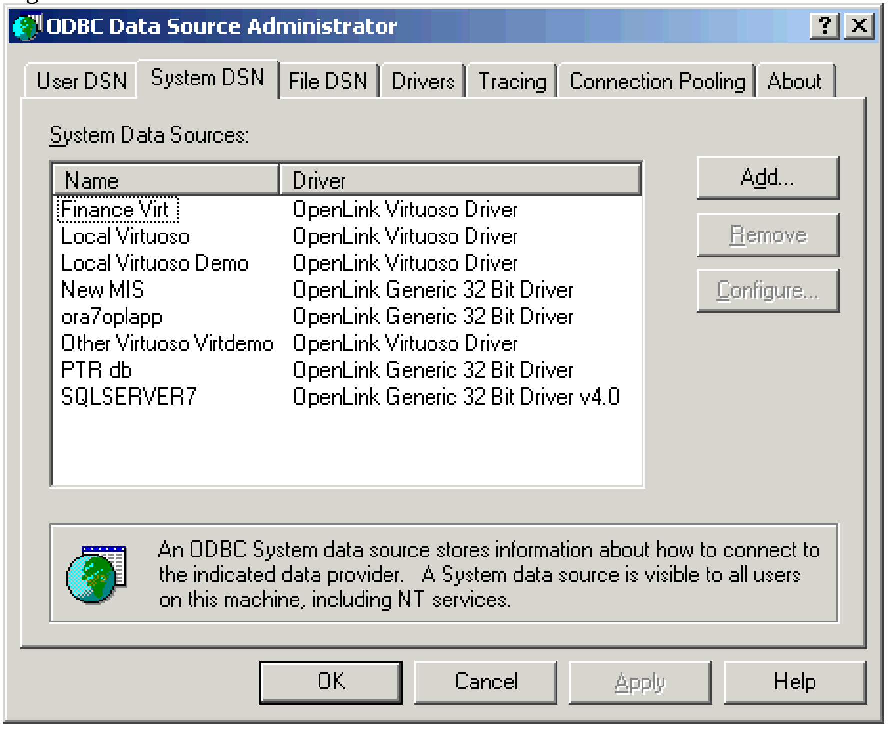
The Microsoft ODBC 2.0, 3.0 & 3.5 Driver Manager (depicted below) allows the creation of User, System, and File DSNs.

A User DSN will only be available to the user who creates the data source; a System DSN will be available to the whole system so that any user, including the system account, will be able to use that data source; A File DSN is a special 'mobile' data source that stores the data source information associated with the ODBC Driver in a file that is sharable.

The steps for creating a DSN are as follows:-

From the desired tab (User; System; File) press the Add button to begin creating a new Data source.

Figure 5.1. Microsoft ODBC Administrator

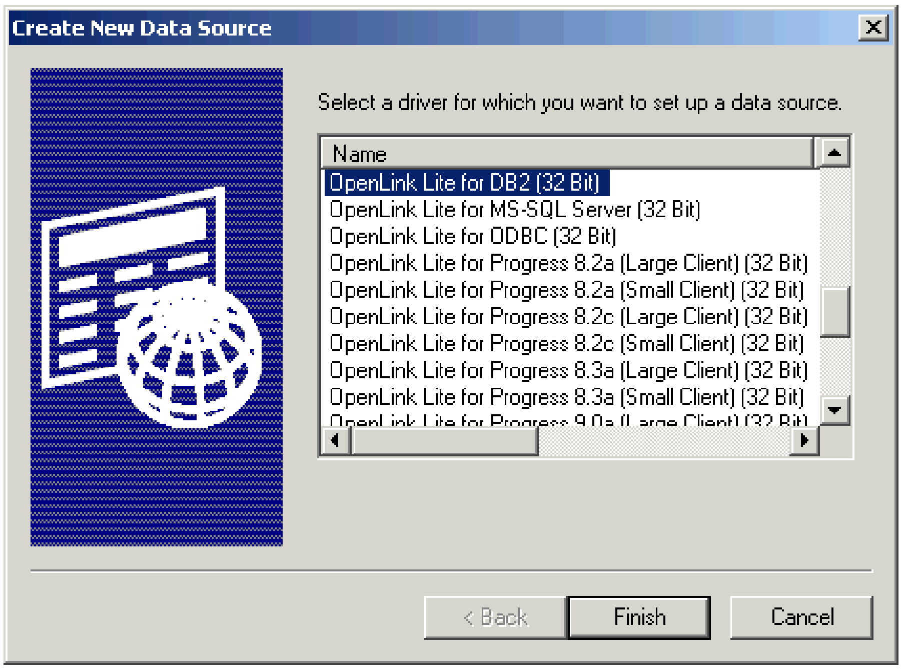


Name	Driver
Finance Virt	OpenLink Virtuoso Driver
Local Virtuoso	OpenLink Virtuoso Driver
Local Virtuoso Demo	OpenLink Virtuoso Driver
New MIS	OpenLink Generic 32 Bit Driver
ora7oplapp	OpenLink Generic 32 Bit Driver
Other Virtuoso Virtdemo	OpenLink Virtuoso Driver
PTR db	OpenLink Generic 32 Bit Driver
SQLSERVER7	OpenLink Generic 32 Bit Driver v4.0

An ODBC System data source stores information about how to connect to the indicated data provider. A System data source is visible to all users on this machine, including NT services.

Pick the ODBC Driver to be used to create your ODBC DSN. In this example the Driver Labeled "OpenLink Lite for DB2 (32 Bit)" is highlighted.

Figure 5.2. Microsoft ODBC Administrator


Create New Data Source

Select a driver for which you want to set up a data source.

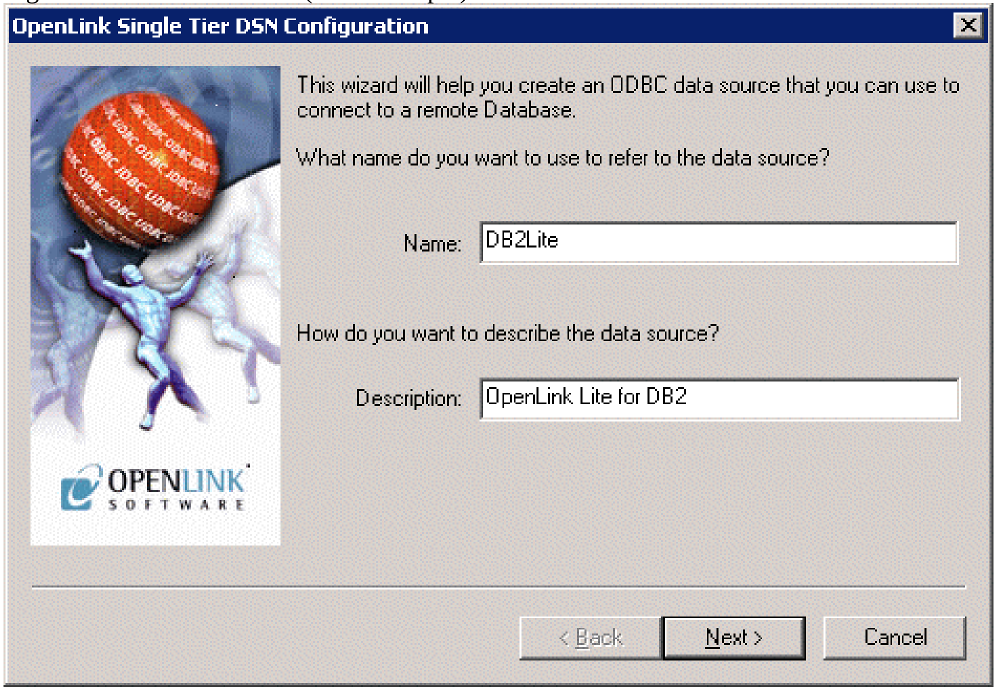
Name
OpenLink Lite for DB2 (32 Bit)
OpenLink Lite for MS-SQL Server (32 Bit)
OpenLink Lite for ODBC (32 Bit)
OpenLink Lite for Progress 8.2a (Large Client) (32 Bit)
OpenLink Lite for Progress 8.2a (Small Client) (32 Bit)
OpenLink Lite for Progress 8.2c (Large Client) (32 Bit)
OpenLink Lite for Progress 8.2c (Small Client) (32 Bit)
OpenLink Lite for Progress 8.3a (Large Client) (32 Bit)
OpenLink Lite for Progress 8.3a (Small Client) (32 Bit)

Once you have selected the appropriate OpenLink Lite Driver, you will be presented with the OpenLink ODBC Data Source Configuration Wizard for the driver selected. The Wizard has several frames, most of which require you to provide information.

7.1.1.2 Data Source Tab

The first tab is the Data Source Tab. The following parameters are common to all databases.

Figure 5.3. Data Source tab (DB2 example)


OpenLink Single Tier DSN Configuration

This wizard will help you create an ODBC data source that you can use to connect to a remote Database.

What name do you want to use to refer to the data source?

Name: DB2Lite

How do you want to describe the data source?

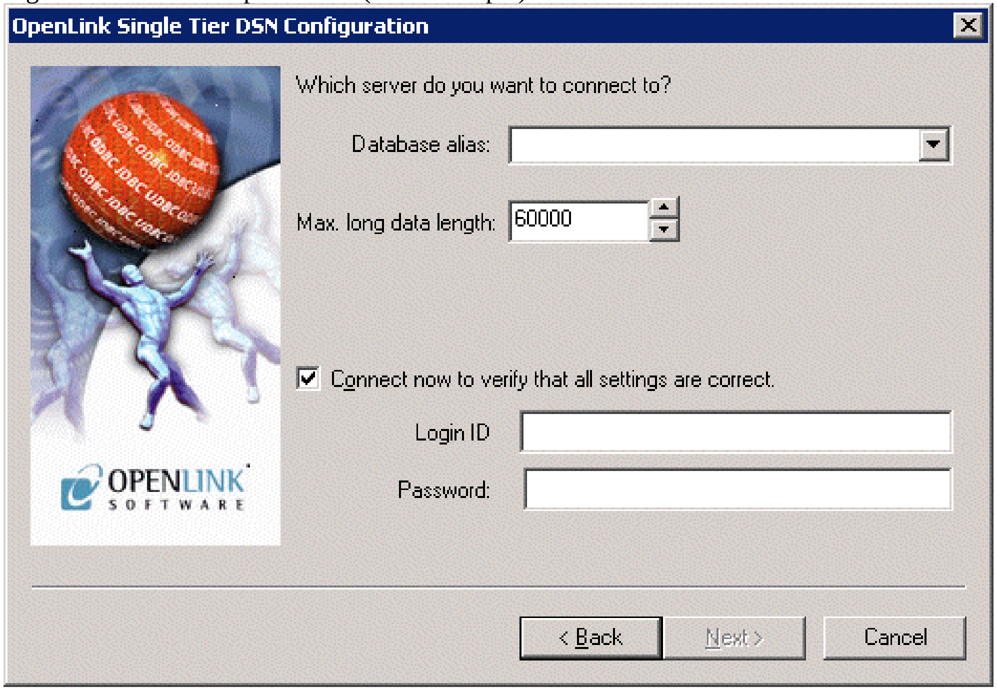
Description: OpenLink Lite for DB2

- Name. (Data source) The name of the ODBC DSN; this is how you will interact with the OpenLink Lite ODBC Driver from within ODBC-compliant applications once your ODBC DSN has been created.
- Desription. Additional information that further describes the ODBC DSN that you are creating.

7.1.1.3 Database-Specific Tab

In the second frame of the wizard, you enter a database alias for the underlying communications layer of the database, and a username and password. If you select the "Connect now to verify that all settings are correct" check-box, pressing the Next> button will verify that DSN can connect.

Figure 5.4. Database-specific tab (DB2 example)



OpenLink Single Tier DSN Configuration

Which server do you want to connect to?

Database alias:

Max. long data length: 60000

[✓] Connect now to verify that all settings are correct.

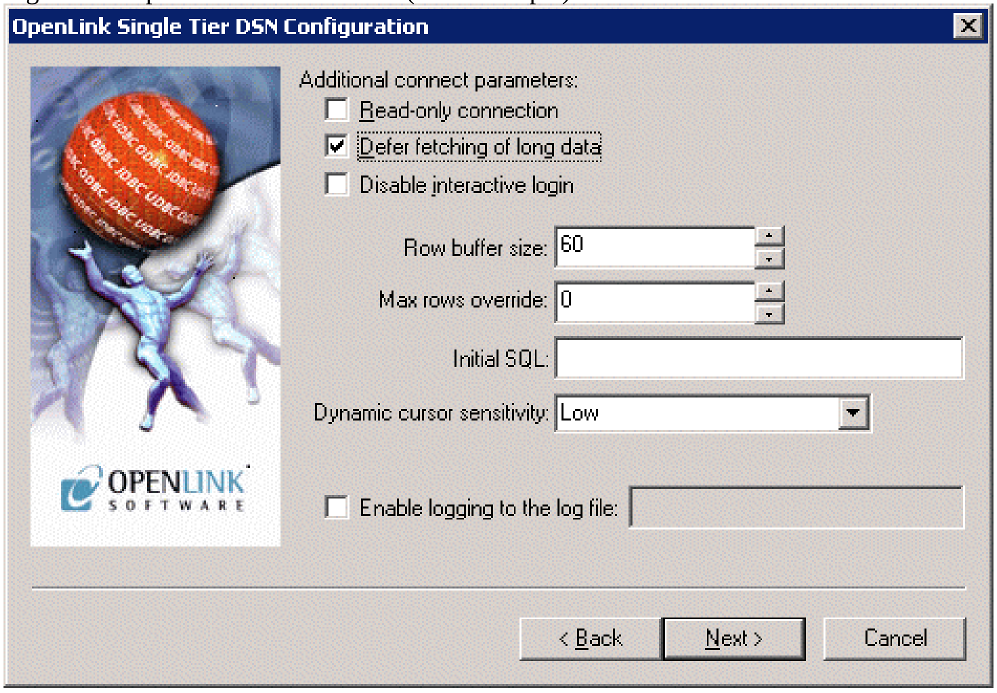
Login ID

Password:

7.1.1.4 OpenLink Parameters

The third frame contains OpenLink-specific parameters for the DSN connection; here you can set the connection to be read-only, have it defer the fetching of long (BLOB) data, disable interactive login, set a row-buffer size (the number of records to be transported over the network in a single network hop), set a file containing SQL statements to run on login, set the dynamic cursor sensitivity level, and enable logging to a file.

Figure 5.5. OpenLink Parameters tab (DB2 example)



OpenLink Single Tier DSN Configuration

Additional connect parameters:

[ ] Read-only connection

[✓] Defer fetching of long data

[ ] Disable interactive login

Row buffer size: 60

Max rows override: 0

Initial SQL:

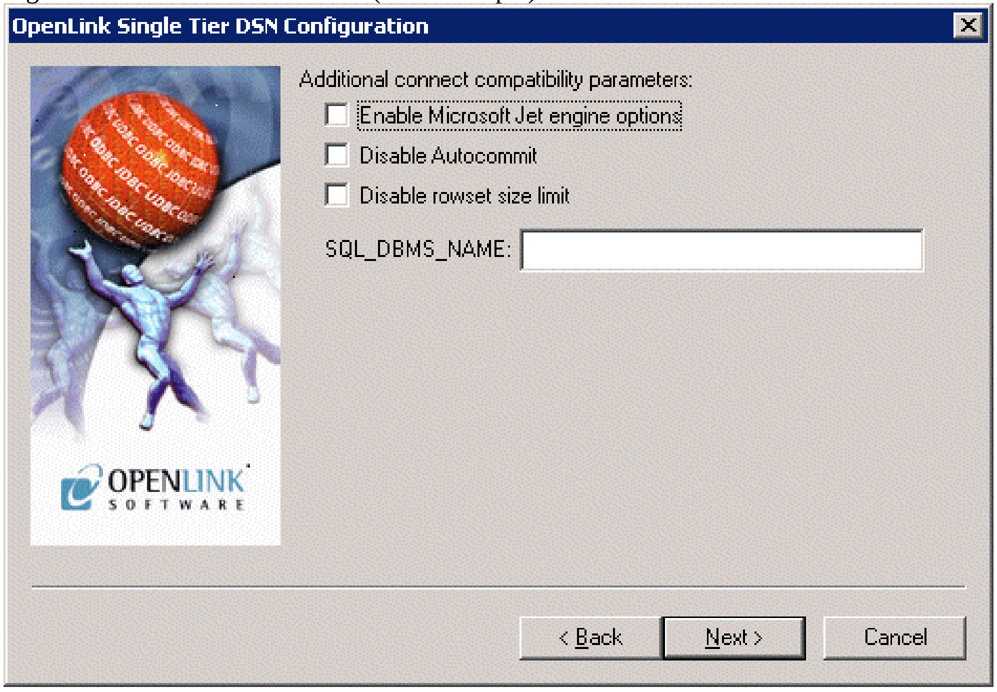
Dynamic cursor sensitivity: Low

[ ] Enable logging to the log file:

7.1.1.5 ODBC Parameters

The fourth frame contains more custom parameters: you can enable changes for the MS Jet Engine, disable autocommitting, and disable the rowset size limit. You can also set the SQL_DBMS_NAME (required for some applications, notably Access).

Figure 5.6. ODBC Parameters tab (DB2 example)



OpenLink Single Tier DSN Configuration

Additional connect compatibility parameters:

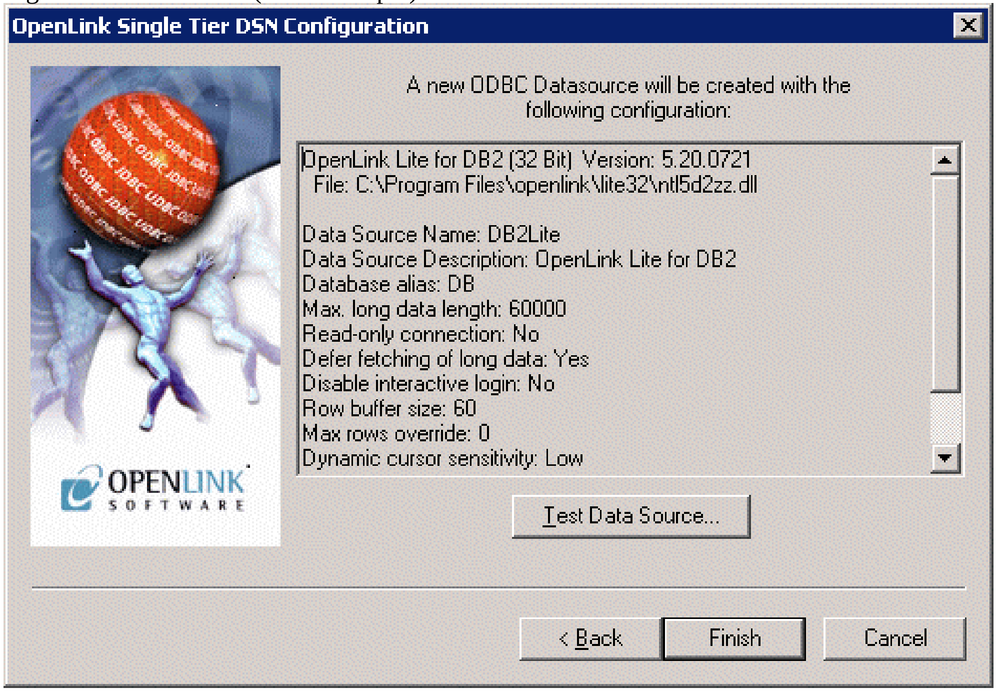
- [ ] Enable Microsoft Jet engine options
- [ ] Disable Autocommit
- [ ] Disable rowset size limit

SQL_DBMS_NAME:

7.1.1.6 `About' frame

The fifth and final frame in the wizard shows the details of the connection - the driver name and version and DSN configuration parameters; it also gives you the option to test the data-source.

Figure 5.7. `About' tab (DB2 example)



OpenLink Single Tier DSN Configuration

A new ODBC Datasource will be created with the following configuration:

```
OpenLink Lite for DB2 (32 Bit)  Version: 5.20.0721
  File: C:\Program Files\openlink\lite32\ntl5d2zz.dll

Data Source Name: DB2Lite
Data Source Description: OpenLink Lite for DB2
Database alias: DB
Max. long data length: 60000
Read-only connection: No
Defer fetching of long data: Yes
Disable interactive login: No
Row buffer size: 60
Max rows override: 0
Dynamic cursor sensitivity: Low
```

7.1.1.7 Glossary of Standard Configuration Options

- Name. (Data source) The name of the ODBC DSN; this is how you will interact with the OpenLink Lite ODBC Driver from within ODBC-compliant applications once your ODBC DSN has been created.
- Desription. Additional information that further describes the ODBC DSN that you are creating.
- MaxRows Override. Allows you to define a limit on the maximum number of rows to returned from a query. The default value of 0 means no limit.
- Initial SQL. Lets you specify a file containing SQL statements that will be run against the database upon connection, automatically.
- Enable Microsoft Jet Engine Options. Extra support or altered functionality for better compatibility with Microsoft Jet using applications such as Microsoft Access.
- Disable AutoCommit. Change the default commit behaviour of the OpenLink Lite Driver. The default mode is AutoCommit mode (box unchecked).
- Disable Rowset Size Limit. Disable the limitation enforced by the cursor library. The limitation is enforced by default to prevent the Driver claiming all available memory in the event that a resultset is generated from an erroneous query is very large. The limit is normally never reached.
-
  #### 7.1.1.7.1 High Cursor Sensitivity

  Enables or disables the row version cache used with dynamic cursors.

  When dynamic cursor sensitivity is set high, the Cursor Library calculates checksums for each row in the current rowset and compares these with the checksums (if any) already stored in the row version cache for the same rows when fetched previously. If the checksums differ for a row, the row has been updated since it was last fetched and the row status flag is set to SQL_ROW_UPDATED. The row version cache is then updated with the latest checksums for the rowset.

  From the user's point of view, the only visible difference between the two sensitivity settings is that a row status flag can never be set to SQL_ROW_UPDATED when the cursor sensitivity is low. (The row status is instead displayed as SQL_ROW_SUCCESS.) In all other respects, performance aside, the two settings are the same - deleted rows don't appear in the rowset, updates to the row since the row was last fetched are reflected in the row data, and inserted rows appear in the rowset if their keys fall within the span of the rowset.

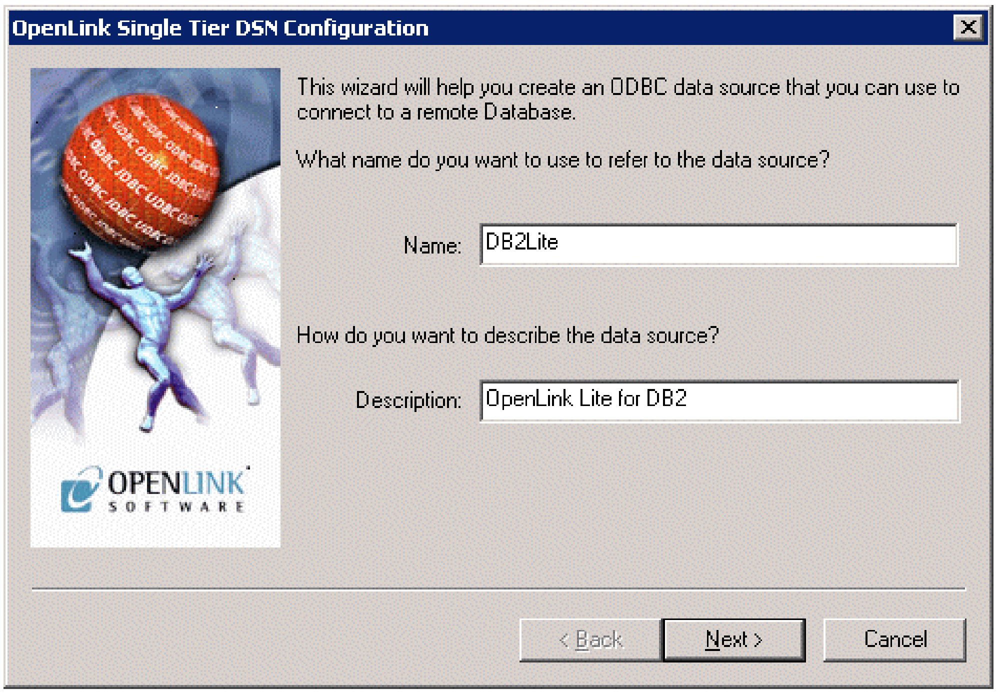
  If your application does not need to detect the row status SQL_ROW_UPDATED, you should leave the 'High Cursor Sensitivity' checkbox unchecked, as performance is improved. The calculation and comparison of checksums for each row fetched carries an overhead.

  If this option is enabled, the table oplrvc must have been created beforehand using the appropriate script for the target database.
- Row Buffer Size. This attribute specifies the number of records to be transported over the network in a single network hop. Values can range from 1 to 99.
- Default UserID. This attribute specifies the default username to be used when attempting to make a connection. You may still override this at run time.
- Hide Login Dialog. Suppress the ODBC "Username" and "Password" login dialog box when interacting with your ODBC DSN from within an ODBC compliant application.
- Read Only connection. Specify whether the connection is to be "Read-only". Make sure the checkbox is unchecked to request a "Read/Write" connection.

7.1.2 DB2

7.1.2.1 Datasource

Figure 5.8. Datasource tab


OpenLink Single Tier DSN Configuration

This wizard will help you create an ODBC data source that you can use to connect to a remote Database.

What name do you want to use to refer to the data source?

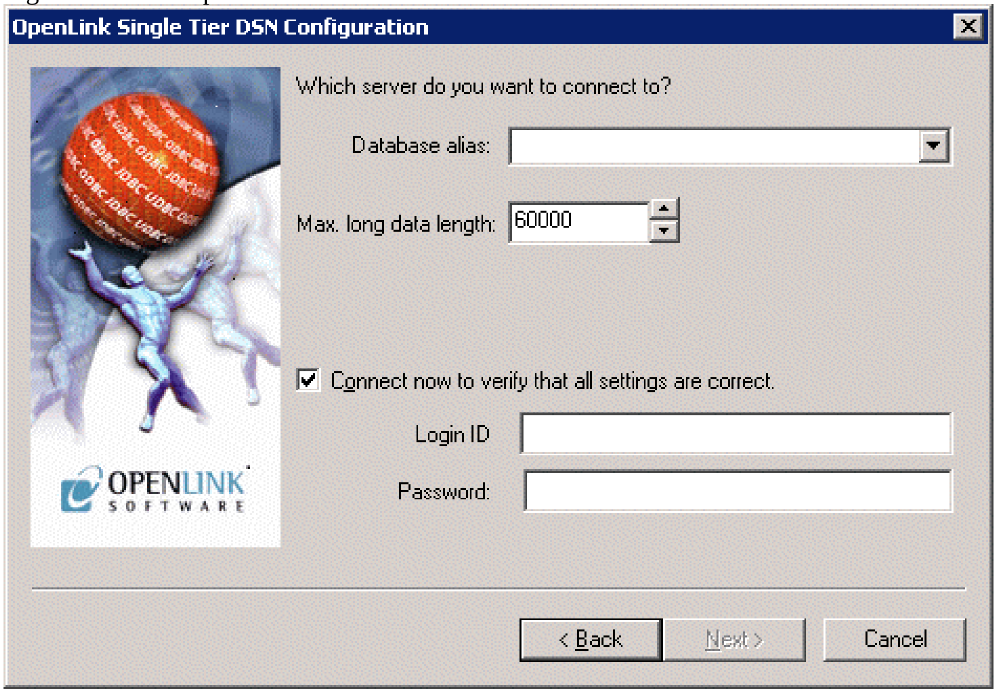
Name: DB2Lite

How do you want to describe the data source?

Description: OpenLink Lite for DB2

7.1.2.2 DB2 Options

Figure 5.9. DB2 Options tab


OpenLink Single Tier DSN Configuration

Which server do you want to connect to?

Database alias:

Max. long data length: 60000

[✓] Connect now to verify that all settings are correct.

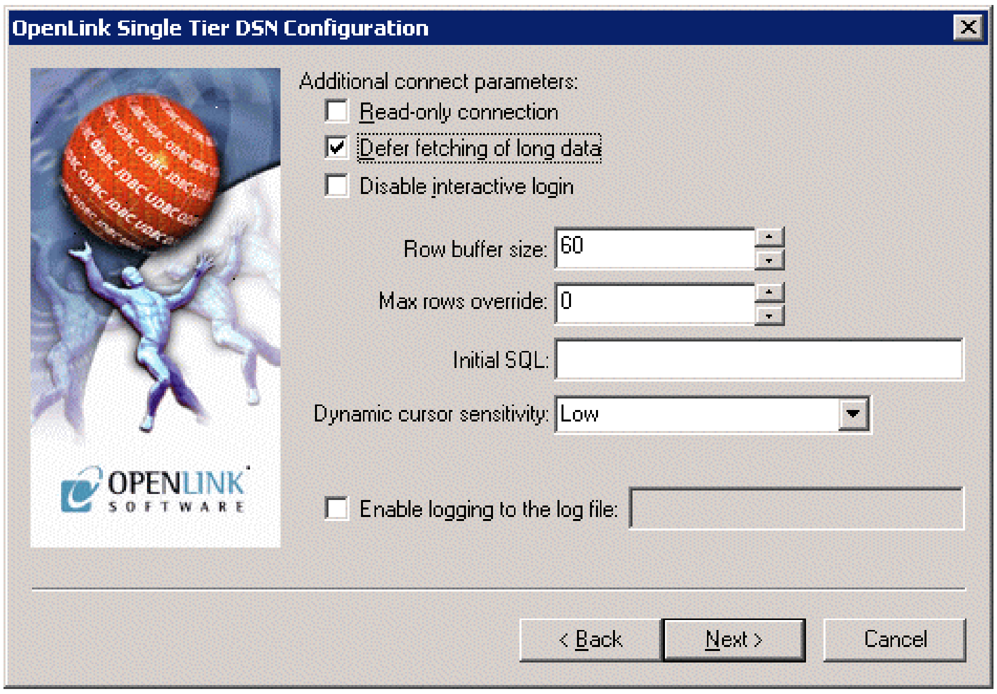
Login ID

Password:

- Database Alias. The DB2 Connect Alias for the database to which you wish to connect.

7.1.2.3 OpenLink Parameters

Figure 5.10. OpenLink Parameters tab


OpenLink Single Tier DSN Configuration

Additional connect parameters:

- [ ] Read-only connection
- [x] Defer fetching of long data
- [ ] Disable interactive login

Row buffer size: 60

Max rows override: 0

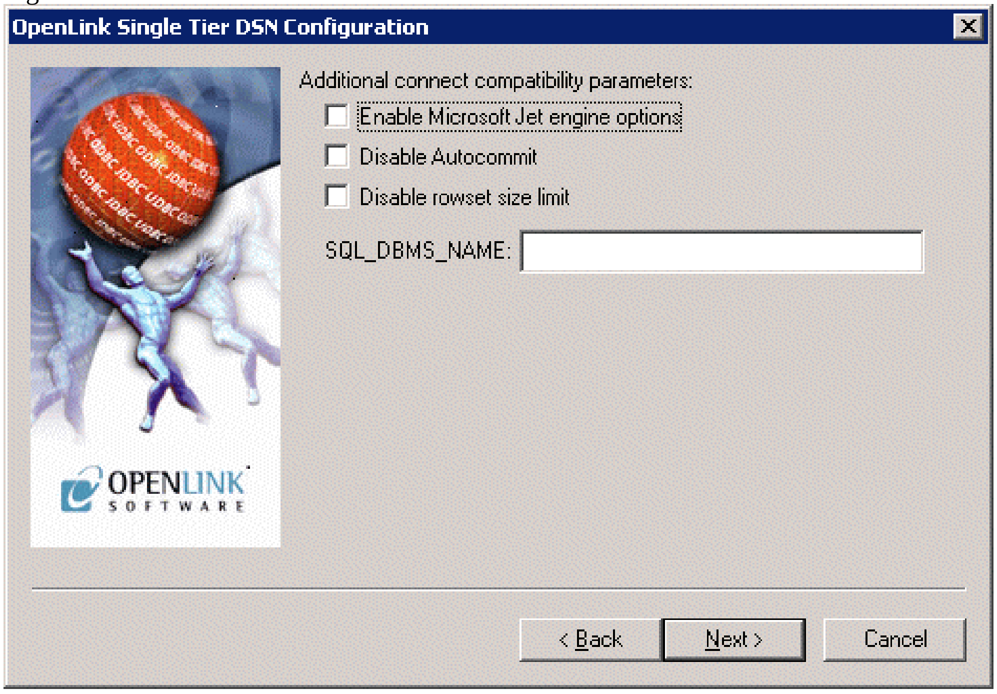
Initial SQL:

Dynamic cursor sensitivity: Low

- [ ] Enable logging to the log file:

7.1.2.4 ODBC Parameters

Figure 5.11. ODBC Parameters tab


OpenLink Single Tier DSN Configuration

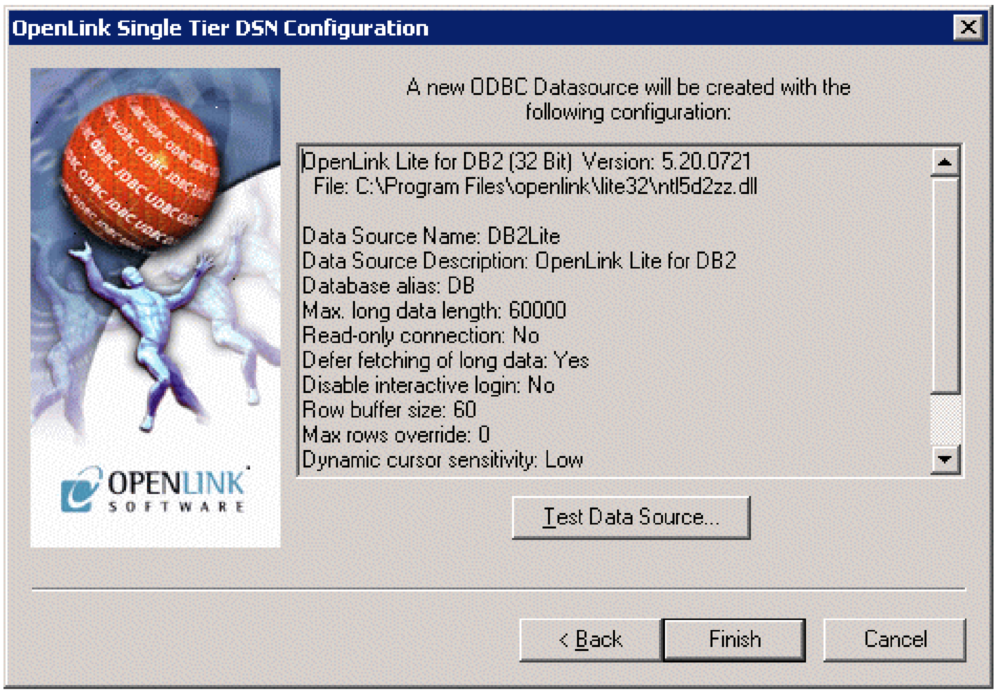
Additional connect compatibility parameters:

- [ ] Enable Microsoft Jet engine options
- [ ] Disable Autocommit
- [ ] Disable rowset size limit

SQL_DBMS_NAME:

7.1.2.5 Confirm and Test

Figure 5.12. Confirm and Test tab



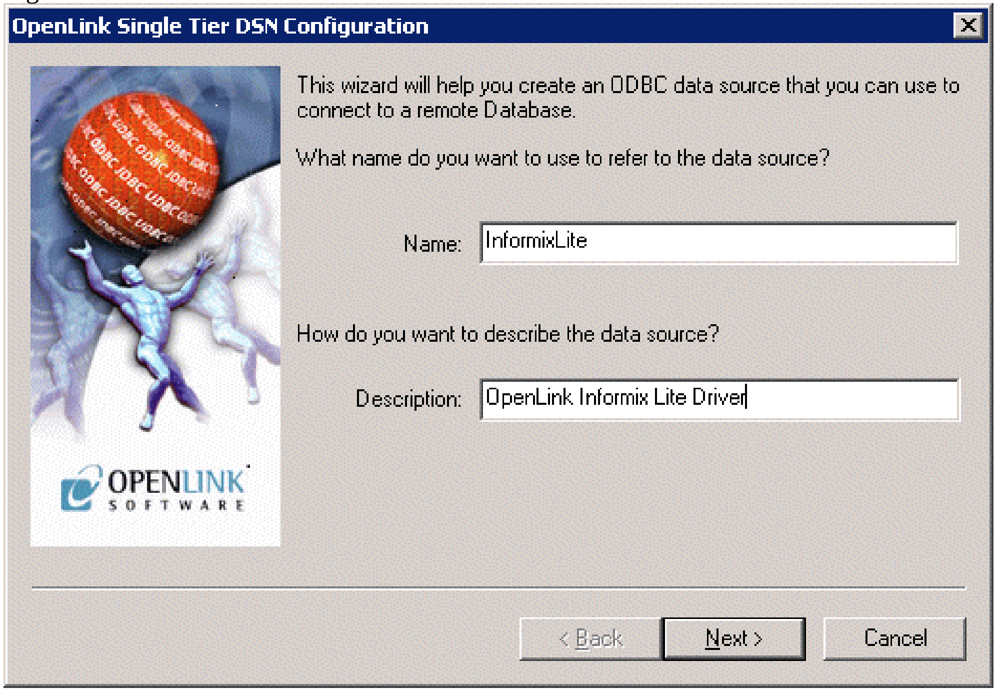
A new ODBC Datasource will be created with the following configuration:

```
OpenLink Lite for DB2 (32 Bit)  Version: 5.20.0721
  File: C:\Program Files\openlink\lite32\ntl5d2zz.dll

Data Source Name: DB2Lite
Data Source Description: OpenLink Lite for DB2
Database alias: DB
Max. long data length: 60000
Read-only connection: No
Defer fetching of long data: Yes
Disable interactive login: No
Row buffer size: 60
Max rows override: 0
Dynamic cursor sensitivity: Low
```

7.1.3 Informix 7 and 9

7.1.3.1 Datasource

Figure 5.13. Datasource tab



This wizard will help you create an ODBC data source that you can use to connect to a remote Database.

What name do you want to use to refer to the data source?

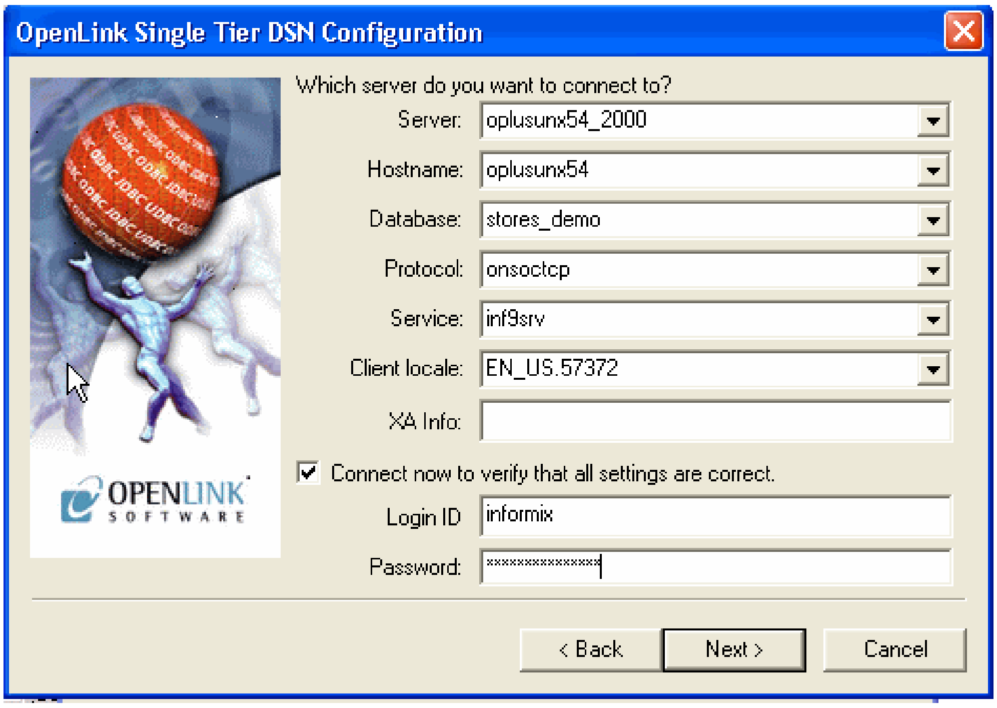
Name: InformixLite

How do you want to describe the data source?

Description: OpenLink Informix Lite Driver

7.1.3.2 Informix 9 - Connect

Figure 5.14. Informix 9 - Connect tab



Which server do you want to connect to?

Server: oplusunx54_2000
Hostname: oplusunx54
Database: stores_demo
Protocol: onsoctcp
Service: inf9srv
Client locale: EN_US.57372
XA Info:
[✓] Connect now to verify that all settings are correct.
Login ID: informix
Password: **************

Enter details of the Informix server.

- Server. The name of the Informix server that you want to communicate with.
- Hostname. The network hostname of the machine hosting the Informix server.
- Database. The name of the database on the server that you want to connect to.
- Protocol. The informix network protocol identifier.
- Service. The service name as configured in the winnt\system32\drivers\etc\services or windows\services file
- #### 7.1.3.2.1 Client Locale

  Define the client locale. This takes the form:

  ```
  [language_territory.]codeset[@modifier]
  ```

  For example:

  ```
  57371
                  en_us.57372
                  en_us.utf8@dict
  ```

  An Informix 9 Lite driver should use UTF-8 as the codeset. The language and territory should not matter; so it should be possible, for example, to use French (fr_fr) or American English (en_us).

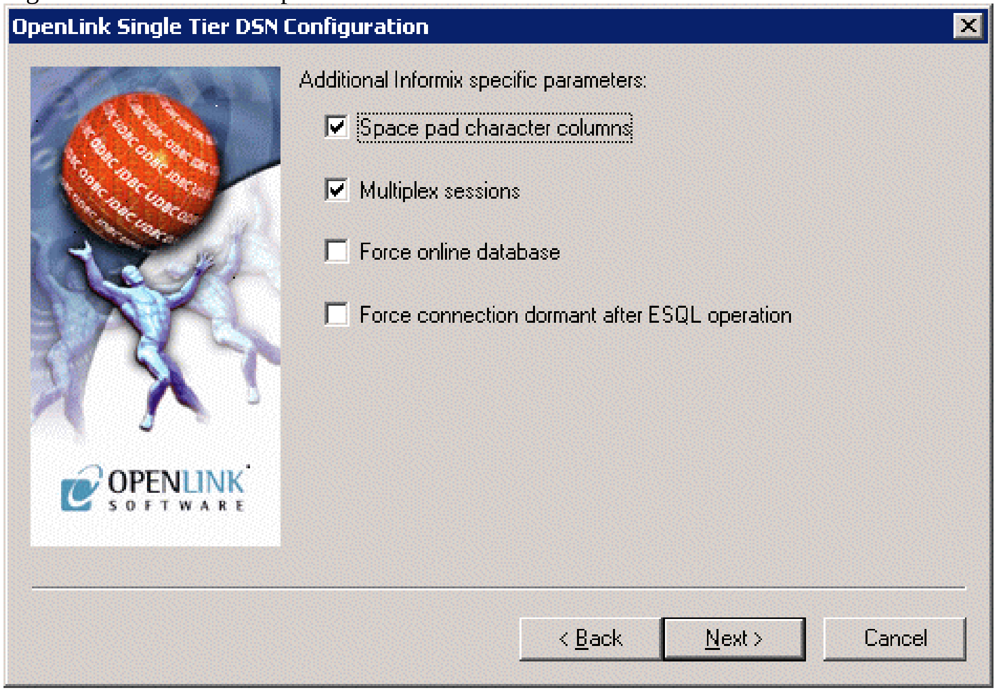
  For Informix clients on Windows, the client locale is typically set through SetNet32. Rather than rely on the SetNet32 settings, our Lite driver instead sets the client locale at runtime.

  It is possible to use a codeset number (Eg. 57372) rather than a codeset name (UTF8) to specify UTF-8 as the codeset. Either form can be used. The registry file included in an Informix client installation lists the supported code sets and the correspondence between codeset names and numbers.

  The optional modifier has a maximum of four alphanumeric characters. This specification modifies the cultural-convention settings that the language and territory settings imply. The modifier usually indicates a special type of localized order that the locale supports. For example, you can set @modifier to specify dictionary or telephone book collation order.
- Username & Password. If you enter the username and password here, and check the "Connect now" checkbox, proceeding to `Next>' will make a test connection to verify the above parameters.
- XA Info. In the case of an OpenLink driver, this parameter is an ODBC Datasource Name (DSN): see the XA documentation for more about this.

7.1.3.3 Informix 9 Options

Figure 5.15. Informix 9 Options tab



Additional Informix specific parameters:

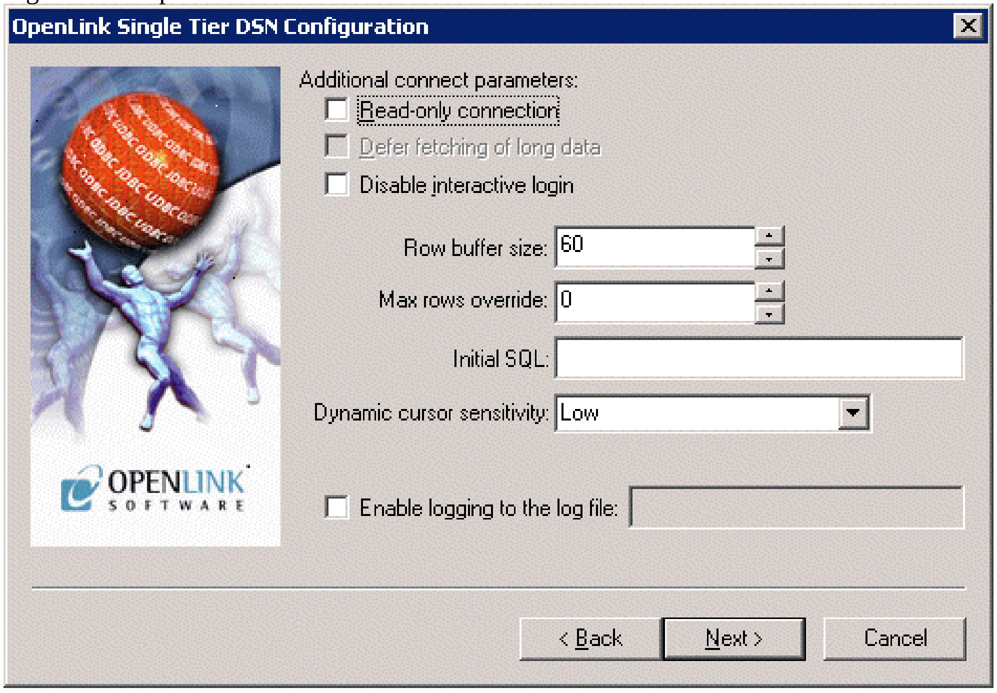
- [✓] Space pad character columns
- [✓] Multiplex sessions
- [ ] Force online database
- [ ] Force connection dormant after ESQL operation

Enter options for the Informix connection:

- Space Pad Character colums. If set, then colums are padded to full width by using the space character.
- Multiplex Sessions. determine the connection parallelization mode.
- Force Online Database. If set, then the database will always appear as online.

7.1.3.4 OpenLink Parameters

Figure 5.16. OpenLink Parameters tab



Additional connect parameters:

- [ ] Read-only connection
- [ ] Defer fetching of long data
- [ ] Disable interactive login

Row buffer size: 60

Max rows override: 0

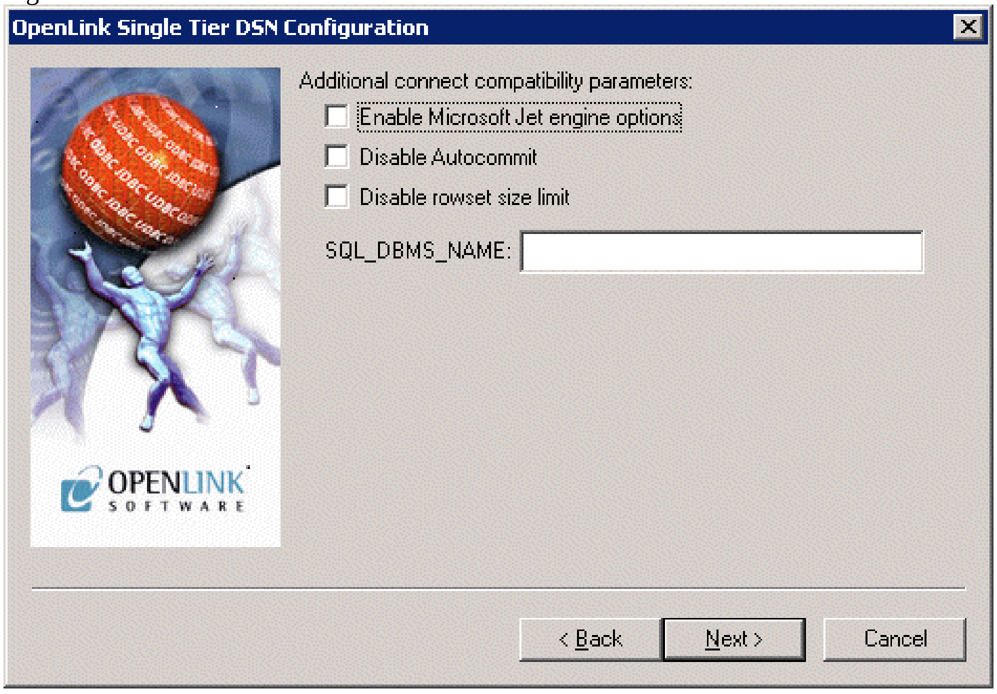
Initial SQL:

Dynamic cursor sensitivity: Low

- [ ] Enable logging to the log file:

7.1.3.5 ODBC Parameters

Figure 5.17. ODBC Parameters tab



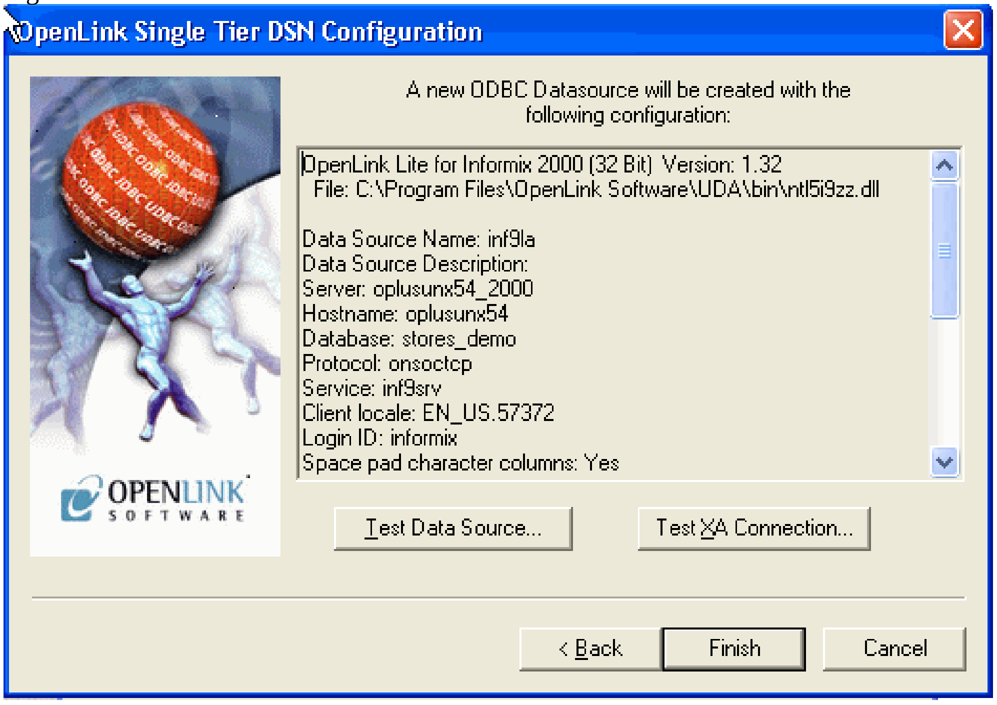
Additional connect compatibility parameters:

- [ ] Enable Microsoft Jet engine options
- [ ] Disable Autocommit
- [ ] Disable rowset size limit

SQL_DBMS_NAME:

7.1.3.6 Finish and Test

Figure 5.18. Finish and test tab



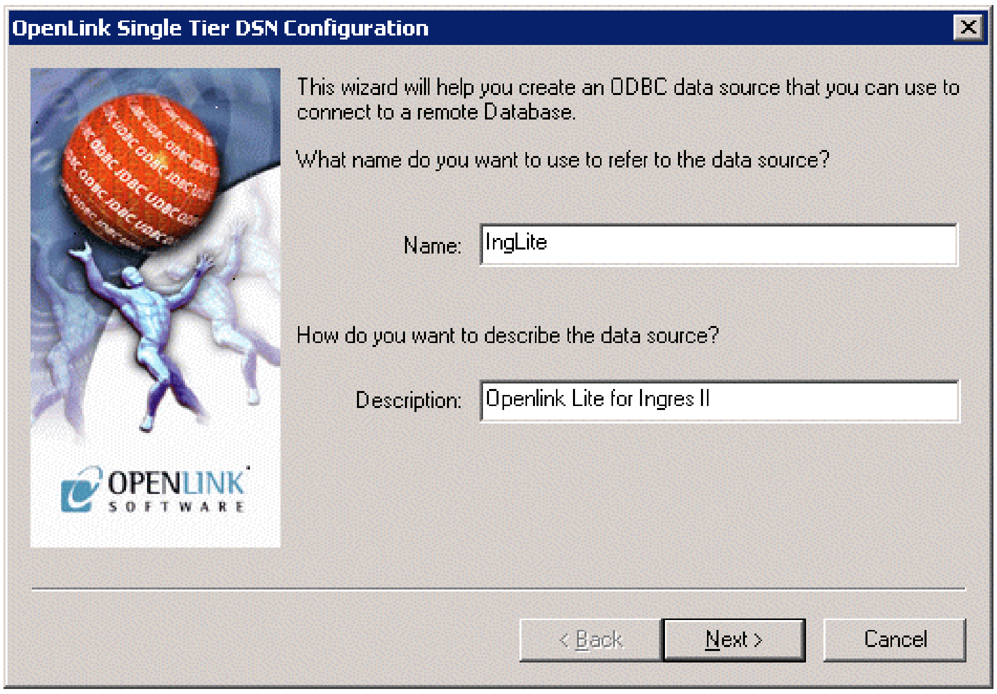
A new ODBC Datasource will be created with the following configuration:

```
OpenLink Lite for Informix 2000 (32 Bit)  Version: 1.32
  File: C:\Program Files\OpenLink Software\UDA\bin\ntl5i9zz.dll

Data Source Name: inf9la
Data Source Description:
Server: oplusunx54_2000
Hostname: oplusunx54
Database: stores_demo
Protocol: onsoctcp
Service: inf9srv
Client locale: EN_US.57372
Login ID: informix
Space pad character columns: Yes
```

7.1.4 Ingres and OpenIngres

7.1.4.1 Datasource

Figure 5.19. Datasource tab


OpenLink Single Tier DSN Configuration

This wizard will help you create an ODBC data source that you can use to connect to a remote Database.

What name do you want to use to refer to the data source?

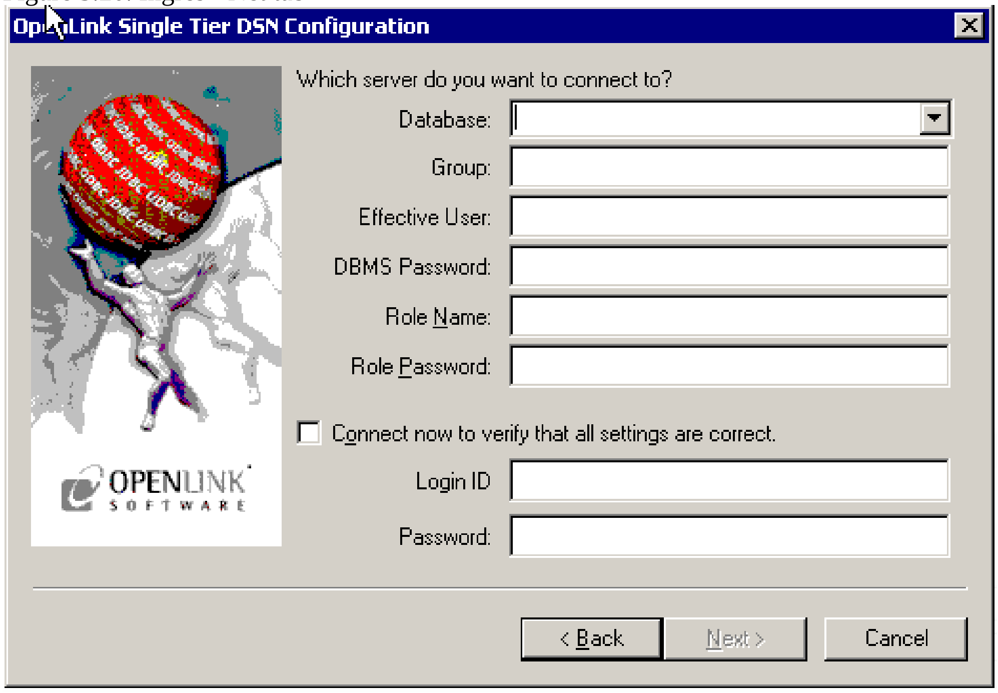
Name: IngLite

How do you want to describe the data source?

Description: Openlink Lite for Ingres II

7.1.4.2 Ingres Net

Figure 5.20. Ingres - Net tab


OpenLink Single Tier DSN Configuration

Which server do you want to connect to?

Database:

Group:

Effective User:

DBMS Password:

Role Name:

Role Password:

☐ Connect now to verify that all settings are correct.

Login ID

Password:

Enter details here about the Ingres server.

- Connection. Takes the form <vnode>::<dbname> where vnode is the name of the virtual node configured either in the Ingres V(isual)DBA or Ingres Netutil utility, and dbname is the name of the database at the vnode destination that you want to connect to.
-

7.1.4.2.1 Roles & Effective Users

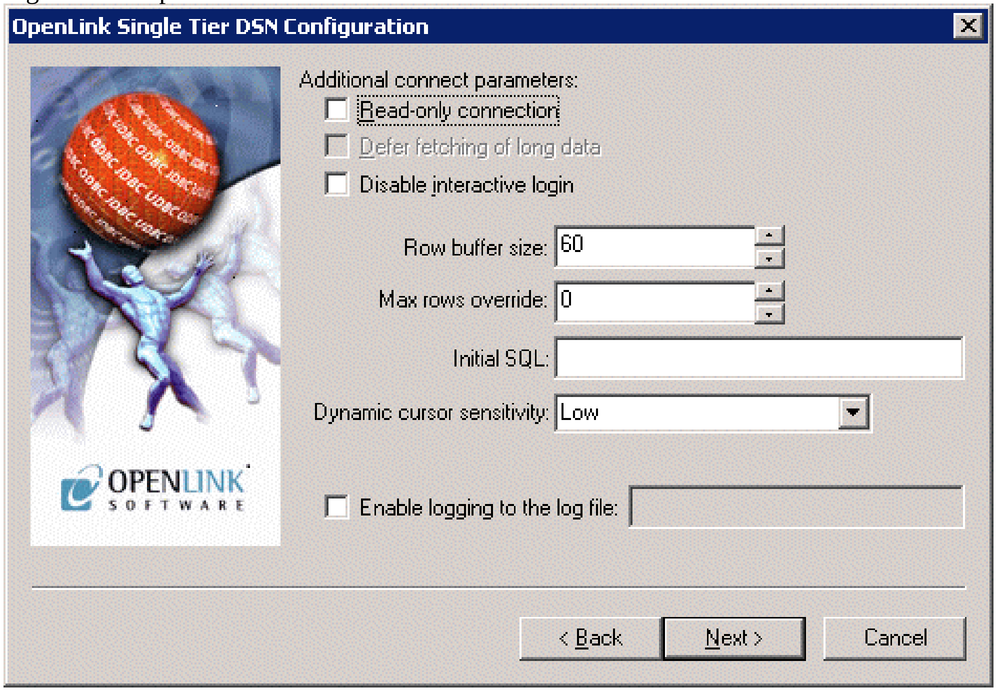
Ingres allows you to connect as a particular role or effective user. From iidbdb you could execute:

```
create role myrole with password=myrolepwd;\g
```

to create a role; it is then this role and password you would enter in the above dialog.

7.1.4.3 OpenLink Parameters

Figure 5.21. OpenLink Parameters tab



OpenLink Single Tier DSN Configuration

Additional connect parameters:

- [ ] Read-only connection
- [ ] Defer fetching of long data
- [ ] Disable interactive login

Row buffer size: 60

Max rows override: 0

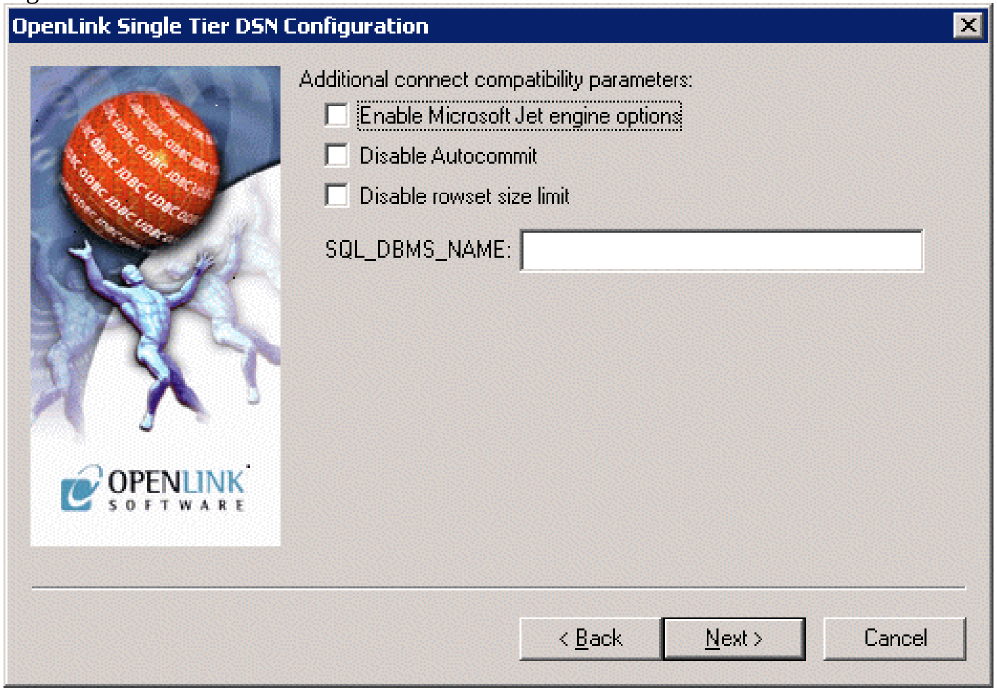
Initial SQL:

Dynamic cursor sensitivity: Low

- [ ] Enable logging to the log file:

7.1.4.4 ODBC Parameters

Figure 5.22. ODBC Parameters tab



OpenLink Single Tier DSN Configuration

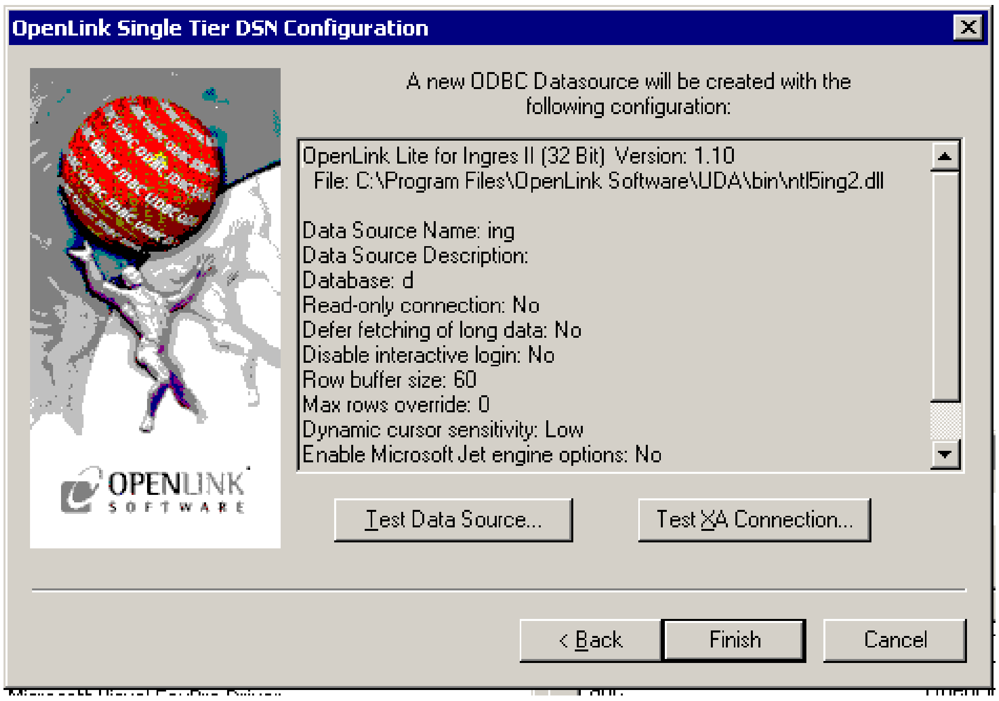
Additional connect compatibility parameters:

- [ ] Enable Microsoft Jet engine options
- [ ] Disable Autocommit
- [ ] Disable rowset size limit

SQL_DBMS_NAME:

7.1.4.5 Finish & test

Figure 5.23. Finish and tab



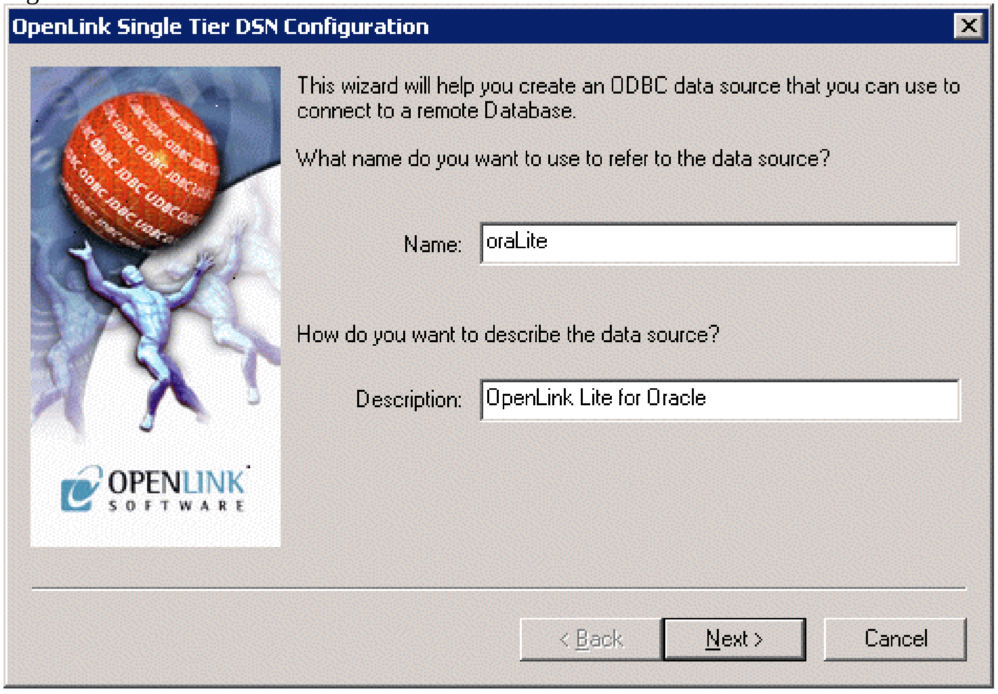
A new ODBC Datasource will be created with the following configuration:

```
OpenLink Lite for Ingres II (32 Bit)  Version: 1.10
  File: C:\Program Files\OpenLink Software\UDA\bin\ntl5ing2.dll

Data Source Name: ing
Data Source Description:
Database: d
Read-only connection: No
Defer fetching of long data: No
Disable interactive login: No
Row buffer size: 60
Max rows override: 0
Dynamic cursor sensitivity: Low
Enable Microsoft Jet engine options: No
```

7.1.5 Oracle 8, 9, and 10

7.1.5.1 Datasource

Figure 5.24. Datasource tab



This wizard will help you create an ODBC data source that you can use to connect to a remote Database.

What name do you want to use to refer to the data source?

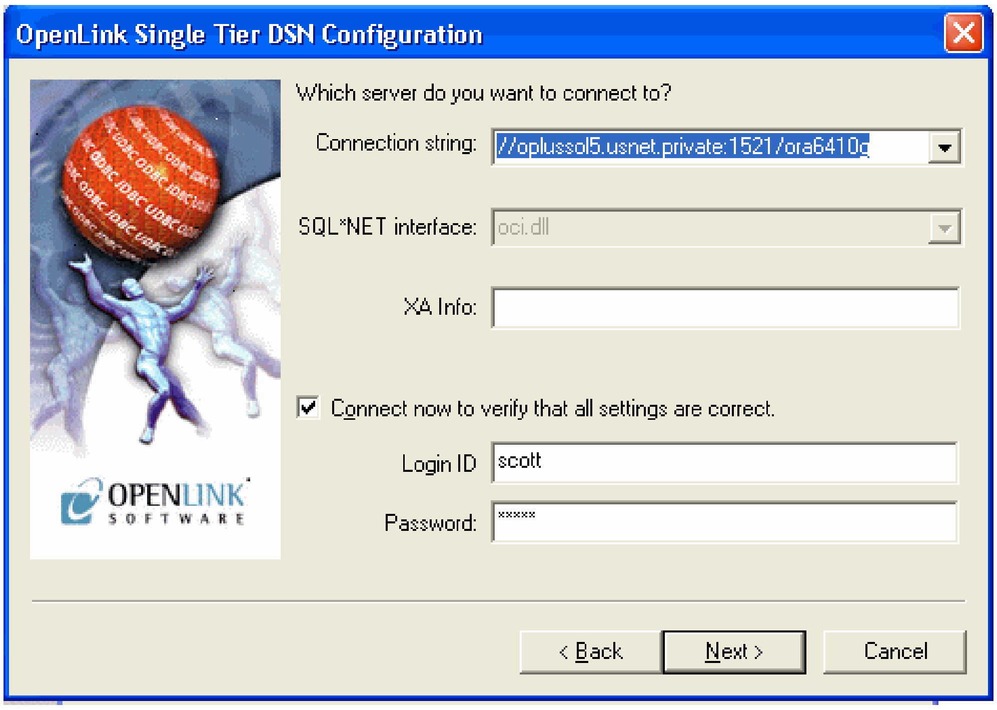
Name: oraLite

How do you want to describe the data source?

Description: OpenLink Lite for Oracle

7.1.5.2 SQL*NET tab

Figure 5.25. SQL*NET tab

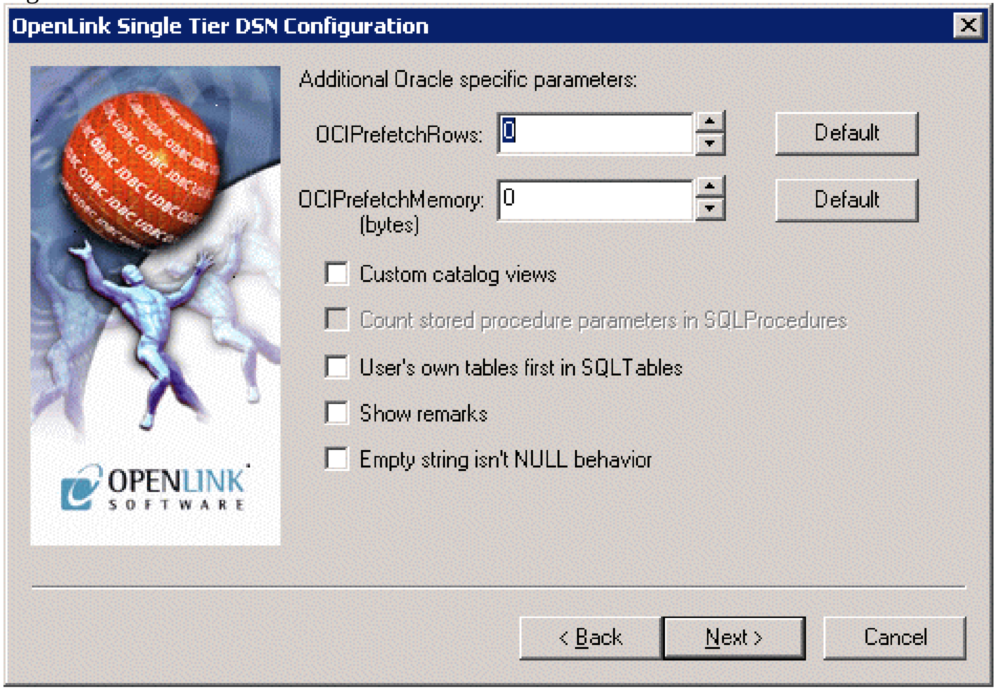

OpenLink Single Tier DSN Configuration
Which server do you want to connect to?
Connection string: //oplussol5.usnet.private:1521/ora6410g
SQL*NET interface: oci.dll
XA Info:
☑ Connect now to verify that all settings are correct.
Login ID scott
Password: *****
< Back
Next >
Cancel

Enter details here for the SQL*NET.

- Connection String. This needs to be a valid SQL*Net connect string. Typically this will only need to be the TNS Name as defined using the Oracle Easy Net configuration utility.
- SQL*net Interface. This lets you select the SQL*Net DLL to be used. AutoScan is the default and best option. If this does not work then try and pick the option that seems to best suite your version of Oracle. If you are using Oracle 8i then use 'oci.dll'.
- XA Info. In the case of an OpenLink driver, this parameter is an ODBC Datasource Name (DSN): see the XA documentation for more about this.

7.1.5.3 Oracle tab

Figure 5.26. Oracle tab


OpenLink Single Tier DSN Configuration
Additional Oracle specific parameters:
OCIPrefetchRows: 0
Default
OCIPrefetchMemory: (bytes) 0
Default
☐ Custom catalog views
☐ Count stored procedure parameters in SQLProcedures
☐ User's own tables first in SQLTables
☐ Show remarks
☐ Empty string isn't NULL behavior
< Back
Next >
Cancel

contains the options:

- **7.1.5.3.1 Custom Catalog Views**

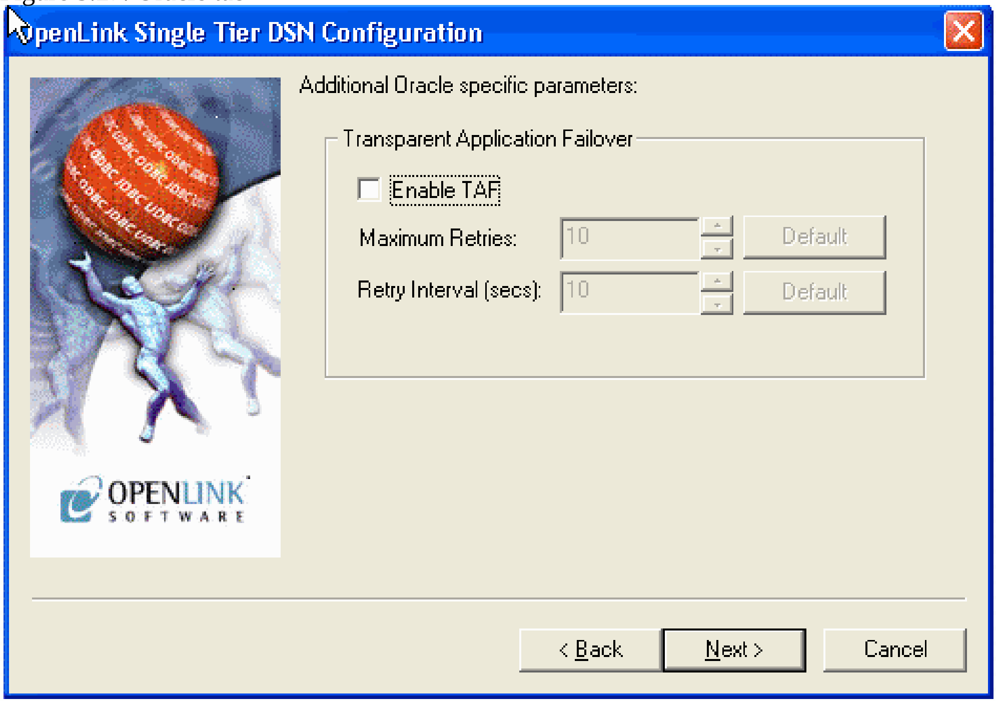
  You must run the ODBCCATx.SQL script against your database as user internal before this option can be checked! Enabling this gives best functionality and support especially for ODBC catalog calls.

  These scripts exist for each version of Oracle supported, the files "odbccat6.sql", "odbccat7.sql", and "odbccat8.sql" representing Oracle versions 6 up to version 8 respectively. These scripts are to be applied to your Oracle instance to enable efficient and extended functionality between OpenLink and Oracle when handling ODBC, JDBC, UDBC, and OLE-DB catalog calls such as SQLForeignKeys() and SQLPrimaryKeys() functions. These functions have significant impact on the performance of your OpenLink clients.

  To run these scripts you need to start the Oracle server manager (svrmgr or sqldba if you do this from the command line). Connect as internal and run the script by locating the relevant script file as you would any other Oracle SQL script file.
- Count Stored Procedure Parameters in SQLProcedures. Enable 'strict' parameter use.

7.1.5.4 Transparent Application Failover (TAF) tab

Figure 5.27. Oracle tab


OpenLink Single Tier DSN Configuration

Additional Oracle specific parameters:

Transparent Application Failover

☐ Enable TAF

Maximum Retries: 10

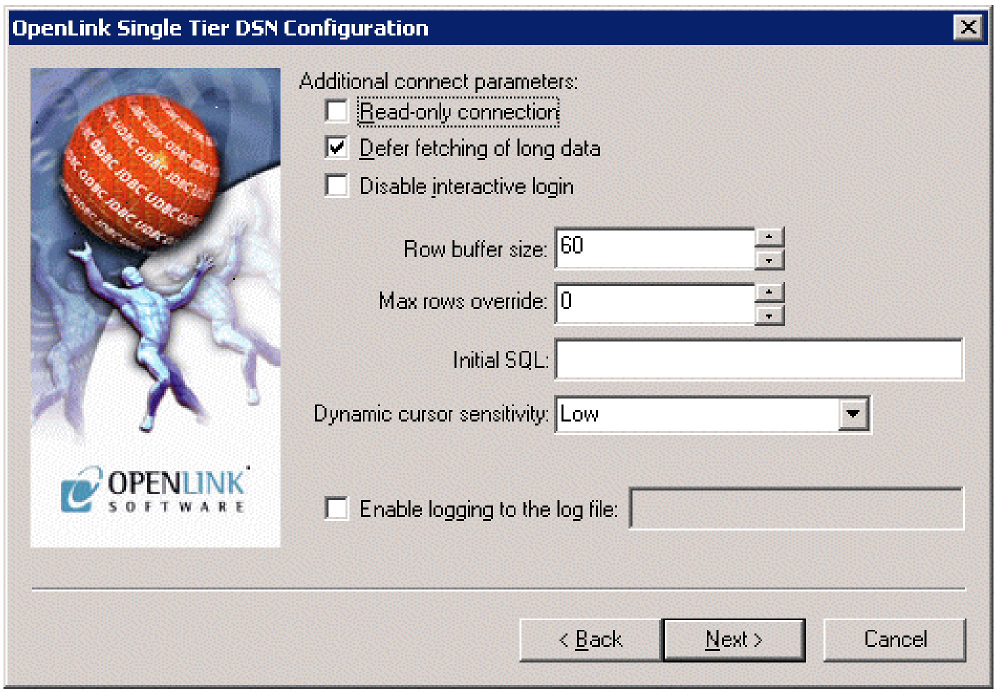
Retry Interval (secs): 10

When OpenLink's TAF support is enabled, in the event that a failover attempt fails, the Lite driver or Multi-Tier agent will instruct Oracle to retry. By default, the maximum number of failover attempts is 10 and the interval between retry attempts is 10 seconds. The default values can be overridden.

See the Oracle RAC/TAF documentation for more.

7.1.5.5 OpenLink Parameters

Figure 5.28. OpenLink Parameters tab



OpenLink Single Tier DSN Configuration

Additional connect parameters:

- [ ] Read-only connection
- [✓] Defer fetching of long data
- [ ] Disable interactive login

Row buffer size: 60

Max rows override: 0

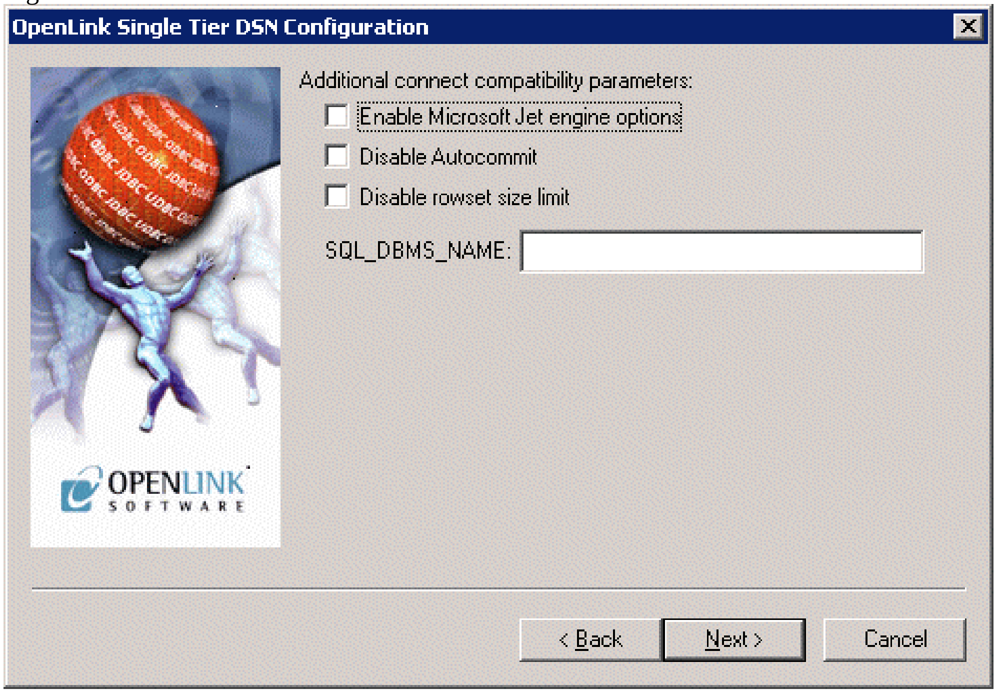
Initial SQL:

Dynamic cursor sensitivity: Low

- [ ] Enable logging to the log file:

7.1.5.6 ODBC Parameters

Figure 5.29. ODBC Parameters tab



OpenLink Single Tier DSN Configuration

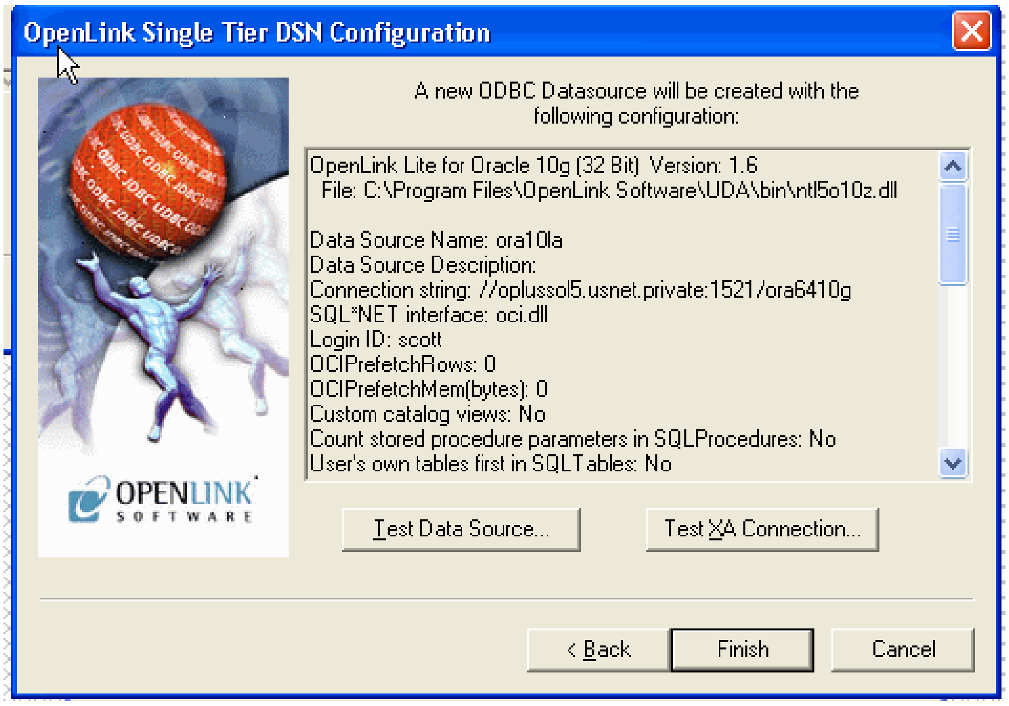
Additional connect compatibility parameters:

- [ ] Enable Microsoft Jet engine options
- [ ] Disable Autocommit
- [ ] Disable rowset size limit

SQL_DBMS_NAME:

7.1.5.7 Finish and testing

Figure 5.30. Finish and Test tab

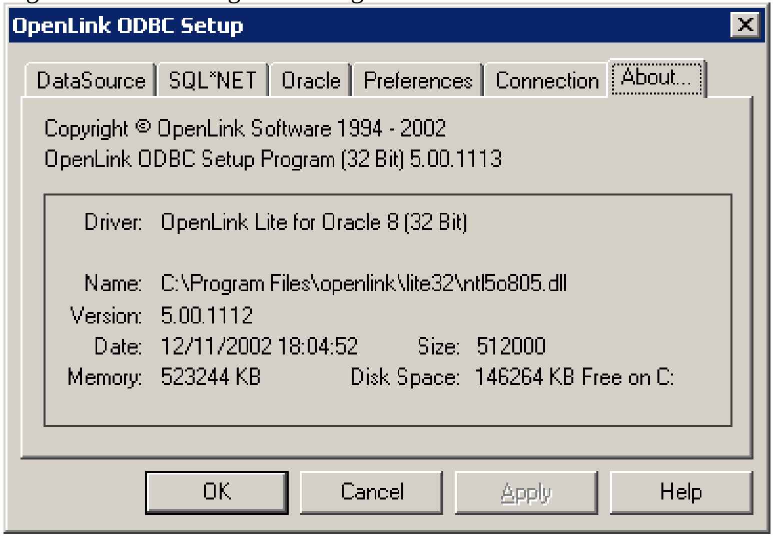

OpenLink Single Tier DSN Configuration

A new ODBC Datasource will be created with the following configuration:

```
OpenLink Lite for Oracle 10g (32 Bit)  Version: 1.6
  File: C:\Program Files\OpenLink Software\UDA\bin\ntl5o10z.dll

Data Source Name: ora10la
Data Source Description:
Connection string: //oplussol5.usnet.private:1521/ora6410g
SQL*NET interface: oci.dll
Login ID: scott
OCIPrefetchRows: 0
OCIPrefetchMem(bytes): 0
Custom catalog views: No
Count stored procedure parameters in SQLProcedures: No
User's own tables first in SQLTables: No
```

7.1.5.8 Finishing and Testing

Figure 5.31. Finishing and testing tab



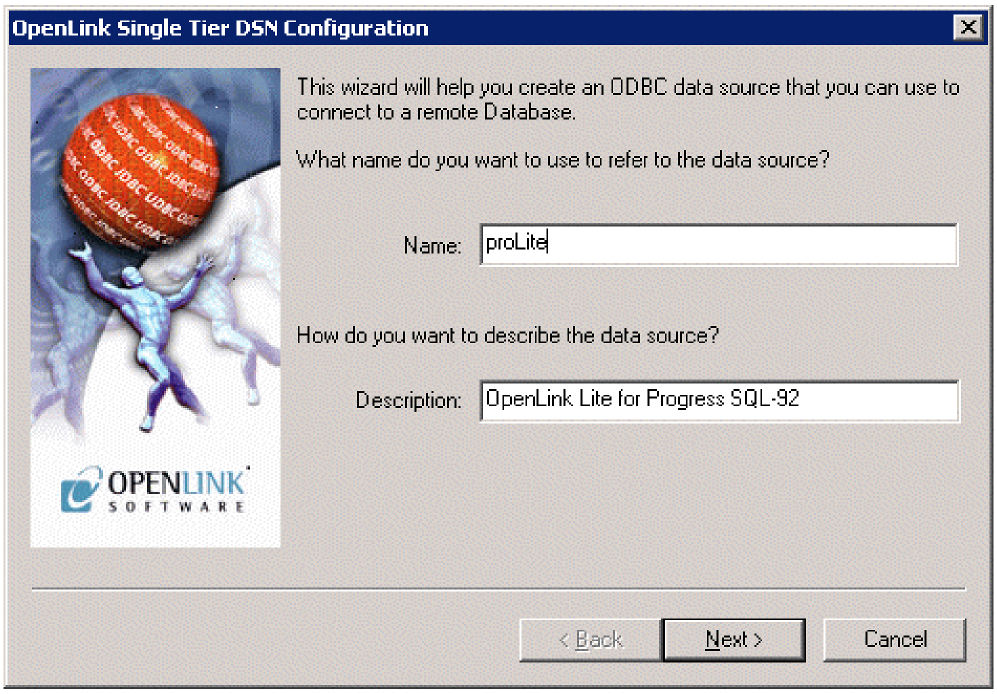
Copyright © OpenLink Software 1994 - 2002
OpenLink ODBC Setup Program (32 Bit) 5.00.1113

```
  Driver:  OpenLink Lite for Oracle 8 (32 Bit)

    Name:  C:\Program Files\openlink\lite32\ntl5o805.dll
 Version:  5.00.1112
    Date:  12/11/2002 18:04:52        Size:  512000
  Memory:  523244 KB           Disk Space:  146264 KB Free on C:
```

7.1.6 Progress 9.1 SQL-92

7.1.6.1 Datasource

Figure 5.32. Datasource tab


OpenLink Single Tier DSN Configuration

This wizard will help you create an ODBC data source that you can use to connect to a remote Database.

What name do you want to use to refer to the data source?

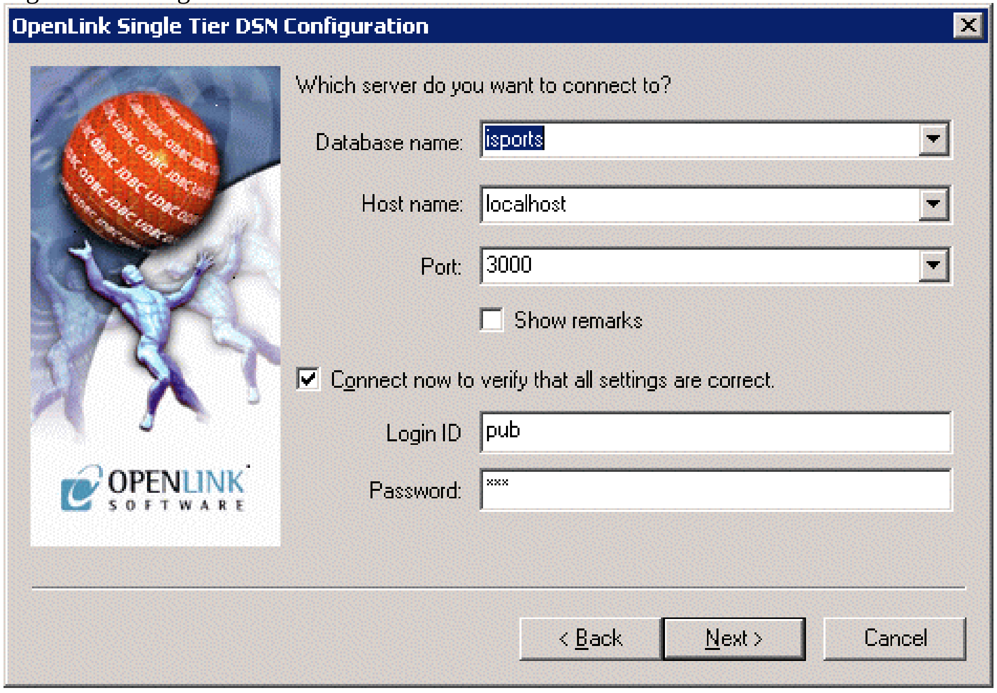
Name: proLite

How do you want to describe the data source?

Description: OpenLink Lite for Progress SQL-92

7.1.6.2 Progress 9 tab

Figure 5.33. Progress 9 tab


OpenLink Single Tier DSN Configuration

Which server do you want to connect to?

Database name: isports

Host name: localhost

Port: 3000

☐ Show remarks

☑ Connect now to verify that all settings are correct.

Login ID pub

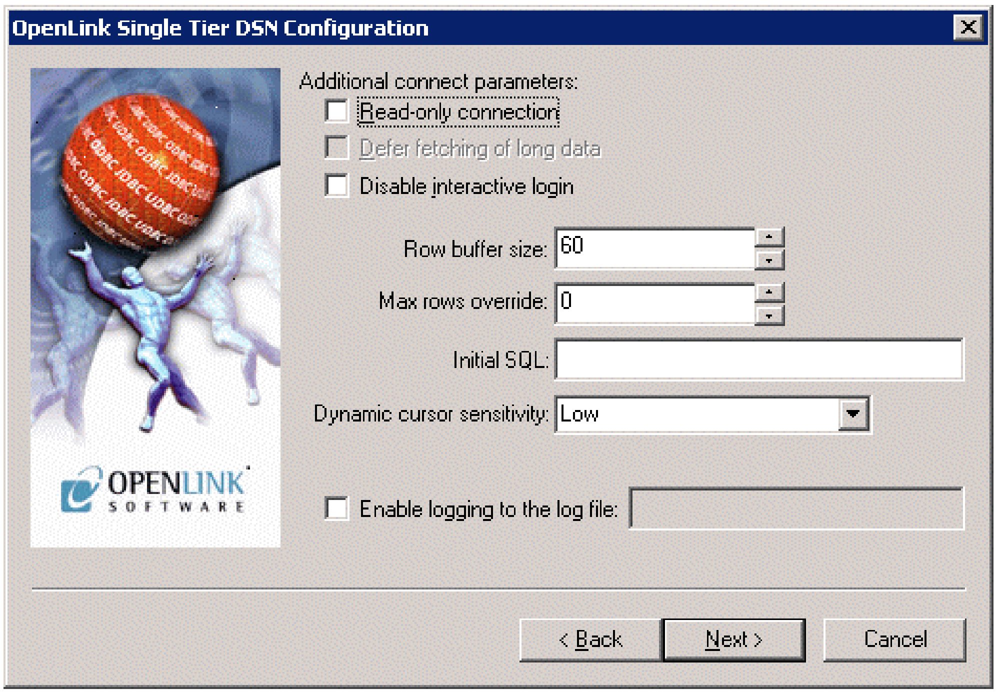
Password: ***

Enter details here to specify Progress connection information.

- Database name. Name of the Progress database.
- Host name. Domain name or IP number of the machine hosting the database.
- Port. TCP port on which the database is listening.

7.1.6.3 OpenLink Parameters

Figure 5.34. OpenLink Parameters tab



OpenLink Single Tier DSN Configuration

Additional connect parameters:

- [ ] Read-only connection
- [ ] Defer fetching of long data
- [ ] Disable interactive login

Row buffer size: 60

Max rows override: 0

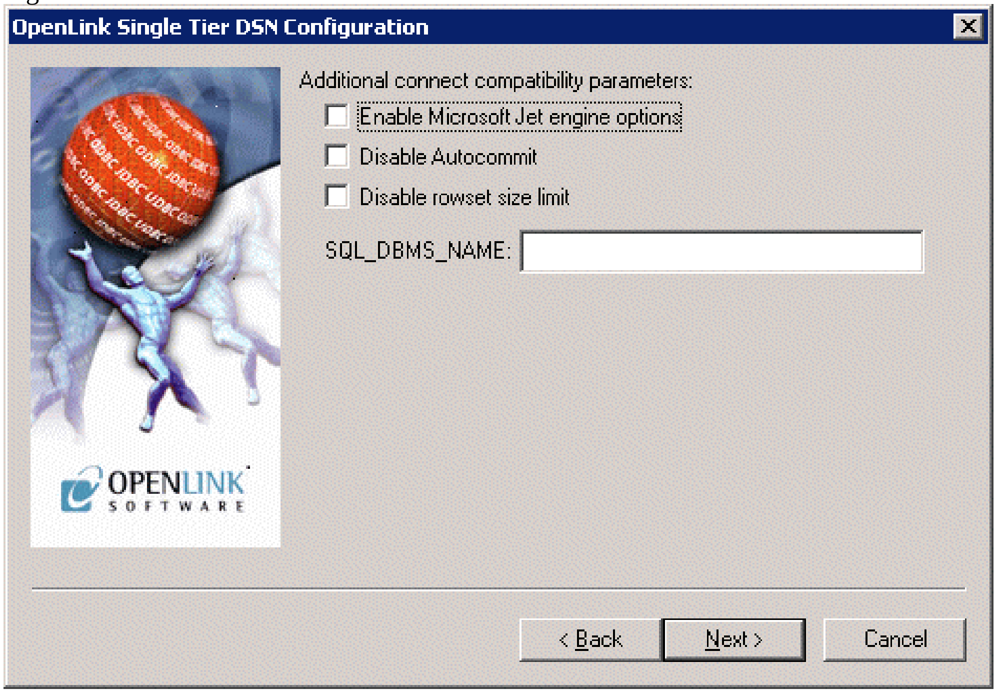
Initial SQL:

Dynamic cursor sensitivity: Low

- [ ] Enable logging to the log file:

7.1.6.4 ODBC Parameters

Figure 5.35. ODBC Parameters tab



OpenLink Single Tier DSN Configuration

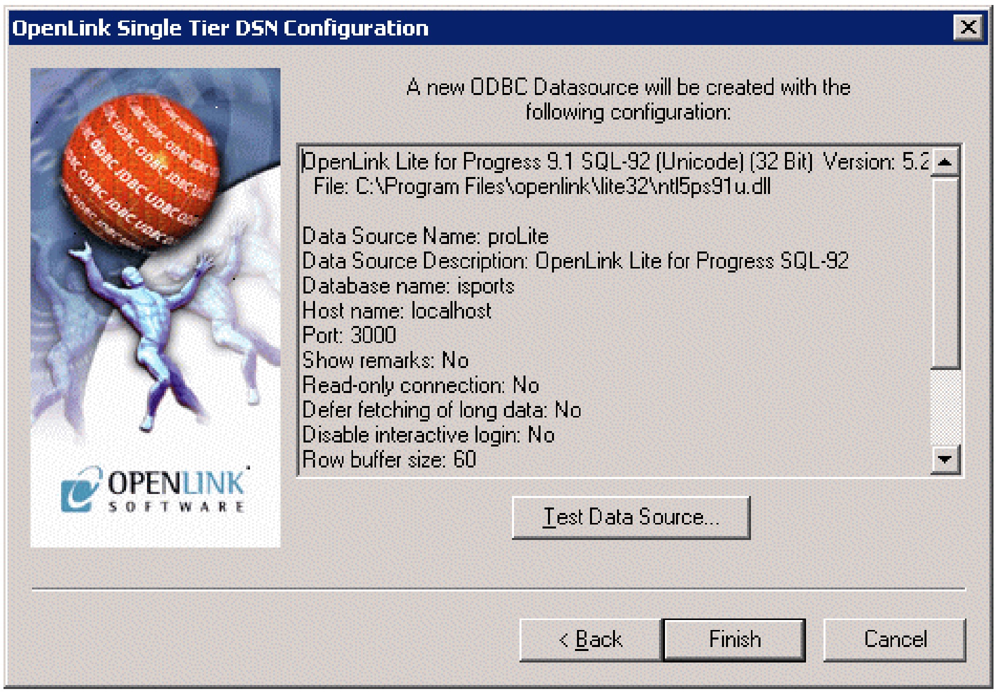
Additional connect compatibility parameters:

- [ ] Enable Microsoft Jet engine options
- [ ] Disable Autocommit
- [ ] Disable rowset size limit

SQL_DBMS_NAME:

7.1.6.5 Finishing & Testing

Figure 5.36. Finishing and testing tab


OpenLink Single Tier DSN Configuration

A new ODBC Datasource will be created with the following configuration:

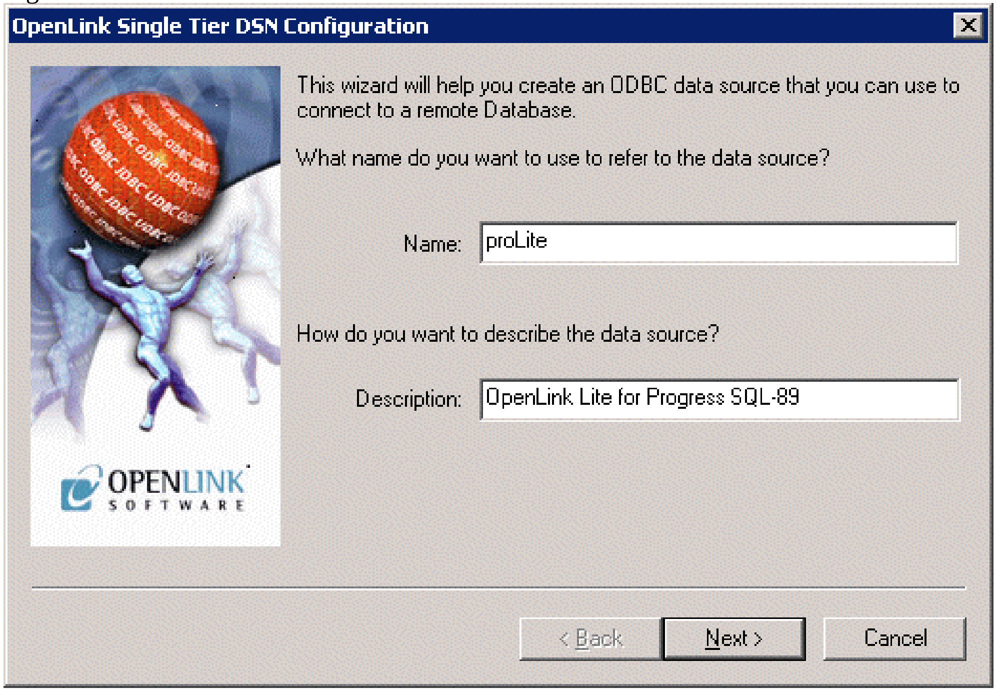
OpenLink Lite for Progress 9.1 SQL-92 (Unicode) (32 Bit) Version: 5.2
File: C:\Program Files\openlink\lite32\ntl5ps91u.dll

Data Source Name: proLite
Data Source Description: OpenLink Lite for Progress SQL-92
Database name: isports
Host name: localhost
Port: 3000
Show remarks: No
Read-only connection: No
Defer fetching of long data: No
Disable interactive login: No
Row buffer size: 60

7.1.7 Other Progress

7.1.7.1 Datasource

Figure 5.37. Datasource tab


OpenLink Single Tier DSN Configuration

This wizard will help you create an ODBC data source that you can use to connect to a remote Database.

What name do you want to use to refer to the data source?

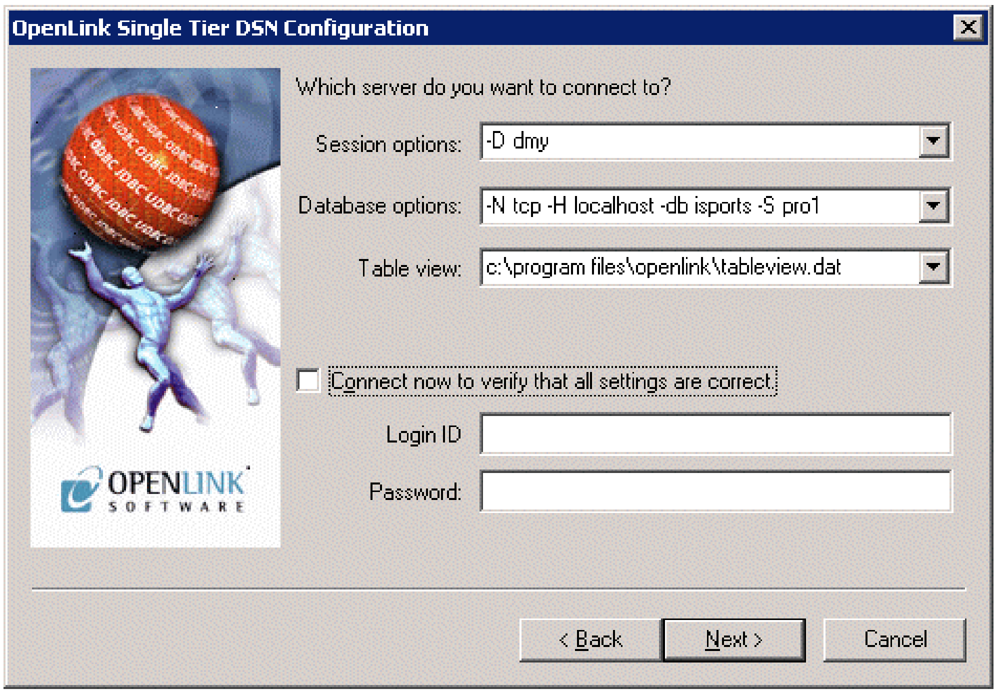
Name: proLite

How do you want to describe the data source?

Description: OpenLink Lite for Progress SQL-89

7.1.7.2 Progress tab

Figure 5.38. Progress tab


OpenLink Single Tier DSN Configuration

Which server do you want to connect to?

Session options: -D dmy

Database options: -N tcp -H localhost -db isports -S pro1

Table view: c:\program files\openlink\tableview.dat

Connect now to verify that all settings are correct

Login ID

Password:

Enter details here to specify Progress connection information.

- #### 7.1.7.2.1 Session Options

  Any Progress server startup options are accepted in this box. Note: These options are required for the Small Client driver only.

  Typical options could be:

  ```
  -SV -S <service> -H <hostname> -N TCP
  ```

- #### 7.1.7.2.2 Database Options

  Any valid Progress Database connection options. See your Progress manual for a complete list of accepted options.

  When using the Small Client driver, enter the following minimum database information in this box:

  ```
  -db <dbname>
  ```

  When using the Large Client driver, enter the following minimum database information in this box:

  ```
  -db <dbname> -S <service> -H <hostname> -N <protocol>
  ```

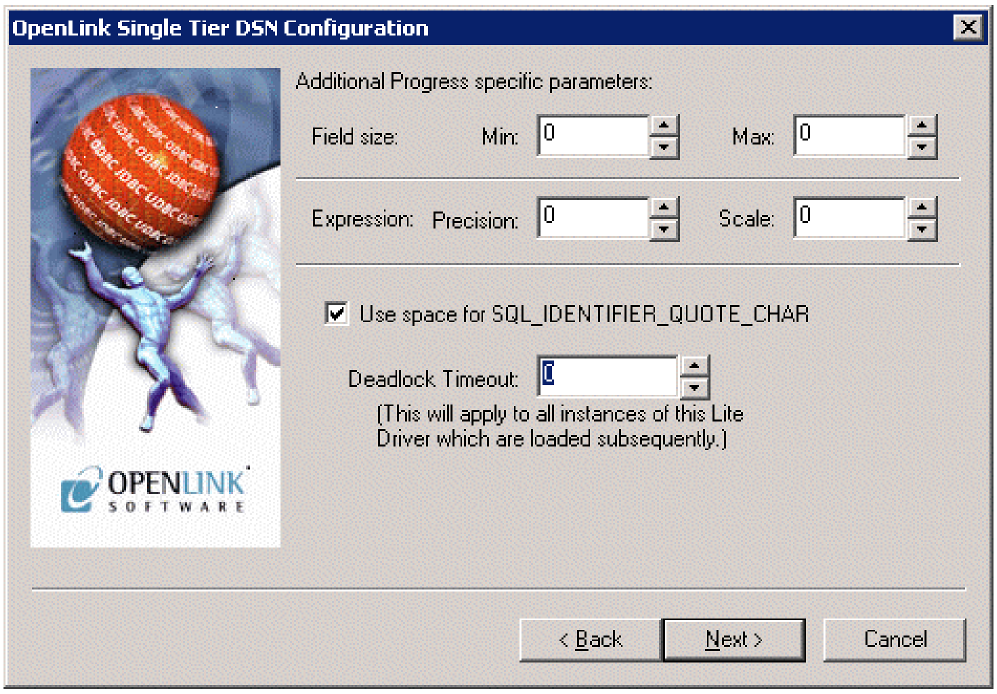
  Note: The <service> entry must meet the following requirements:

  1. It must be listed in the Progress database server's /etc/services file, with a corresponding TCP port to which to bind.
  2. It must be listed with the same name as above in your Windows \system32\drivers\etc\services file, matching the TCP port used for the database server's Progress service name.

  To connect to multiple databases and make use of array fields see the tableview guide
- Table View. The full path and file name of the .dat 'tableview' file created after running the setup.p applications. See tableview guide for more information.

7.1.7.3 Additional Progress-specific parameters

Figure 5.39. Additional Progress-specific parameters tab


OpenLink Single Tier DSN Configuration

Additional Progress specific parameters:

Field size: Min: 0 Max: 0

Expression: Precision: 0 Scale: 0

☑ Use space for SQL_IDENTIFIER_QUOTE_CHAR

Deadlock Timeout: 0

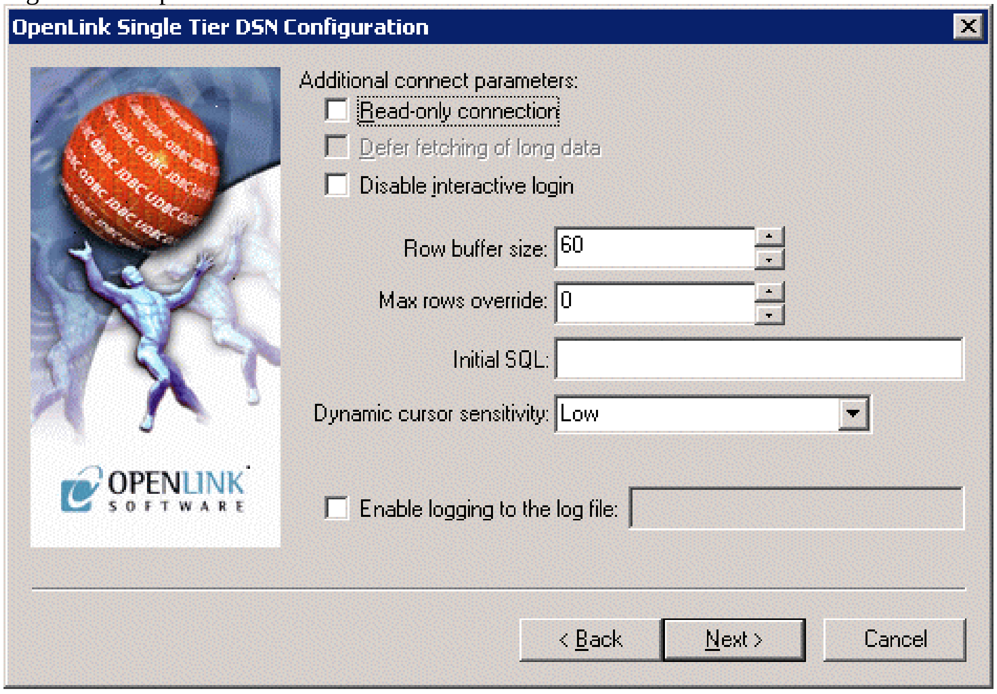
(This will apply to all instances of this Lite Driver which are loaded subsequently.)

< Back | Next > | Cancel

- Field size. Enter the minimum and maximum sizes for a char(N) field here
- Expression Precision & Scale. This is the default precision and scale for anonymous numeric fields in the resultset.
- Use space for SQL_IDENTIFIER_QUOTE_CHAR. Check this to enable a workaround for Business Objects' handling of the space-character in quoting an identifier.

7.1.7.4 OpenLink Parameters

Figure 5.40. OpenLink Parameters tab


OpenLink Single Tier DSN Configuration

Additional connect parameters:

☐ Read-only connection

☐ Defer fetching of long data

☐ Disable interactive login

Row buffer size: 60

Max rows override: 0

Initial SQL:

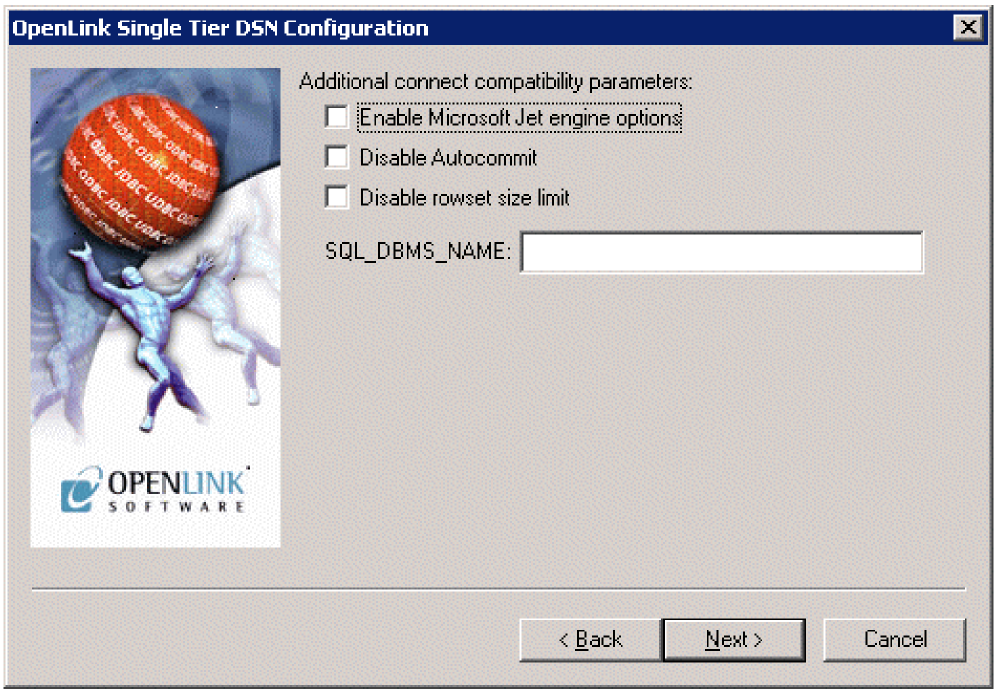
Dynamic cursor sensitivity: Low

☐ Enable logging to the log file:

< Back | Next > | Cancel

7.1.7.5 ODBC Parameters

Figure 5.41. ODBC Parameters tab



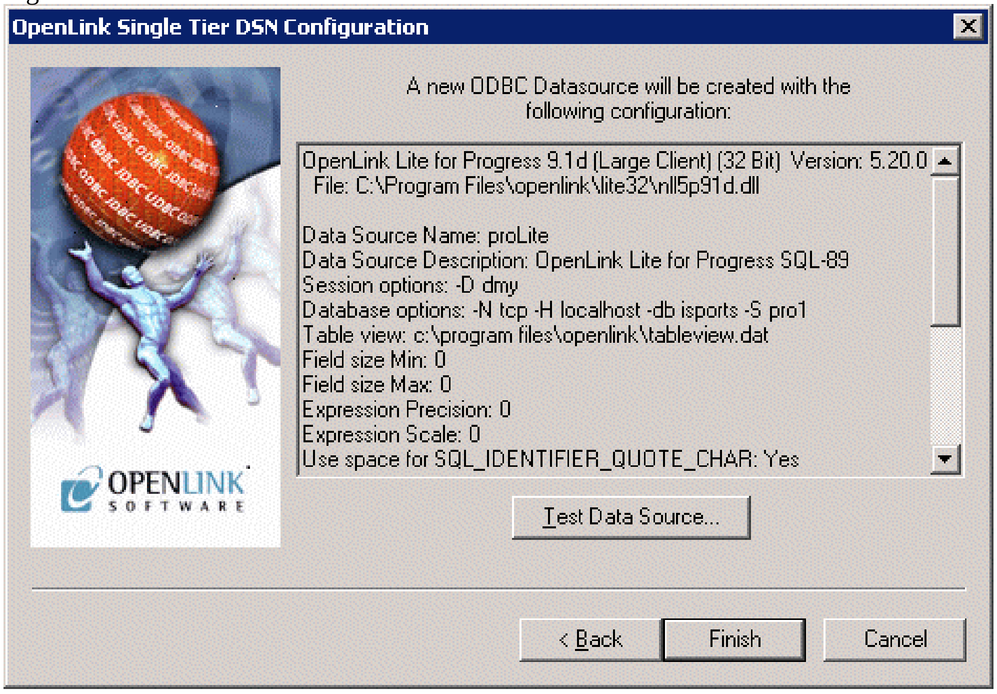
Additional connect compatibility parameters:

☐ Enable Microsoft Jet engine options
☐ Disable Autocommit
☐ Disable rowset size limit

SQL_DBMS_NAME:

7.1.7.6 Finish and test

Figure 5.42. Finish and Test tab



A new ODBC Datasource will be created with the following configuration:

```
OpenLink Lite for Progress 9.1d (Large Client) (32 Bit)  Version: 5.20.0
  File: C:\Program Files\openlink\lite32\nll5p91d.dll

Data Source Name: proLite
Data Source Description: OpenLink Lite for Progress SQL-89
Session options: -D dmy
Database options: -N tcp -H localhost -db isports -S pro1
Table view: c:\program files\openlink\tableview.dat
Field size Min: 0
Field size Max: 0
Expression Precision: 0
Expression Scale: 0
Use space for SQL_IDENTIFIER_QUOTE_CHAR: Yes
```

7.1.7.7 Connecting Progress Lite to Multiple Databases and Gaining Access to Arrays

Utility and functionality for the Progress Driver that enables the user to connect to multiple databases and use array fields. This is only applicable to drivers not built against Progress SQL92 Libraries.

After installing a Progress Lite Driver you should find the following files in the lite32 directory:

```
setup.p
setup.i
oplrvc1.p
oplrvc2.p
```

setup.p is a Progress script program. When the program runs it will ask you what databases you wish to connect to and generate a catalog file of all the databases and tables within into a tableview file (.dat), and will create its associated parameter file (.pf).

Doing this allows you to connect to multiple databases, allows you to see all the tables in all databases from SQLTables, and allows you to use arrays fields through ODBC.

Prior to running this program you must ensure that all database servers for the databases you wish to include are running since the program will need to connect to them.

Make sure that your $DLC environment variable is set correctly to point to your DLC directory.

e.g. DLC=/dbs/progress/dlc

export DLC

Go to the openlink/lite32 directory, and type the following:

$DLC/bin/pro -p setup.p

7.1.8 Note:

This may vary between versions. In Progress 6, pro is in the dlc directory not dlc/bin.

You may also need to set a PROPATH environment variable to include the current working directory and the directory containing the setup.p utility files.

You will get the following screens:

```
.       @@@@@@   @@@@@@   @@@@@@@   @@@@@   @@@@@@   @@@@@@@   @@@@@    @@@@@
       @     @  @     @  @     @  @     @  @     @  @        @     @  @     @
      @     @  @     @  @     @  @        @     @  @        @        @
     @@@@@@   @@@@@@   @     @  @  @@@@  @@@@@@   @@@@@     @@@@@    @@@@@
    @        @   @    @     @  @     @  @   @    @              @        @
   @        @    @   @     @  @     @  @    @   @        @     @  @     @
  @        @     @  @@@@@@@   @@@@@   @     @  @@@@@@@   @@@@@    @@@@@
                           Progress Software Corporation
                                    14 Oak Park
                            Bedford, Massachusetts 01730
                                    617-280-4000
       PROGRESS is a registered trademark of Progress Software Corporation
      Copyright 1984,1985,1986,1987,1988,1989,1990,1991,1992,1993,1994,1995
                        by Progress Software Corporation
                             All Rights Reserved
PROGRESS Version 7.3C as of Thu Jun 29 15:05:14 EDT 1995
```

Followed by:

```
+-----------------------------------------------------+
| Enter a number of databases you want to connect to. |
| The first database is your master database.         |
+-----------------------------------------------------+
+-----------------------------------------------------------------------------+
| # DbName                         Connect String                           OK|
|-- ------------------------------ ---------------------------------------- --|
| 1 ______________________________ ________________________________________ __|
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
+-----------------------------------------------------------------------------+
Enter data or press PF4 to end.
```

At this point you will need to give the program information to contact the databases you want to include here. As shown below.

```
+------------------------------------------------------+
| Enter a number of databases you want to connect to. |
| The first database is your master database.         |
+------------------------------------------------------+
+-------------------------------------------------------------------------------+
| # DbName                          Connect String                           OK|
|-- ------------------------------ ---------------------------------------- --|
| 1 /users/progress/dbs/pro7test__ -N tcp -H 194.152.95.26 -S pro7test_____ __|
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
+-------------------------------------------------------------------------------+
Enter data or press PF4 to end.
```

After entering the line of information press return. There will be a little pause while the program checks that the database server is running and can be contacted. When this is verified OK will appear at the end of the line.

```
+------------------------------------------------------+
| Enter a number of databases you want to connect to. |
| The first database is your master database.         |
+------------------------------------------------------+
+-------------------------------------------------------------------------------+
| # DbName                          Connect String                           OK|
|-- ------------------------------ ---------------------------------------- --|
| 1 /users/progress/dbs/pro7test__ -N tcp -H 194.152.95.26 -S pro7test_____ OK|
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
+-------------------------------------------------------------------------------+
Enter data or press PF4 to end.
```

The cursor will move to the next line. Repeat the above procedure for each database. Press PF4 when finished. You will then need to supply the name for the .dat and .pf files to be created.

```
+------------------------------------------------------+
| Enter a number of databases you want to connect to. |
| The first database is your master database.         |
+------------------------------------------------------+
+-------------------------------------------------------------------------------+
| # DbName                          Connect String                           OK|
|-- ------------------------------ ---------------------------------------- --|
| 1 /users/progress/dbs/pro7test__ -N tcp -H 194.152.95.26 -S pro7test_____ OK|
| 2 ______________________________ ________________________________________ __|
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
+-------------------------------------------------------------------------------+
Basename for .pf and .dat files_____________________
Enter data or press PF4 to end.
```

After a brief period the program will have finished:

```
+------------------------------------------------------+
| Enter a number of databases you want to connect to. |
| The first database is your master database.         |
+------------------------------------------------------+
+------------------------------------------------------------------------------+
| # DbName                         Connect String                           OK|
|-- ------------------------------ ---------------------------------------- --|
| 1 /users/progress/dbs/pro7test__ -N tcp -H 194.152.95.26 -S pro7test_____ OK|
| 2 ______________________________ ________________________________________ __|
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
+------------------------------------------------------------------------------+
Creating .pf file to use
Creating .dat file with table information
Procedure Complete. Press space bar to continue.
```

Now you have to integrate these files into your system.

In the Lite Driver setup dialog box you will find an option box called Table View. In this field place:

<full path and file name to .dat file>

Now you can use in the Connection Options, only:

-pf <full path and file name to .pf file>

To resolve you connection parameters since they are include in this file.

7.1.9 Microsoft or Sybase SQL Server (TDS)

7.1.9.1 Installation

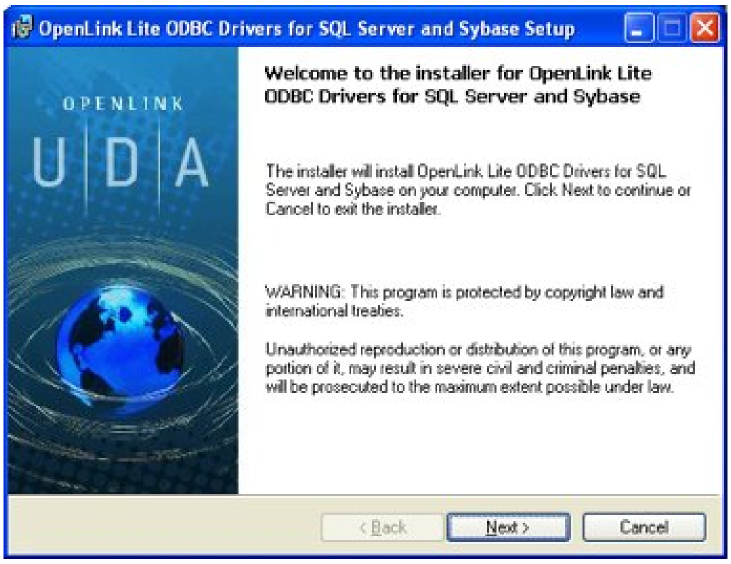
The OpenLink ODBC Driver for SQL Server and Sybase for Windows is distributed in a single .msi file.

Click the Open link that appears in your Downloads dialog.

Figure 5.43. lite_tds_SQL_Open.png

The installer will display a "Welcome" message. Click "Next."

Figure 5.44. lite_tds_SQL_Welcome.png



Welcome to the installer for OpenLink Lite ODBC Drivers for SQL Server and Sybase

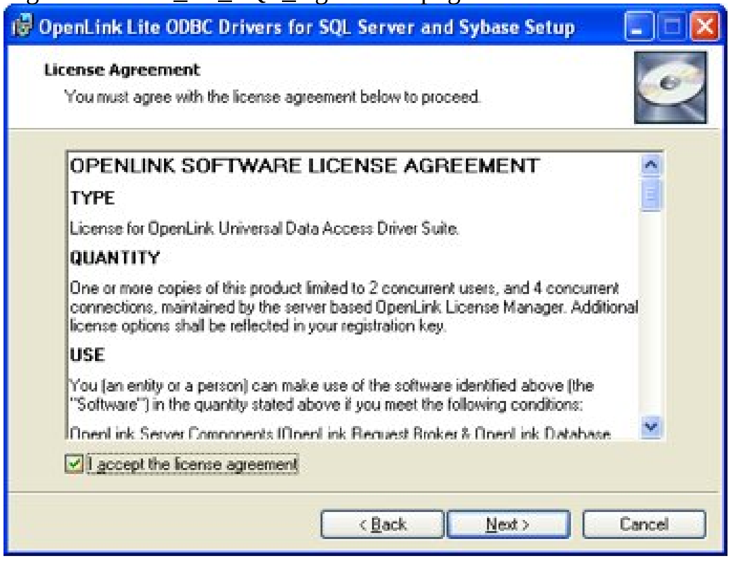
The installer will install OpenLink Lite ODBC Drivers for SQL Server and Sybase on your computer. Click Next to continue or Cancel to exit the installer.

WARNING: This program is protected by copyright law and international treaties.

Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under law.

The next screen will display the License Agreement for the OpenLink Lite Driver. Please read and check the "I accept the license agreement" checkbox. Then, click Next.

Figure 5.45. lite_tds_SQL_Agreement.png



License Agreement

You must agree with the license agreement below to proceed.

OPENLINK SOFTWARE LICENSE AGREEMENT

TYPE

License for OpenLink Universal Data Access Driver Suite.

QUANTITY

One or more copies of this product limited to 2 concurrent users, and 4 concurrent connections, maintained by the server based OpenLink License Manager. Additional license options shall be reflected in your registration key.

USE

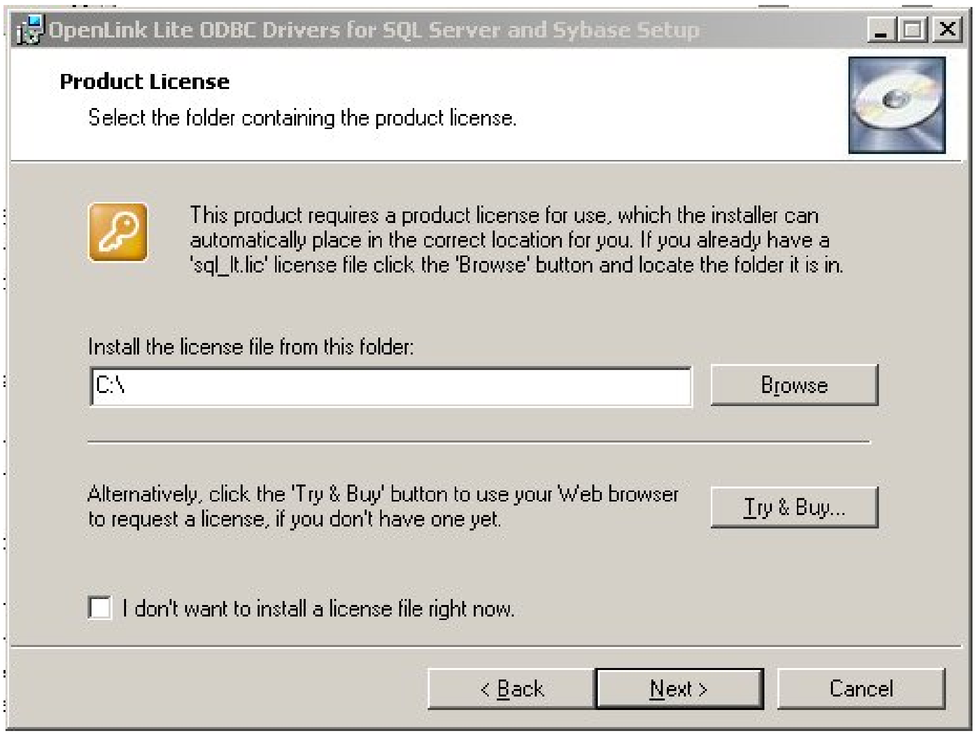
You (an entity or a person) can make use of the software identified above (the "Software") in the quantity stated above if you meet the following conditions:

OpenLink Server Components (OpenLink Request Broker & OpenLink Database

☑ I accept the license agreement

Your driver needs a license file to operate. Click the Browse button to locate a commercial or evaluation license that you have previously downloaded onto your local hard drive. Alternatively, click the Try & Buy button to obtain a commercial or evaluation license.

Figure 5.46. lite_tds_SQL_License.png


OpenLink Lite ODBC Drivers for SQL Server and Sybase Setup

Product License

Select the folder containing the product license.

This product requires a product license for use, which the installer can automatically place in the correct location for you. If you already have a 'sql_lt.lic' license file click the 'Browse' button and locate the folder it is in.

Install the license file from this folder:

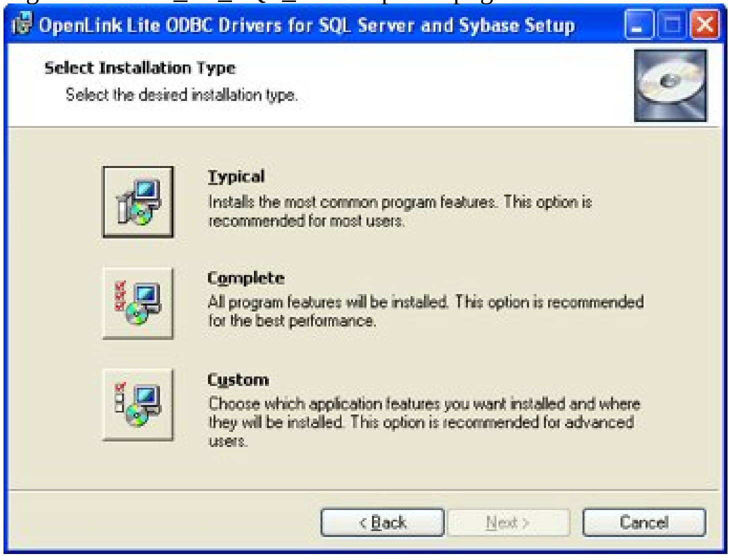
C:\

Alternatively, click the 'Try & Buy' button to use your Web browser to request a license, if you don't have one yet.

I don't want to install a license file right now.

You can check the "I don't want to install a license file right now" check box. This option will permit you to install the product. However, you will not be able to use the product until you obtain a commercial or evaluation license key.

Figure 5.47. lite_tds_SQL_InstallOptions.png


OpenLink Lite ODBC Drivers for SQL Server and Sybase Setup

Select Installation Type

Select the desired installation type.

Typical
Installs the most common program features. This option is recommended for most users.

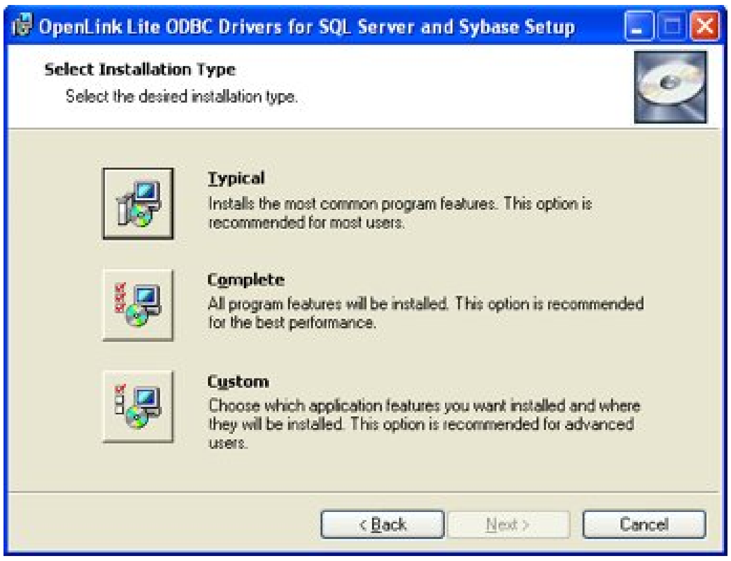
Complete
All program features will be installed. This option is recommended for the best performance.

Custom
Choose which application features you want installed and where they will be installed. This option is recommended for advanced users.

Click Next.

Choose among the Typical, Complete, or Custom installation types.

Figure 5.48. lite_tds_SQL_InstallOptions.png



Select Installation Type

Select the desired installation type.

Typical
Installs the most common program features. This option is recommended for most users.

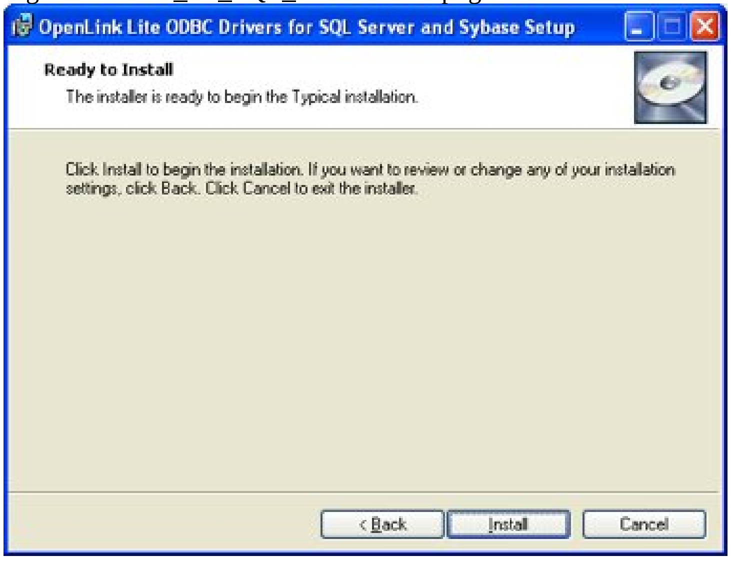
Complete
All program features will be installed. This option is recommended for the best performance.

Custom
Choose which application features you want installed and where they will be installed. This option is recommended for advanced users.

Click Next.

Click the Install button.

Figure 5.49. lite_tds_SQL_InstallButton.png



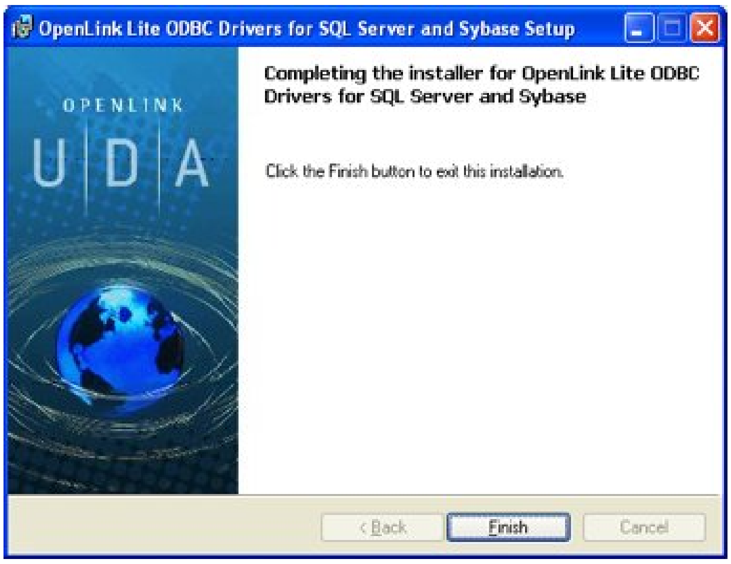
Ready to Install

The installer is ready to begin the Typical installation.

Click Install to begin the installation. If you want to review or change any of your installation settings, click Back. Click Cancel to exit the installer.

Installation is complete. Click the Finish button.

Figure 5.50. lite_tds_SQL_FinishButton.png


OpenLink Lite ODBC Drivers for SQL Server and Sybase Setup

Completing the installer for OpenLink Lite ODBC Drivers for SQL Server and Sybase

Click the Finish button to exit this installation.

You may be prompted to restart your computer, if you have a pre-existing OpenLink License Manager running on your computer.

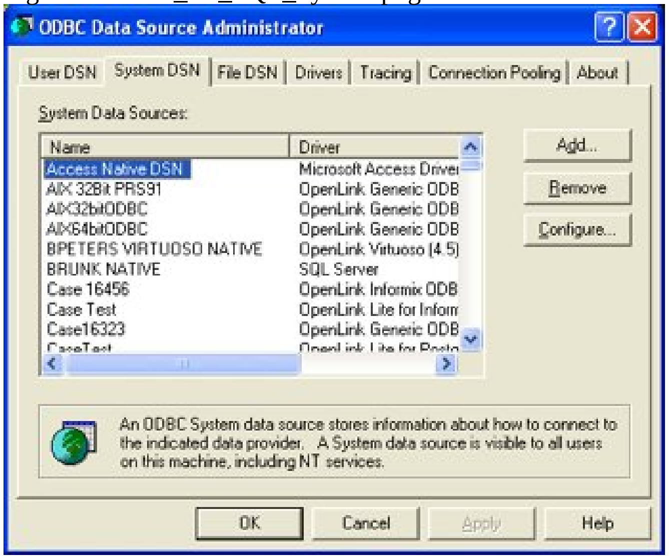
7.1.9.2 Configuration

Open the ODBC Data Sources Administrator that appears in the Administrative Tools section of your Control Panel.

Figure 5.51. lite_tds_MTx86_iODBC.png

Click the System DSN tab:

Figure 5.52. lite_tds_SQL_System.png


ODBC Data Source Administrator

User DSN | System DSN | File DSN | Drivers | Tracing | Connection Pooling | About

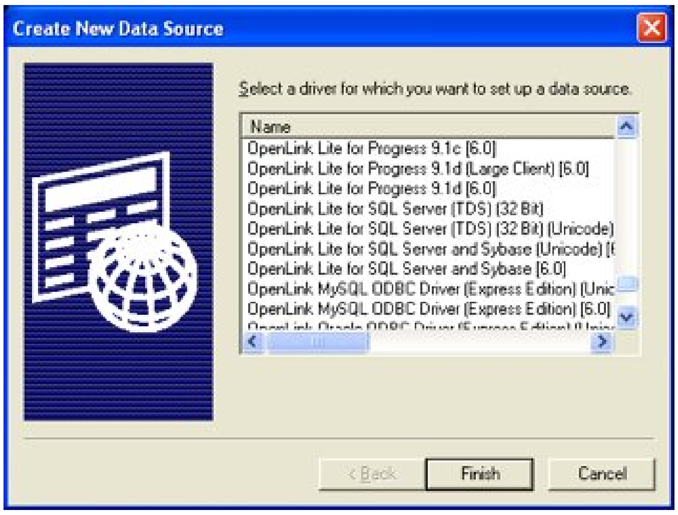
System Data Sources:

Name	Driver
Access Native DSN	Microsoft Access Driver
AIX 32Bit PRS91	OpenLink Generic ODB
AIX32bitODBC	OpenLink Generic ODB
AIX64bitODBC	OpenLink Generic ODB
BPETERS VIRTUOSO NATIVE	OpenLink Virtuoso (4.5)
BRUNK NATIVE	SQL Server
Case 16456	OpenLink Informix ODB
Case Test	OpenLink Lite for Inform
Case16323	OpenLink Generic ODB
CaseTest	OpenLink Lite for Postg

An ODBC System data source stores information about how to connect to the indicated data provider. A System data source is visible to all users on this machine, including NT services.

Click the Add button. Then, select the OpenLink SQL Server and Sybase Lite Driver from the list of available drivers:

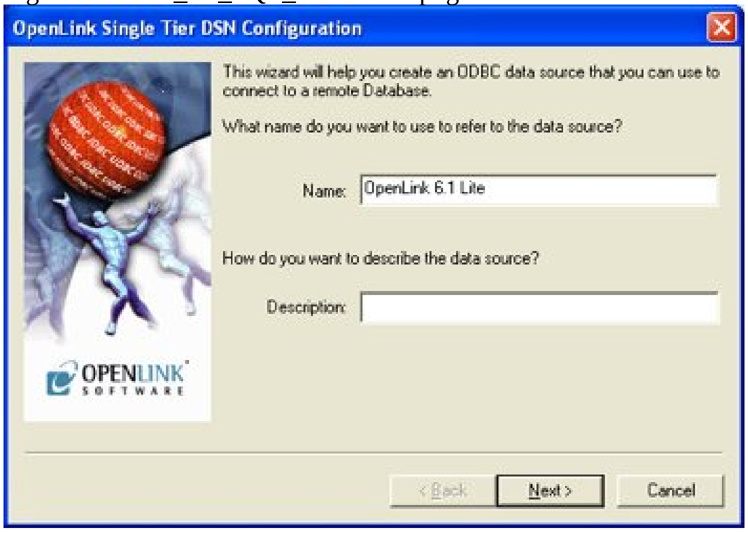
Figure 5.53. lite_tds_SQL_Available.png


Create New Data Source
Select a driver for which you want to set up a data source.
Name
OpenLink Lite for Progress 9.1c [6.0]
OpenLink Lite for Progress 9.1d (Large Client) [6.0]
OpenLink Lite for Progress 9.1d [6.0]
OpenLink Lite for SQL Server (TDS) (32 Bit)
OpenLink Lite for SQL Server (TDS) (32 Bit) (Unicode)
OpenLink Lite for SQL Server and Sybase (Unicode) [
OpenLink Lite for SQL Server and Sybase [6.0]
OpenLink MySQL ODBC Driver (Express Edition) (Unic
OpenLink MySQL ODBC Driver (Express Edition) [6.0]
< Back
Finish
Cancel

Click Finish.

The first dialog prompts for a Data Source Name and optional description.

Figure 5.54. lite_tds_SQL_DSNName.png



This wizard will help you create an ODBC data source that you can use to connect to a remote Database.

What name do you want to use to refer to the data source?

Name: OpenLink 6.1 Lite

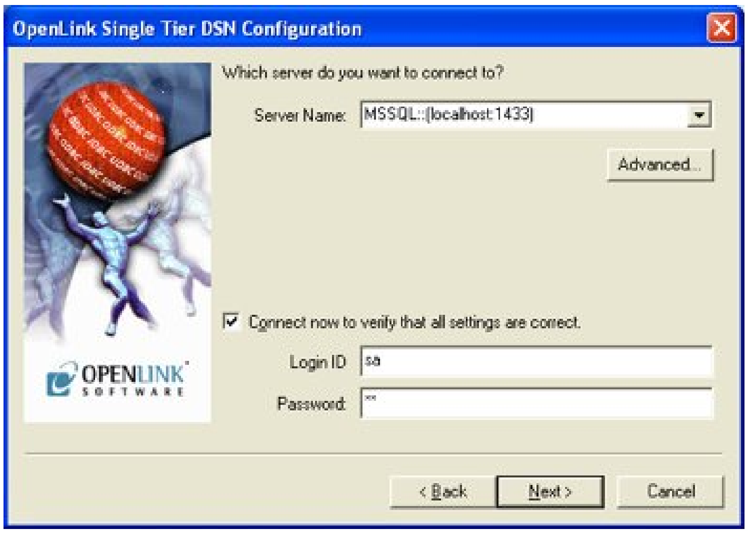
How do you want to describe the data source?

Description:

Click Next.

The second dialog prompts for information that identifies the SQL Server DBMS and database.

Figure 5.55. lite_tds_SQL_ConnTab.png



Which server do you want to connect to?

Server Name: MSSQL::(localhost:1433)

☑ Connect now to verify that all settings are correct.

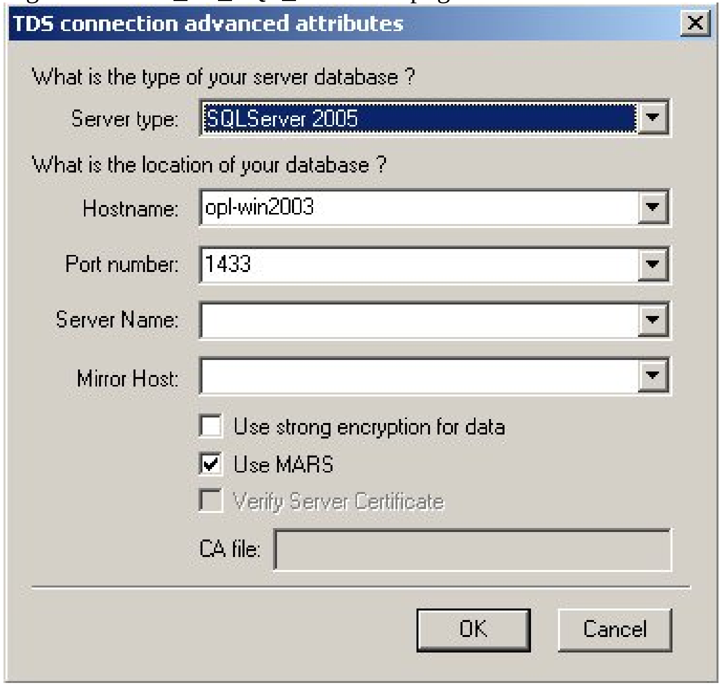
Login ID: sa

Password: **

- *Server Name* - Select the drop down list box to invoke the driver's Dynamic discovery of SQL Server instance on the network and choose the instance require if available.
- *Connect now to verify that all settings are correct* -
- *Login ID* - A valid SQL Server username
- *Password* - A valid SQL Server password

Use the "Advanced" button to manually configure a connection if the SQL Server instance could not be dynamically located, as detailed below.

Figure 5.56. lite_tds_SQL_Advanced.png



What is the type of your server database ?

Server type: SQLServer 2005

What is the location of your database ?

Hostname: opl-win2003

Port number: 1433

Server Name:

Mirror Host:

☐ Use strong encryption for data

☑ Use MARS

☐ Verify Server Certificate

CA file:

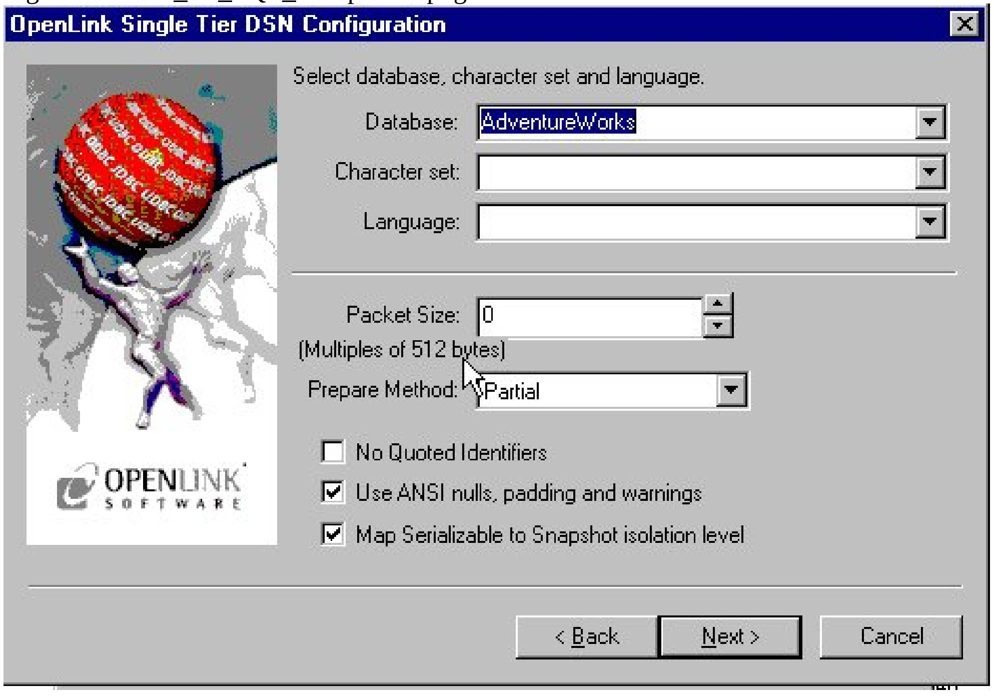
- *ServerType* - An OpenLink proprietary parameter that associates the connection with a particular TDS version
- *Hostname* - The hostname or IP address on which SQL Server listens
- *Port number* - The TCP port on which SQL Server lists
- *Server Name* - SQL Server instance name on the specified host. A SQL Server instance can also be specified by appending "\InstanceName" to the ServerName ie "ServerName\InstanceName"
- *Mirror Host* - The name of the Failover Server hosting the mirrored database if configured
- *Use strong encryption of data* - Enable SSL encryption of data between driver and database
- *Use Mars - Multiple Active Result Sets* enables the concurrent processing of multiple statements/queries and/or result sets on a single connection

- *Verify Server Certificate* - Verify the Database Server SSL certificate against the one specified in the "CA file" field
- *CA file* - Specify the location of a Valid SSL Certificate for use during the connection

Click Next to continue.

The third dialog takes a combination of database specific and optional parameters:

Figure 5.57. lite_tds_SQL_DBSpecific.png


OpenLink Single Tier DSN Configuration

Select database, character set and language.

Database: AdventureWorks

Character set:

Language:

Packet Size: 0
(Multiples of 512 bytes)

Prepare Method: Partial

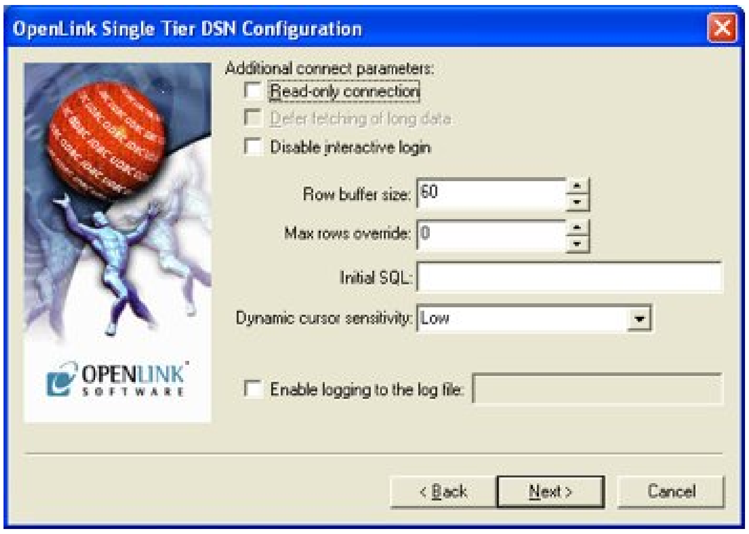
☐ No Quoted Identifiers
☑ Use ANSI nulls, padding and warnings
☑ Map Serializable to Snapshot isolation level

- *Database* - The SQL Server database
- *Character set* - The SQL Server character set
- *Language* - The SQL Server language
- *Packet Size* - A value that determines the number of bytes per network packet transferred from the database server to the client. The correct setting of this attribute can improve performance. When set to 0, the initial default, the driver uses the default packet size as specified in the Sybase server configuration. When set to -1, the driver computes the maximum allowable packet size on the first connect to the data source and saves the value in the system information. When set to x, an integer from 1 to 10, which indicates a multiple of 512 bytes (for example, Packet Size of 6 means to set the packet size to 6 * 512 equal 3072 bytes). For you to take advantage of this connection attribute, you must configure the System 10 server for a maximum network packet size greater than or equal to the value you specified for Packet Size.
- *Prepare Method* - This option is specific to the TDS Driver for MS & SQL Server SQLServers. It can take the values None, Partial Full (connectoptions -O [0, 1, 2] respectively). It is used to determine whether stored procedures are created on the server for calls to SQLPrepare.
- *No Quoted Identifiers* - This option indicates that the underlying driver does not support quoted identifiers, which is required for Jet engine based products like MS Access.
- *Use ANSI nulls, padding and warnings* - This option affects TDS agent & Lite Driver connections to MS SQLServer databases. SQL Server connectivity is not affected.
- *Map Serializable to Snapshot isolation level* - Enable Snapshot transaction isolation level in the driver. Snapshot Isolation is a new transaction isolation level available in SQL Server 2005

Click Next to continue.

The fourth dialog enables you to set optional, ODBC connection parameters:

Figure 5.58. lite_tds_SQL_Options.png



Additional connect parameters:
- [ ] Read-only connection
- [ ] Defer fetching of long data
- [ ] Disable interactive login

Row buffer size: 60
Max rows override: 0
Initial SQL:
Dynamic cursor sensitivity: Low

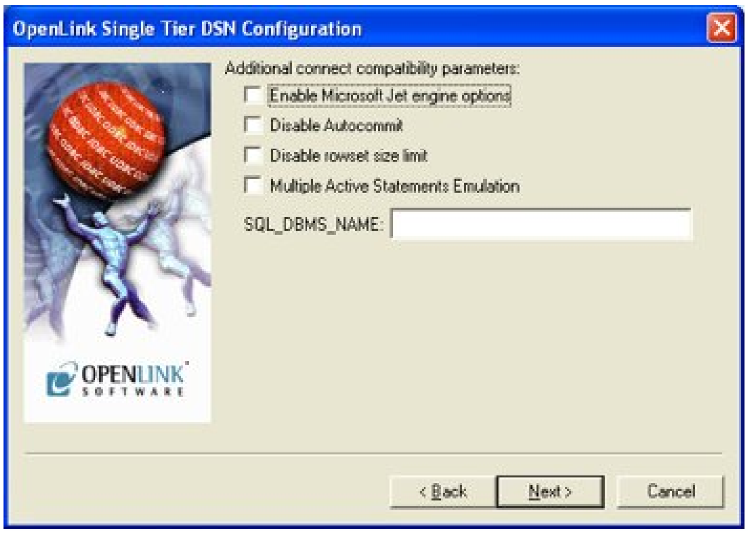
- [ ] Enable logging to the log file:

- *Read-only connection* - Specifies whether the connection is "Read-only." Make sure the checkbox is unchecked to request a "Read/Write" connection.
- *Defer fetching of long data* - Defers fetching of LONG (BINARY, BLOB etc.) data unless explicitly requested in a query. This provides significant performance increases when fields in query do not include LONG data fields.
- *Disable interactive login* - Suppresses the ODBC "Username" and "Password" login dialog boxes when interacting with your ODBC DSN from within an ODBC compliant application.
- *Row Buffer Size* - This attribute specifies the number of records to be transported over the network in a single network hop. Values can range from 1 to 99.
- *Max rows Override* - Allows you to define a limit on the maximum number of rows to be returned from a query. The default value of 0 means no limit.
- *Initial SQL* - Lets you specify a file containing SQL statements that will be run automatically against the database upon connection.
- *Dynamic Cursor Sensitivity* - Enables or disables the row version cache used with dynamic cursors. When dynamic cursor sensitivity is set high, the Cursor Library calculates checksums for each row in the current rowset and compares these with the checksums (if any) already stored in the row version cache for the same rows when fetched previously. If the checksums differ for a row, the row has been updated since it was last fetched and the row status flag is set to SQL_ROW_UPDATED. The row version cache is then updated with the latest checksums for the rowset. From the user's point of view, the only visible difference between the two sensitivity settings is that a row status flag can never be set to SQL_ROW_UPDATED when the cursor sensitivity is low. (The row status is instead displayed as SQL_ROW_SUCCESS.) In all other respects, performance aside, the two settings are the same. Deleted rows don't appear in the rowset. Updates to the row since the row was last fetched are reflected in the row data, and inserted rows appear in the rowset, if their keys fall within the span of the rowset. If your application does not need to detect the row status SQL_ROW_UPDATED, you should leave the 'High Cursor Sensitivity' checkbox unchecked, as performance is improved. The calculation and comparison of checksums for each row fetched carries an overhead. If this option is enabled, the table oplrvc must have been created beforehand using the appropriate script for the target database.
- *Enable logging to the log file* - Check the checkbox and use the associated textbox to provide the full path to a file in which to log diagnostic information.

Click Next to continue.

The fifth dialog enables you to set additional parameters to enhance compatibility with applications:

Figure 5.59. lite_tds_SQL_Compatibility.png



Additional connect compatibility parameters:

- [ ] Enable Microsoft Jet engine options
- [ ] Disable Autocommit
- [ ] Disable rowset size limit
- [ ] Multiple Active Statements Emulation

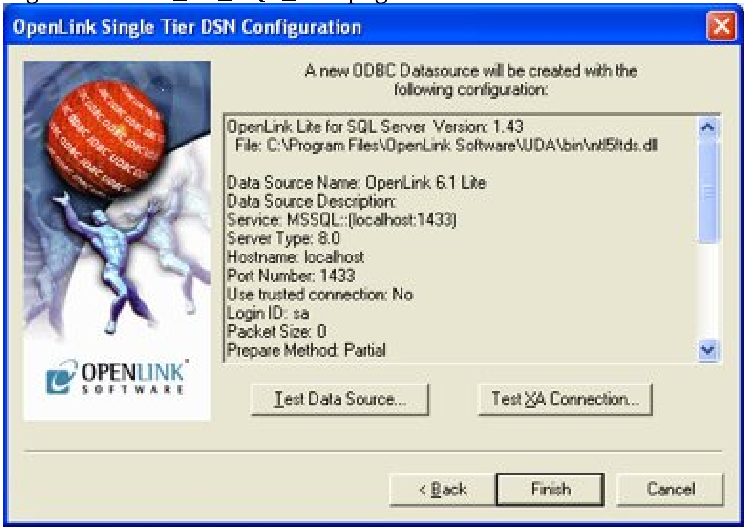
SQL_DBMS_NAME:

- *Enable Microsoft Jet engine options* - Check this checkbox if you intend to use this driver with Microsoft Access.
- *Disable*
- *Disable rowset size limit* - Disables a limitation enforced by the cursor library. This limitation is enforced by default. It prevents the driver from claiming all available memory in the event that a resultset generated from an erroneous query is very large. The limit is normally never reached.
- *Multiple Active Statements Emulation* - Enables use of Multiple Active statements in an ODBC application even if the underlying database does not allow this, as it is emulated in the driver.
- *SQL_DBMS Name* - Manually overrides the SQLGetInfo(SQL_DBMS_NAME) response returned by the driver. This is required for products like Microsoft InfoPath for which the return the value should be "SQL Server".

Click Next to continue.

The final dialog enables you to text your Data Source. Click the Test Data Source button.

Figure 5.60. lite_tds_SQL_Test.png

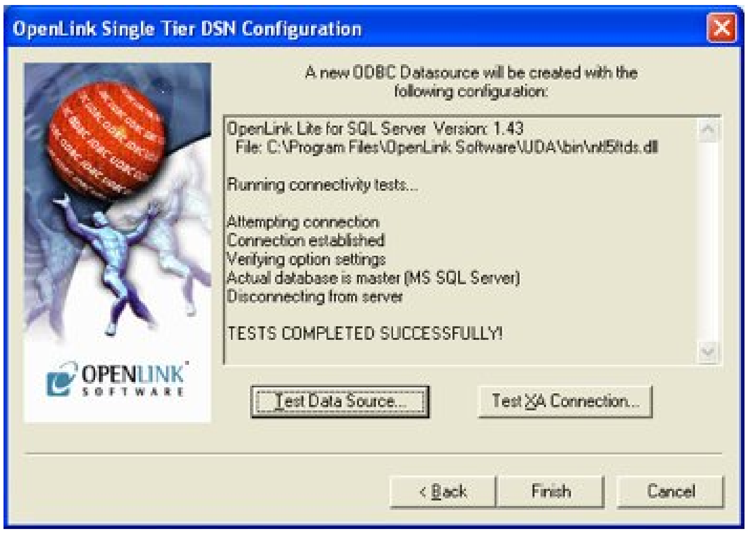


A new ODBC Datasource will be created with the following configuration:

```
OpenLink Lite for SQL Server  Version: 1.43
  File: C:\Program Files\OpenLink Software\UDA\bin\ntl5ltds.dll

Data Source Name: OpenLink 6.1 Lite
Data Source Description:
Service: MSSQL::(localhost:1433)
Server Type: 8.0
Hostname: localhost
Port Number: 1433
Use trusted connection: No
Login ID: sa
Packet Size: 0
Prepare Method: Partial
```

A connection has been established:

Figure 5.61. lite_tds_SQL_Connected.png



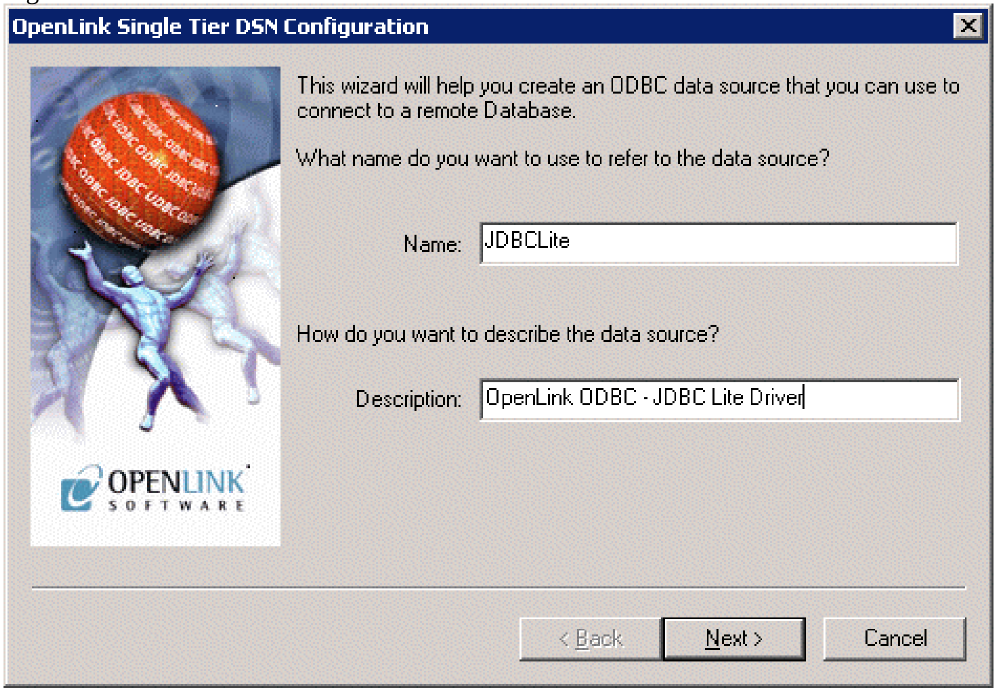
A new ODBC Datasource will be created with the following configuration:

```
OpenLink Lite for SQL Server  Version: 1.43
  File: C:\Program Files\OpenLink Software\UDA\bin\ntl5ltds.dll

Running connectivity tests...

Attempting connection
Connection established
Verifying option settings
Actual database is master (MS SQL Server)
Disconnecting from server

TESTS COMPLETED SUCCESSFULLY!
```

7.1.10 ODBC-JDBC Lite Bridges for Java

7.1.10.1 Datasource

Figure 5.62. Datasource tab



This wizard will help you create an ODBC data source that you can use to connect to a remote Database.

What name do you want to use to refer to the data source?

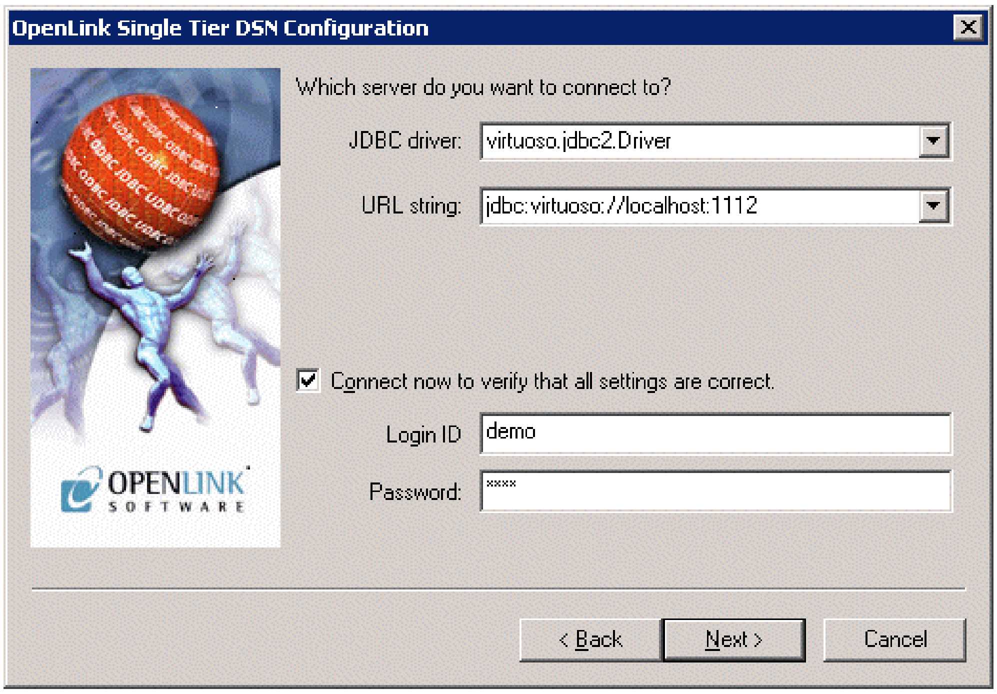
Name: JDBCLite

How do you want to describe the data source?

Description: OpenLink ODBC - JDBC Lite Driver

7.1.10.2 JDBC tab

Figure 5.63. JDBC tab


OpenLink Single Tier DSN Configuration

Which server do you want to connect to?

JDBC driver: virtuoso.jdbc2.Driver

URL string: jdbc:virtuoso://localhost:1112

☑ Connect now to verify that all settings are correct.

Login ID demo

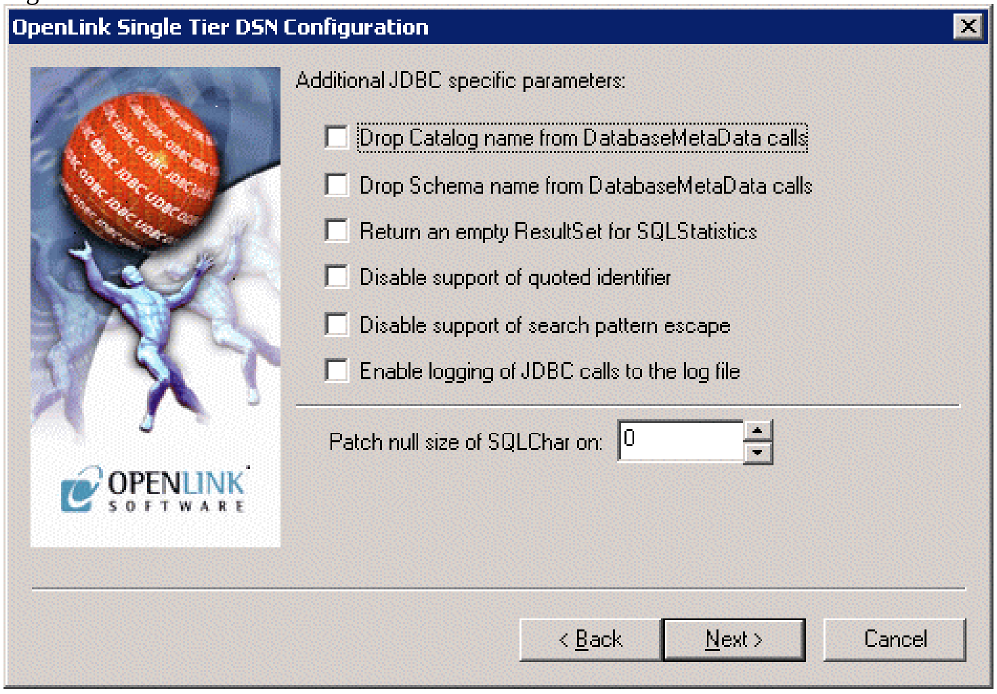
Password: ****

Enter details here for the JDBC Driver to connect with:

- JDBC Driver. The name of the JDBC Driver to be used for the connection
- URL String. The JDBC connectstring URL for the JDBC Driver
- Login ID & Password. Enter the username and password to use for the connection here. If you check the `Connect now' box, pressing `Next>' will make a test connection to verify the above parameters.

7.1.10.3 JDBC Parameters

Figure 5.64. JDBC Parameters tab


OpenLink Single Tier DSN Configuration

Additional JDBC specific parameters:

☐ Drop Catalog name from DatabaseMetaData calls

☐ Drop Schema name from DatabaseMetaData calls

☐ Return an empty ResultSet for SQLStatistics

☐ Disable support of quoted identifier

☐ Disable support of search pattern escape

☐ Enable logging of JDBC calls to the log file

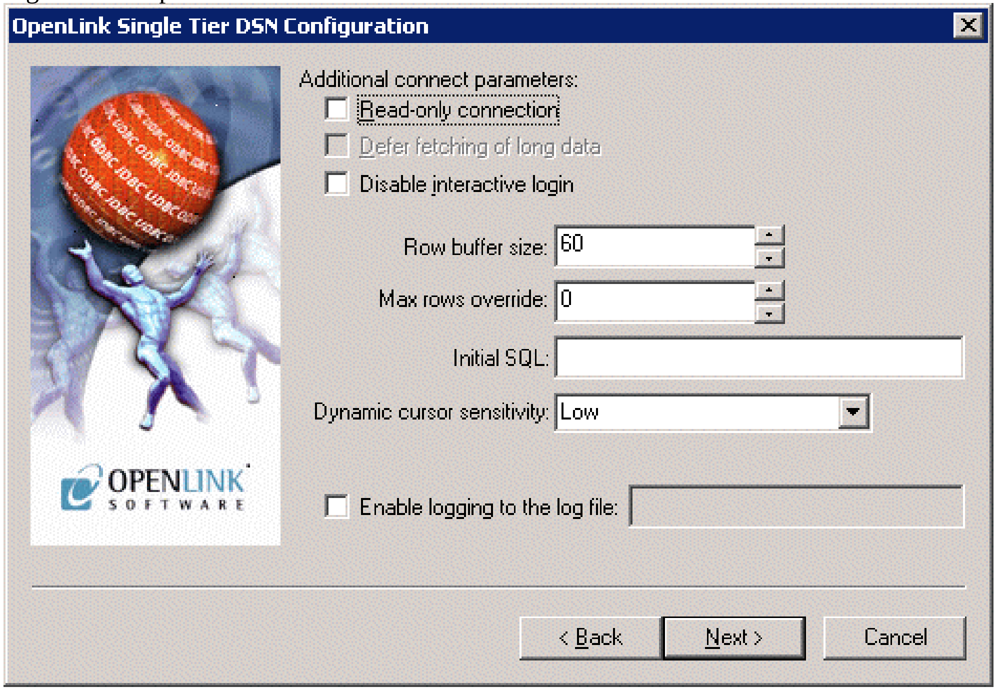
Patch null size of SQLChar on: 0

- Drop Catalog name from DatabaseMetaData calls. Enable this option to have the catalog name not appear for tables, views and procedures when requesting database meta-data.
- Drop Schema name from DatabaseMetaData calls. Enable this option to have the schema-name not appear for tables, views and procedures when requesting database meta-data.

- Return an empty resultset for SQLStatistics. Check this box to have SQLStatistics() return an empty resultset - use this if the underlying database does not support retrieving statistics about a table (e.g. what indexes there are on it).
- Disable support of quoted identifier. If it is set, the call SQLGetInfo for 'SQL_IDENTIFIER_QUOTE_CHAR' will return the space (" "). It can be used if DBMS doesn't support quoted SQL like select * from "account"
- Disable support of search pattern escape. If it is set, the call SQLGetInfo for 'SQL_LIKE_ESCAPE_CLAUSE' will return the space (" "). It can be used if DBMS doesn't support SQL escape patterns

7.1.10.4 OpenLink Parameters

Figure 5.65. OpenLink Parameters tab



OpenLink Single Tier DSN Configuration

Additional connect parameters:

- [ ] Read-only connection
- [ ] Defer fetching of long data
- [ ] Disable interactive login

Row buffer size: 60

Max rows override: 0

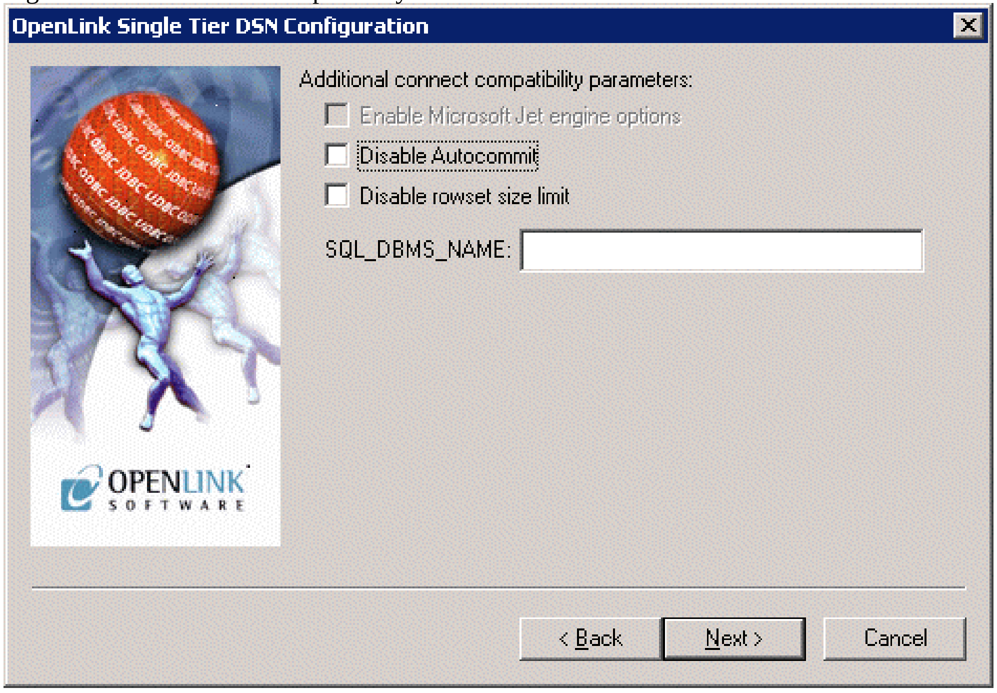
Initial SQL:

Dynamic cursor sensitivity: Low

- [ ] Enable logging to the log file:

7.1.10.5 Additional Compatibility Parameters

Figure 5.66. Additional Compatibility Parameters tab



OpenLink Single Tier DSN Configuration

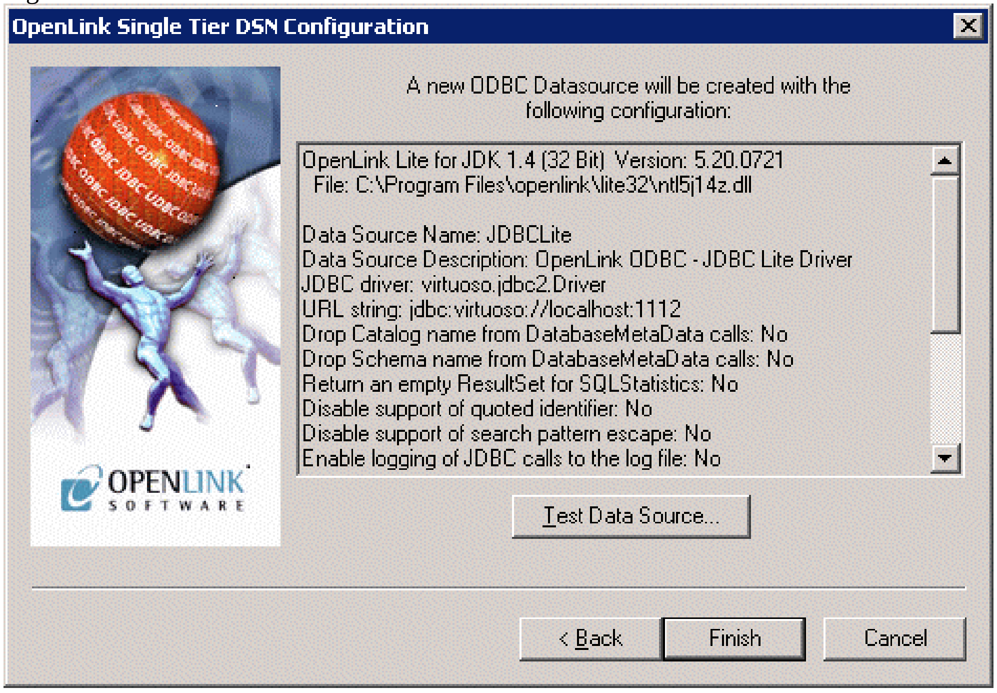
Additional connect compatibility parameters:

- [ ] Enable Microsoft Jet engine options
- [ ] Disable Autocommit
- [ ] Disable rowset size limit

SQL_DBMS_NAME:

7.1.10.6 Finish & Test

Figure 5.67. Finish and test tab



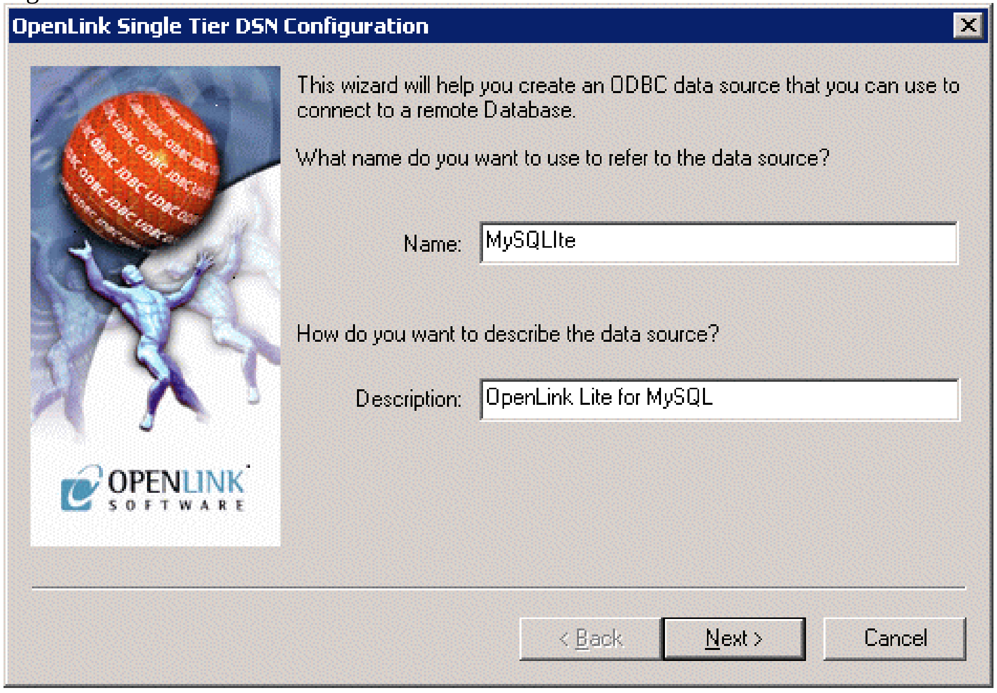
A new ODBC Datasource will be created with the following configuration:

```
OpenLink Lite for JDK 1.4 (32 Bit) Version: 5.20.0721
  File: C:\Program Files\openlink\lite32\ntl5j14z.dll

Data Source Name: JDBCLite
Data Source Description: OpenLink ODBC - JDBC Lite Driver
JDBC driver: virtuoso.jdbc2.Driver
URL string: jdbc:virtuoso://localhost:1112
Drop Catalog name from DatabaseMetaData calls: No
Drop Schema name from DatabaseMetaData calls: No
Return an empty ResultSet for SQLStatistics: No
Disable support of quoted identifier: No
Disable support of search pattern escape: No
Enable logging of JDBC calls to the log file: No
```

7.1.11 MySQL

7.1.11.1 Datasource

Figure 5.68. Datasource tab



This wizard will help you create an ODBC data source that you can use to connect to a remote Database.

What name do you want to use to refer to the data source?

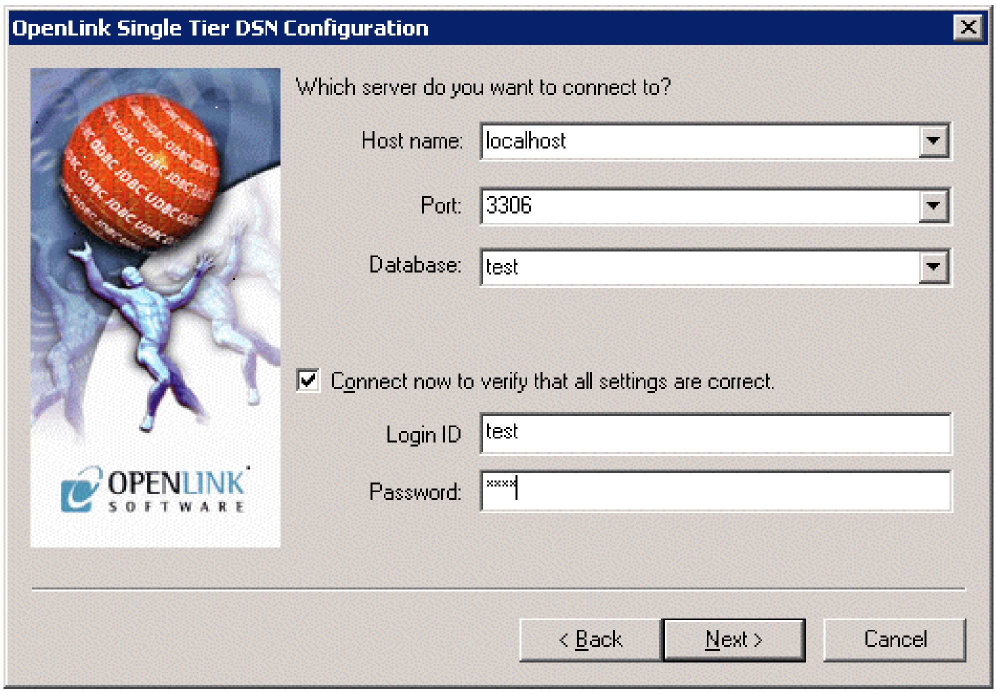
Name: MySQLIte

How do you want to describe the data source?

Description: OpenLink Lite for MySQL

7.1.11.2 MySQL Options

Figure 5.69. MySQL Options tab


OpenLink Single Tier DSN Configuration

Which server do you want to connect to?

Host name: localhost

Port: 3306

Database: test

[✓] Connect now to verify that all settings are correct.

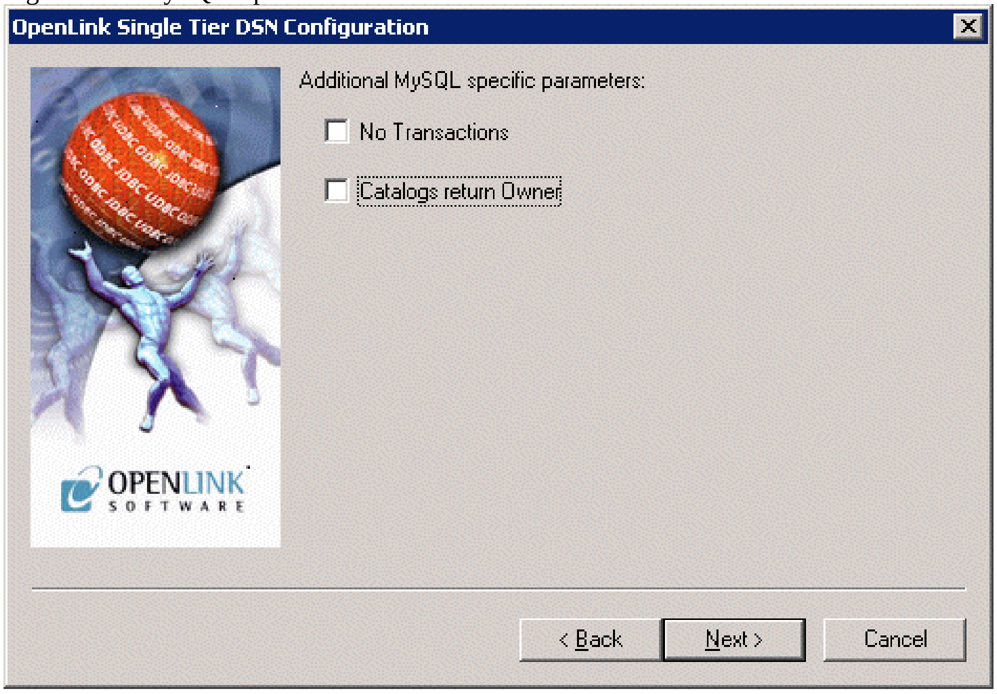
Login ID test

Password: ****

- Hostname. The hostname on which the MySQL database server to be connected to is running on.
- Port. The port number on which the MySQL database server is running on the host machine. Defaults to 3306 if not specified.
- Database. The database name to which the connection is to be made.

7.1.11.3 MySQL Options

Figure 5.70. MySQL Options tab


OpenLink Single Tier DSN Configuration

Additional MySQL specific parameters:

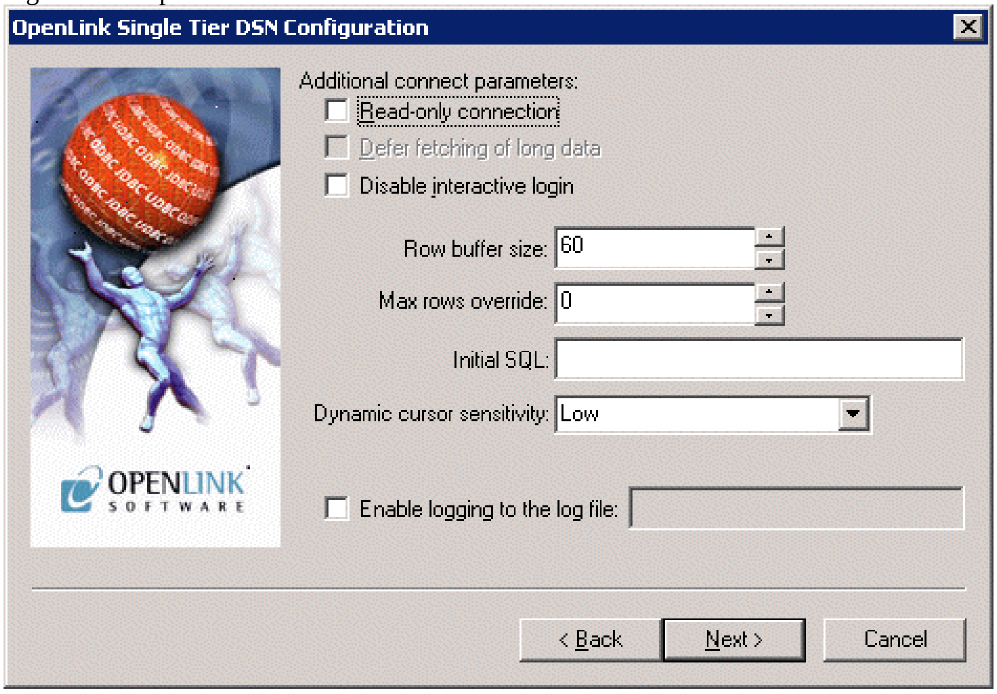
[ ] No Transactions

[ ] Catalogs return Owner

- No Transactions. Disable ODBC transaction management. All transactions will be automatically committed. This prevents palloc() failures with out-of-memory errors when doing really big transactions such as Exporting 10000 records from MS/Access.

7.1.11.4 OpenLink Parameters

Figure 5.71. OpenLink Parameters tab



OpenLink Single Tier DSN Configuration

Additional connect parameters:

- [ ] Read-only connection
- [ ] Defer fetching of long data
- [ ] Disable interactive login

Row buffer size: 60

Max rows override: 0

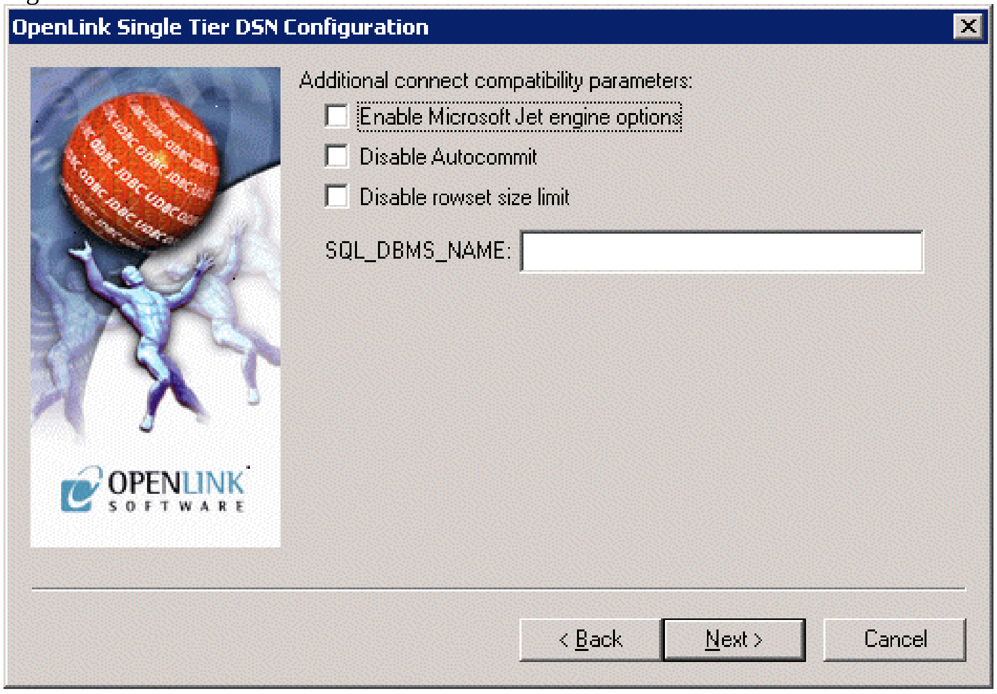
Initial SQL:

Dynamic cursor sensitivity: Low

- [ ] Enable logging to the log file:

7.1.11.5 ODBC Parameters

Figure 5.72. ODBC Parameters tab



OpenLink Single Tier DSN Configuration

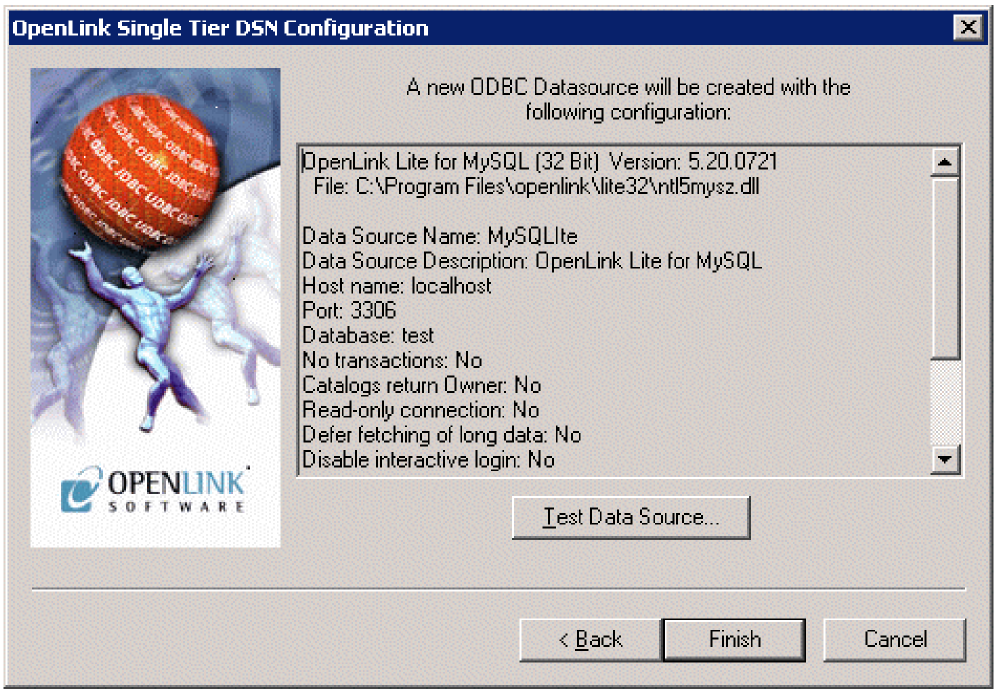
Additional connect compatibility parameters:

- [ ] Enable Microsoft Jet engine options
- [ ] Disable Autocommit
- [ ] Disable rowset size limit

SQL_DBMS_NAME:

7.1.11.6 Finish and Test

Figure 5.73. Finish and test tab



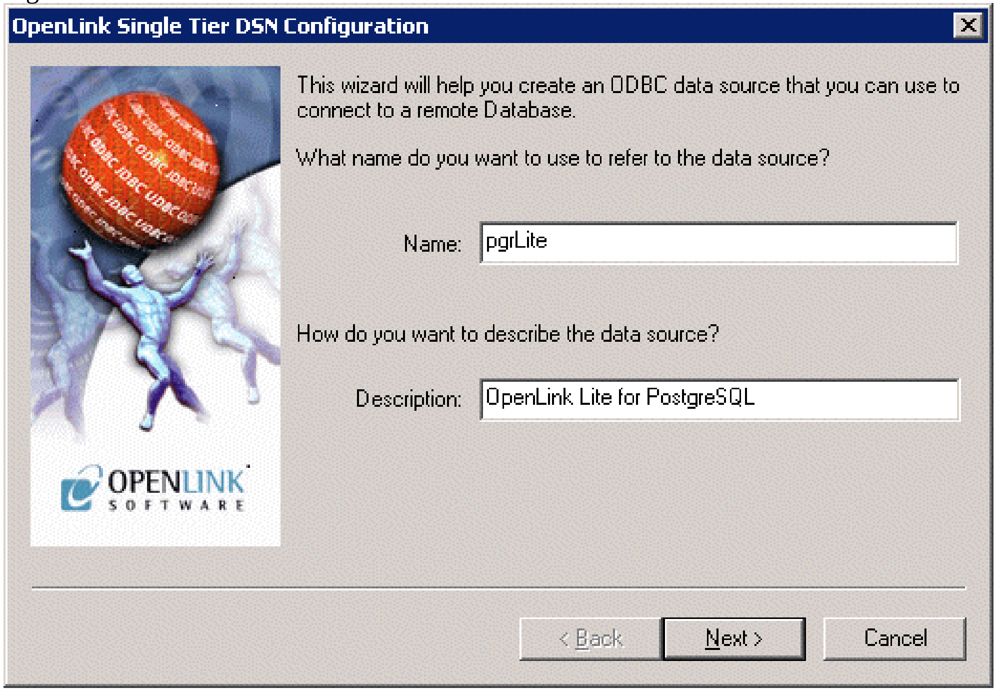
A new ODBC Datasource will be created with the following configuration:

```
OpenLink Lite for MySQL (32 Bit)  Version: 5.20.0721
  File: C:\Program Files\openlink\lite32\ntl5mysz.dll

Data Source Name: MySQLlte
Data Source Description: OpenLink Lite for MySQL
Host name: localhost
Port: 3306
Database: test
No transactions: No
Catalogs return Owner: No
Read-only connection: No
Defer fetching of long data: No
Disable interactive login: No
```

7.1.12 PostgreSQL

7.1.12.1 Datasource

Figure 5.74. Datasource tab



This wizard will help you create an ODBC data source that you can use to connect to a remote Database.

What name do you want to use to refer to the data source?

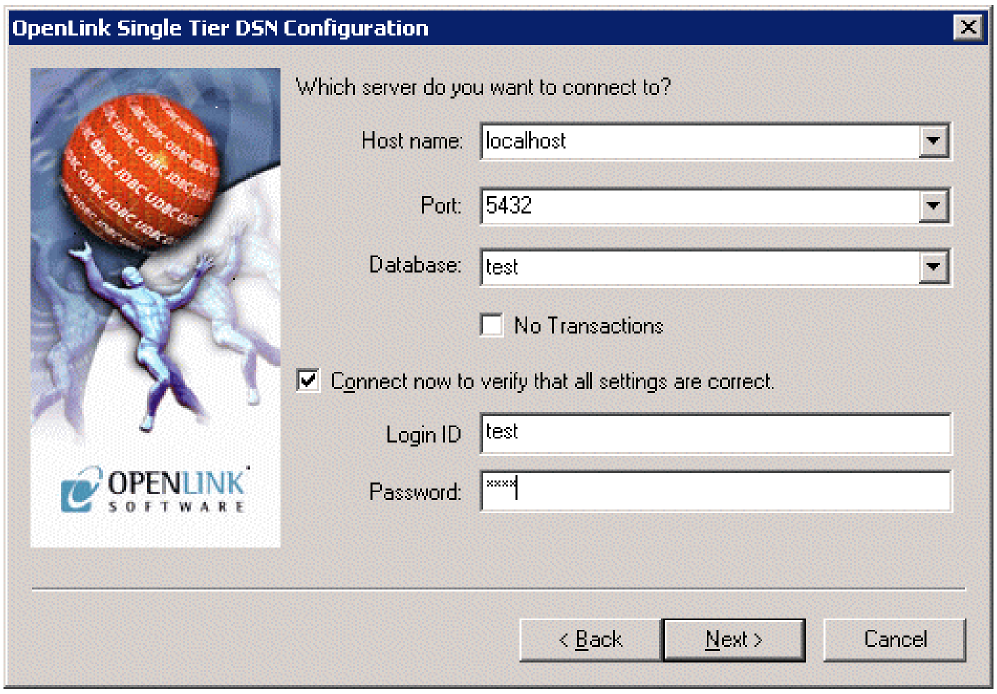
Name: pgrLite

How do you want to describe the data source?

Description: OpenLink Lite for PostgreSQL

7.1.12.2 PostgreSQL Options

Figure 5.75. PostgreSQL Options tab


OpenLink Single Tier DSN Configuration

Which server do you want to connect to?

Host name: localhost

Port: 5432

Database: test

☐ No Transactions

☑ Connect now to verify that all settings are correct.

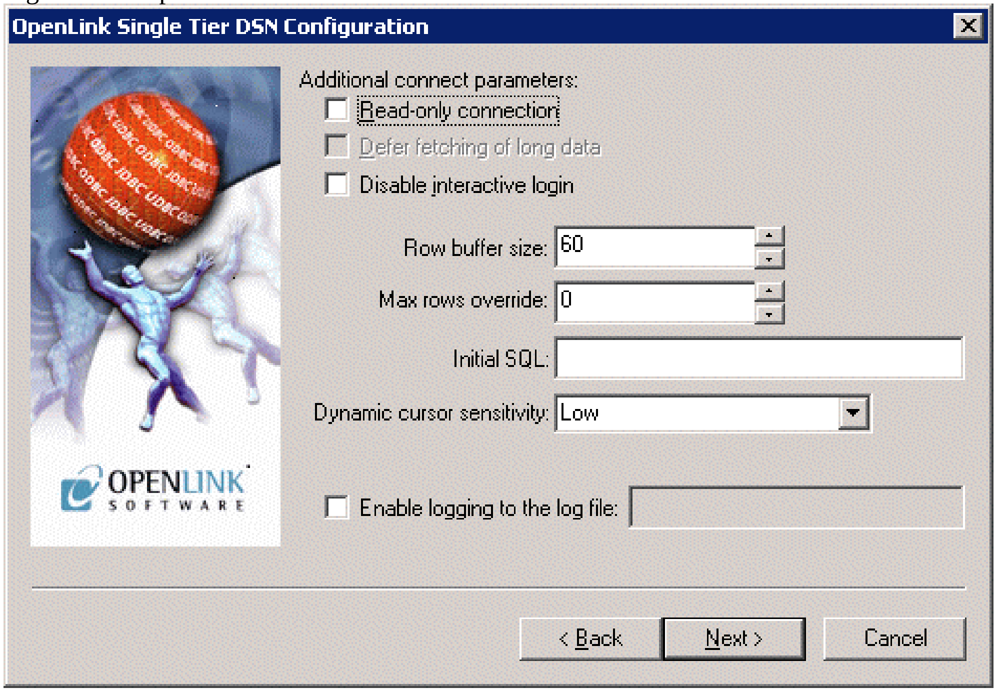
Login ID test

Password: ****

- Hostname. The hostname on which the PostgreSQL database server to be connected to is running on.
- Port. The port number on which the PostgreSQL database server is running on the host machine. Defaults to 3306 if not specified.
- Database. The database name to which the connection is to be made.
- No Transactions. Disable ODBC transaction management. All transactions will be automatically committed. This prevents palloc() failures with out-of-memory errors when doing really big transactions such as Exporting 10000 records from MS/Access.

7.1.12.3 OpenLink Parameters

Figure 5.76. OpenLink Parameters tab


OpenLink Single Tier DSN Configuration

Additional connect parameters:

☐ Read-only connection

☐ Defer fetching of long data

☐ Disable interactive login

Row buffer size: 60

Max rows override: 0

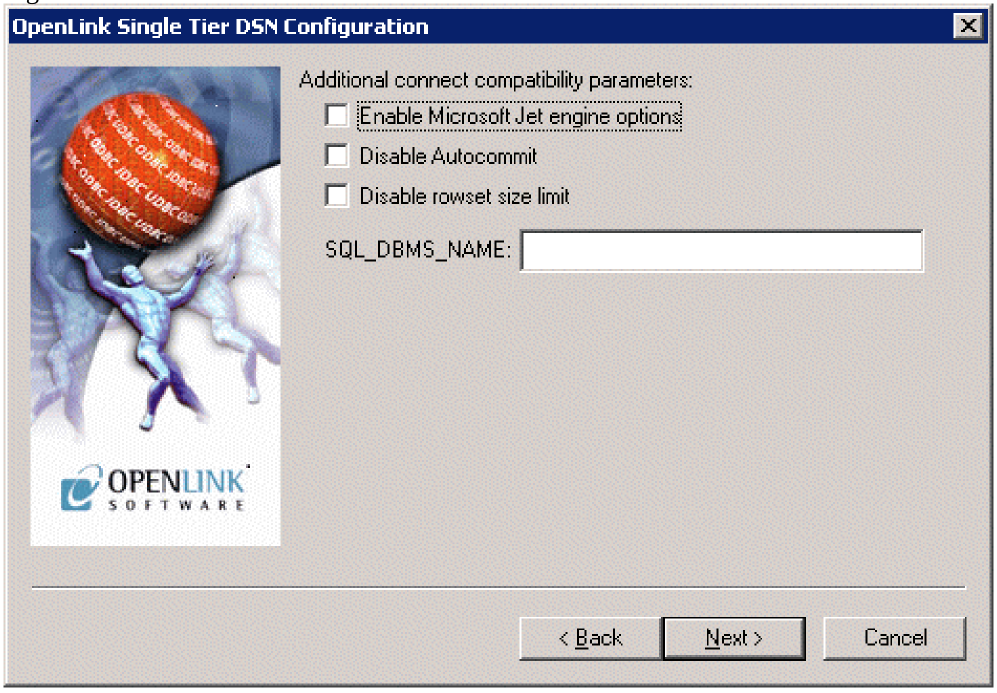
Initial SQL:

Dynamic cursor sensitivity: Low

☐ Enable logging to the log file:

7.1.12.4 ODBC Parameters

Figure 5.77. ODBC Parameters tab



OpenLink Single Tier DSN Configuration

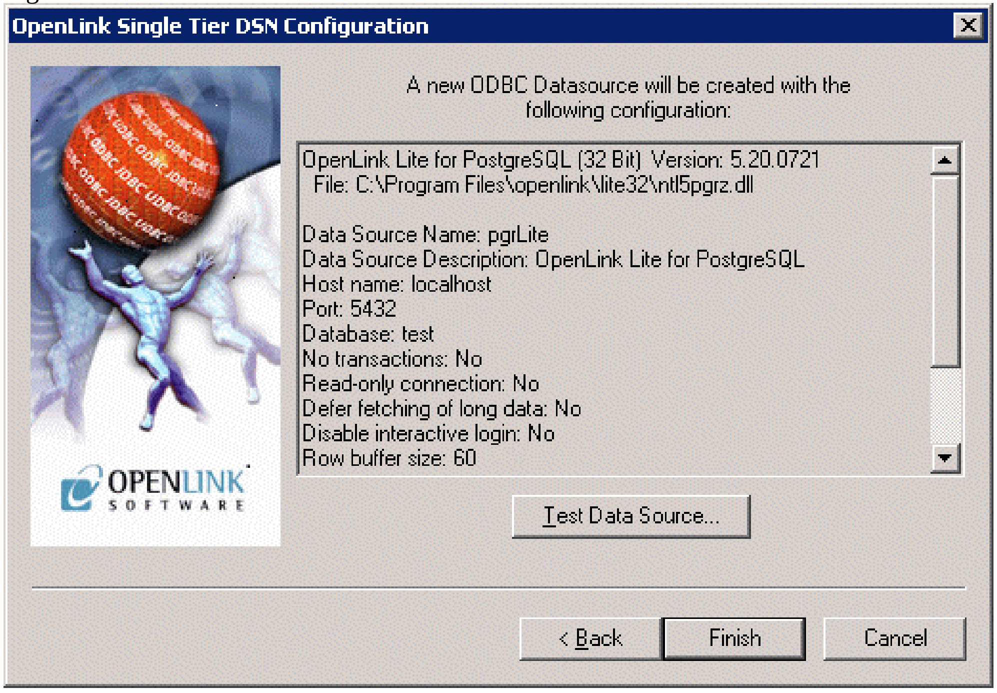
Additional connect compatibility parameters:

- [ ] Enable Microsoft Jet engine options
- [ ] Disable Autocommit
- [ ] Disable rowset size limit

SQL_DBMS_NAME:

7.1.12.5 Finish & Test

Figure 5.78. Finish & test tab



OpenLink Single Tier DSN Configuration

A new ODBC Datasource will be created with the following configuration:

```
OpenLink Lite for PostgreSQL (32 Bit)  Version: 5.20.0721
  File: C:\Program Files\openlink\lite32\ntl5pgrz.dll

Data Source Name: pgrLite
Data Source Description: OpenLink Lite for PostgreSQL
Host name: localhost
Port: 5432
Database: test
No transactions: No
Read-only connection: No
Defer fetching of long data: No
Disable interactive login: No
Row buffer size: 60
```

7.1.13 Connect String parameters

7.1.13.1 Common Connect string

You may sometimes be required to build a complete ODBC Connection String to access an ODBC Datasource.

A connection string has the following syntax:

```
connection-string ::= empty-string[;] | attribute[;] | attribute; connection-string
empty-string ::=
attribute ::= attribute-keyword=attribute-value | DRIVER=[{]attribute-value[}]
```

```
attribute-keyword ::= DSN | UID | PWD | driver-defined-attribute-keyword
attribute-value ::= character-string
driver-defined-attribute-keyword ::= identifier
```

where character-string has zero or more characters; identifier has one or more characters; attribute-keyword is not case-sensitive; attribute-value may be case-sensitive; and the value of the DSN keyword does not consist solely of blanks.

The following list describes valid attributes and their values common to all databases:

- DSN. Datasource name.
- UID. Username.
- PWD. Password.
- DRIVER. The name of the ODBC Driver to be used. This will be the name displayed in the ODBC Administrator or returned by the SQLDrivers function.
- ReadOnly. Yes/No - make the session readonly.
- FetchBufferSize or FBS. 2 digit integer value to determine the number of rows to buffer in each fetch.
- NoLoginBox or NLB. Yes/No - suppress the authentication dialog box that will appear if either username or password have been omitted.
- MaxRows. integer value to limit the number of returned rows.
- NoAutoCommit. Yes/No - define the default behaviour of the driver to adopt.
- Jet. Yes/No - enable Microsoft Jet Engine compatibility features.
- NoRowSetSizeLimit. Yes/No
- SVAST. Yes/No - System views as system tables.
- IntialSQL. Points to a file containing a list of initial SQL statements to be executed against the Database on connnect.

7.1.13.2 DB2 Connect string

There is nothing specific to DB2. See above section for common parameters.

7.1.13.3 Informix Connect string

The following list describes valid attributes and their values that are specific to Informix:

- Protocol. Informix protocol identifier.
- Service. Service name as in the etc\services file.
- Host. hostname of the machine hosting the Informix server.
- InfServer. Name of the Informix server.
- Database. name of the database on the Informix server.
- MultiSess. Yes/No - Multiplex Session.

7.1.13.4 Ingres and OpenIngres Connect string

The following list describes valid attributes and their values that are specific to Ingres and OpenIngres:

- Database. name of the database alias.
- IngServer. <vnode>::<dbname>.

7.1.13.5 Oracle Connect string

The following list describes valid attributes and their values that are specific to Oracle:

- OraCatalogs. Yes/No.
- QuotedIdentifiers. Yes/No.
- SQLNETConnect. SQL*Net connect string usually just the TNS name.
- SQLNETInterface. Interface DLL or AutoScan for Driver self determination.

7.1.13.6 Progress Connect string

The following list describes valid attributes and their values that are specific to Progress:

- Options. Valid Progress connection options.
-
  ##### 7.1.13.6.1 TableView

  full path and filename to the tableview file.

  See tableview guide for more information.
- ServerOptions. Valid Progress server options.
- SQLNETInterface. Interface DLL or AutoScan for Driver self determination.

7.1.13.7 Microsoft or Sybase SQLServer (TDS) Connect string

The following list describes valid attributes and their values that are specific to Microsoft SQLServer:

- TDSServer. The IP address or alias name for the server running SQL Server.
- TDSPort. The TCP port number the SQLServer instance is running on
- TDSVer. The TDS Protocol version for the type of SQLServer instance being used.
- TDSDBase. The name of the SQLServer Database

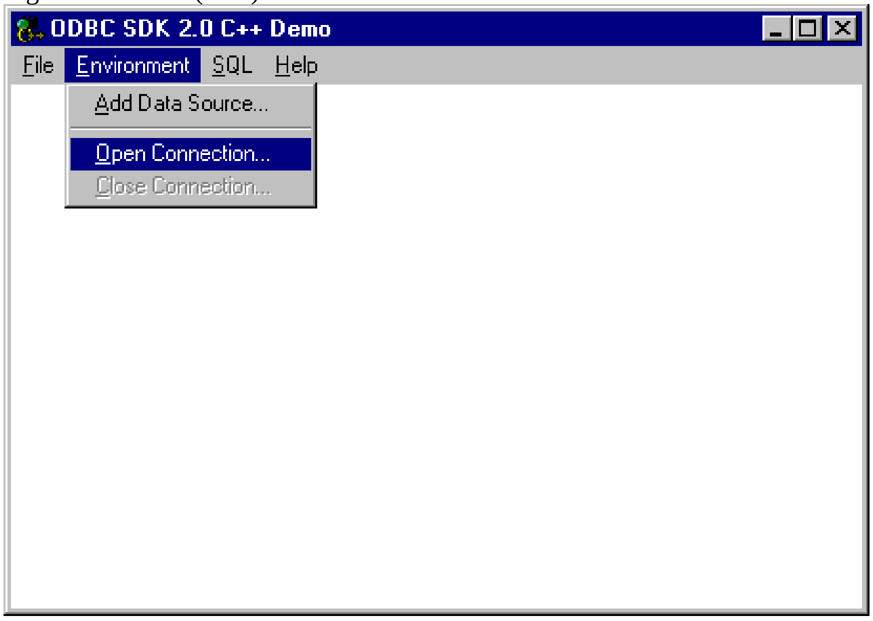
7.1.14 Testing the ODBC Data Source

Once you have configured an ODBC Data Source you can test it using the Test Connection button on the DataSources tab.

For a more thorough test, you can use the sample applications provided in the OpenLink Lite Driver installer (unless you chose not to install them). You will have short-cuts to the sample applications in the 'Start' Menu.

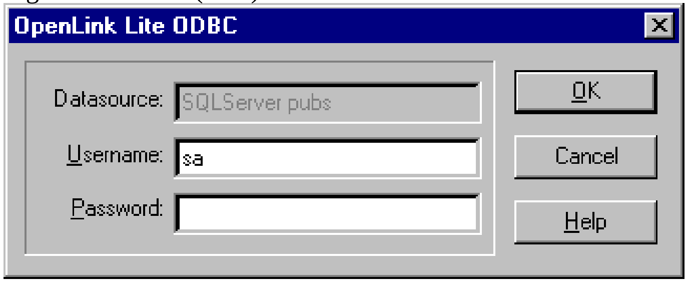
The sample application 'CPP Demo 32 Bit' is a good application to use to test an ODBC Data Source. It is simple, allows you to execute simple SQL Queries and includes source code.

When the application has been started, select 'Open Connection' from the Environment menu item.

Figure 5.79. CPP (C++) Demo


Select the data source you recently created and now want to test. Unless you configured the data source to hide the login dialog prompt you will be presented with it. You need to enter a valid username and password to authenticate the connection.

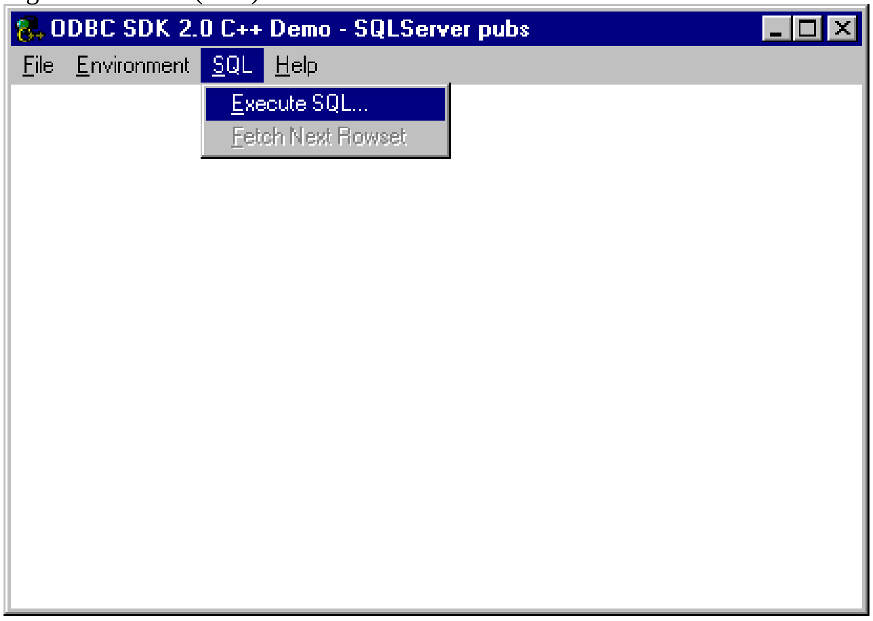
Figure 5.80. CPP (C++) Demo



Once the connection has been established you should observe that the title bar of the application now includes the name of the data source that you connected to.

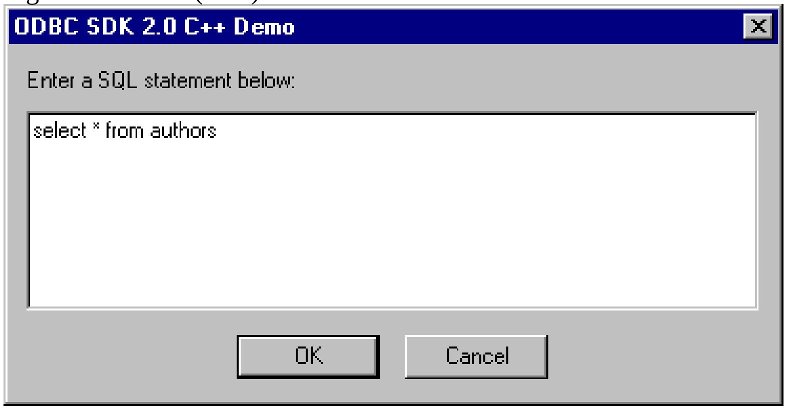
Use the SQL/Execute SQL menu item to query the database and validate basic communication between the Driver and the Database.

Figure 5.81. CPP (C++) Demo



Enter a valid SQL Statement. You will need to know a valid table name within the database to be able to retrieve information from it. To simply return all available data in a particular table of your choice simply change the name 'authors' (show below) to the name of the table you wish to query. Press OK to execute the query.

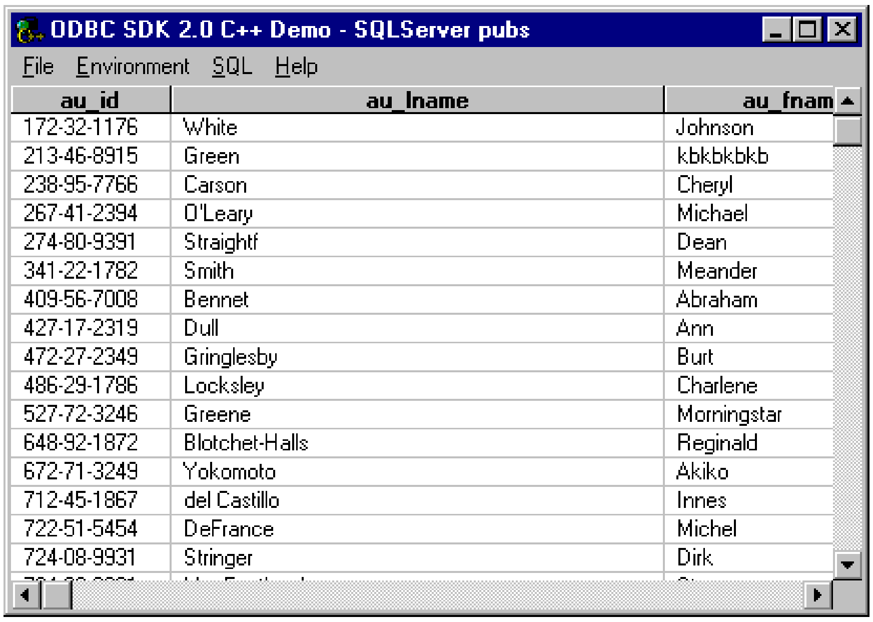
Figure 5.82. CPP (C++) Demo



```
select * from authors
```

If the query executes successfully you will see a table of the data returned by the query.

Figure 5.83. CPP (C++) Demo



au_id	au_lname	au_fnam
172-32-1176	White	Johnson
213-46-8915	Green	kbkbkbkb
238-95-7766	Carson	Cheryl
267-41-2394	O'Leary	Michael
274-80-9391	Straightf	Dean
341-22-1782	Smith	Meander
409-56-7008	Bennet	Abraham
427-17-2319	Dull	Ann
472-27-2349	Gringlesby	Burt
486-29-1786	Locksley	Charlene
527-72-3246	Greene	Morningstar
648-92-1872	Blotchet-Halls	Reginald
672-71-3249	Yokomoto	Akiko
712-45-1867	del Castillo	Innes
722-51-5454	DeFrance	Michel
724-08-9931	Stringer	Dirk

7.2 Unix Data Source Configuration

The OpenLink ODBC Lite for UNIX is the family name of a suite of Single Tier ODBC Drivers supporting a wide range of leading relational database engines. These drivers do not require the installation of any additional software on the server machine hosting the database engine. This is due to the fact that Single Tier driver implementations depend on the database(s) that you are connecting with to provide database connectivity and network services (this software typically installed at database engine installation time).

Before a Lite Driver can be used, a data source must be defined either manually, or by using the HTTP based iODBC Administrator.

7.2.1 Creating Data Sources Using iODBC Administrator

The OpenLink Lite Drivers for Unix can be installed within a previously installed Multi-Tier installation or completely standalone. If installed within a Multi-Tier installation the Lite Driver can share the Admin Assistant installed with the Multi-Tier for configuring data source. In the absence of a Multi-tier installation, an HTTP based iODBC Administrator is installed and used to configure the drivers. The download wizard for Unix Lite will always offer install.sh and the HTTP based iODBC Administrator, and then show the available Lite Drivers for the required operating system.

A Lite driver package contains only the driver and installation files, e.g. the sql_lt.taz file contains:

```
bin/openlink.ini          Contains the Environment settings
bin/inifile
bin/freetds.conf          Part of the FreeTDS library
lib/sql_st_lt.la
lib/sql_st_lt.so          The actual lite driver
scripts/SQLServer/oplrvc.sql
```

During the installation of the OpenLink Lite Drivers for Unix, the install.sh script will generate a file called bin/iodbc-admin-httpd.sh. This is a shell script used to start and stop the HTTP based iODBC Administrator. The usage is as follows:

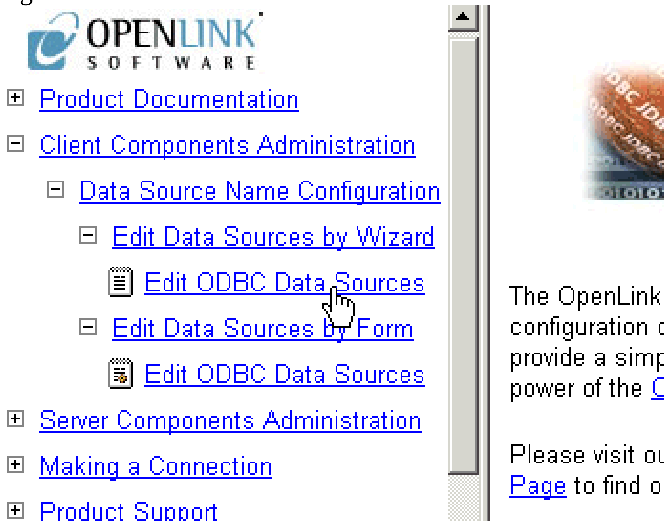
```
$ iodbc-admin-httpd.sh start  # Starts the HTTP based iODBC Administrator
$ iodbc-admin-httpd.sh stop   # Tries to stop the HTTP based iODBC Administrator
$ iodbc-admin-httpd.sh status # Shows if the program is running
```

7.2.1.1 Wizard Based Configuration

1. Start up the HTTP based iODBC Administrator, as explained above.

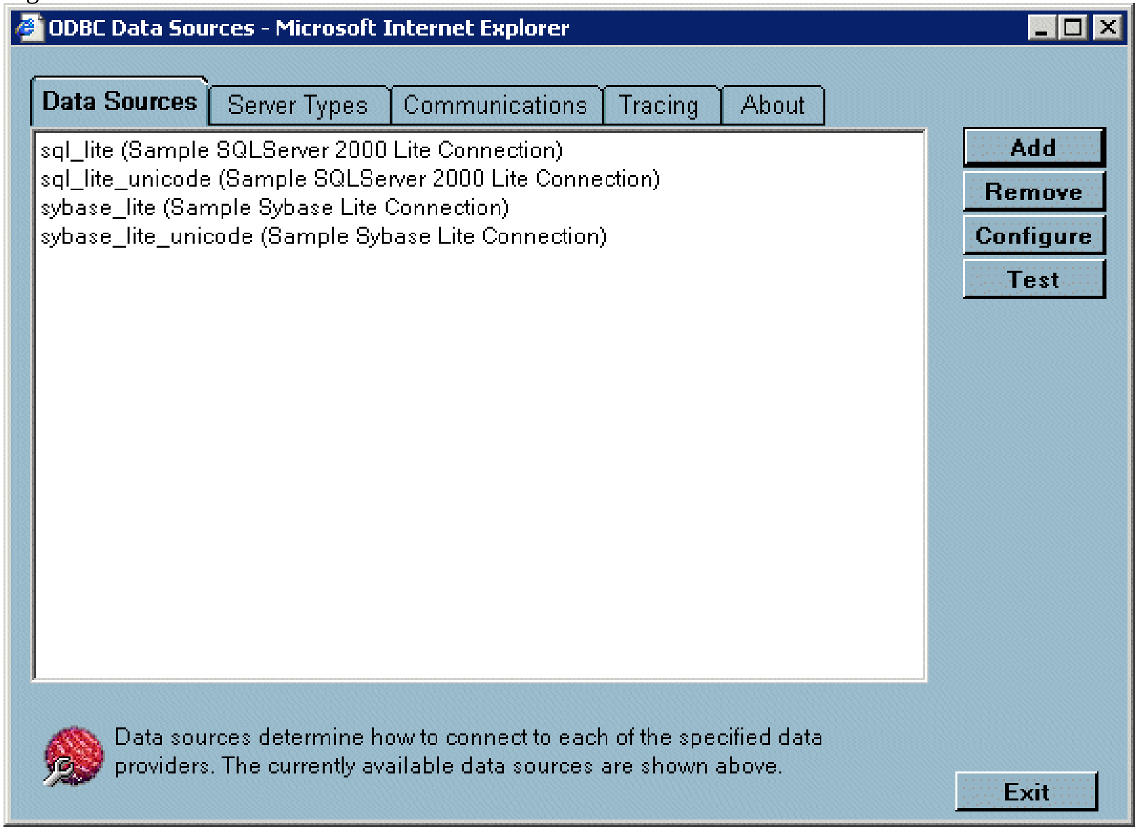
2. Open up your Internet Browser and then enter the following URL: http://localhost:8000/ (note the OpenLink HTTP based iODBC Administrator listens at port 8000 by default, this value is set at installation time).
3. Expand the menu by clicking on the "Client Components Administration", then "Data Source Name Configuration", and "Edit Data Sources by Wizard".

Figure 5.84.



4. Click on the "Edit ODBC Data Sources" hyperlink, this takes you into the actual ODBC Data Source configuration wizard.

Figure 5.85.

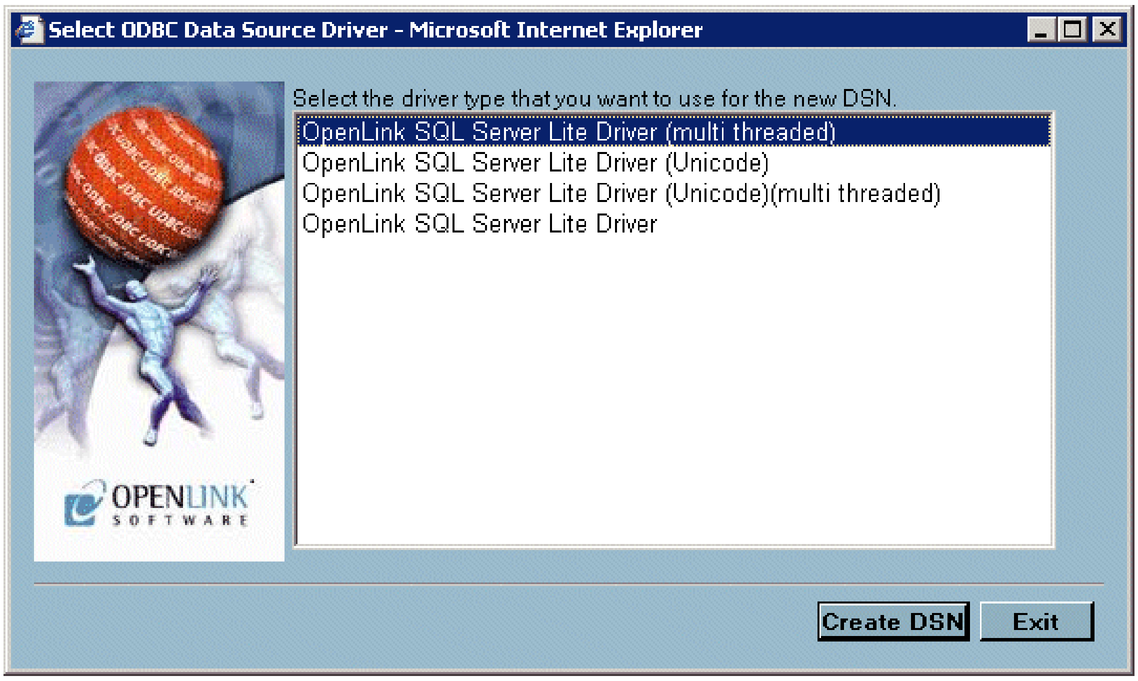


sql_lite (Sample SQLServer 2000 Lite Connection)
sql_lite_unicode (Sample SQLServer 2000 Lite Connection)
sybase_lite (Sample Sybase Lite Connection)
sybase_lite_unicode (Sample Sybase Lite Connection)

Data sources determine how to connect to each of the specified data providers. The currently available data sources are shown above.

5. Click the "Add" button to commence the process of creating a new Lite ODBC DSN, the wizard presents you with a list of Lite Drivers installed on your system. Select the driver required. In this example the OpenLink SQL Server Lite Driver is highlighted. Then click on the "Next" button.

Figure 5.86.


Select ODBC Data Source Driver - Microsoft Internet Explorer

Select the driver type that you want to use for the new DSN.

OpenLink SQL Server Lite Driver (multi threaded)
OpenLink SQL Server Lite Driver (Unicode)
OpenLink SQL Server Lite Driver (Unicode)(multi threaded)
OpenLink SQL Server Lite Driver

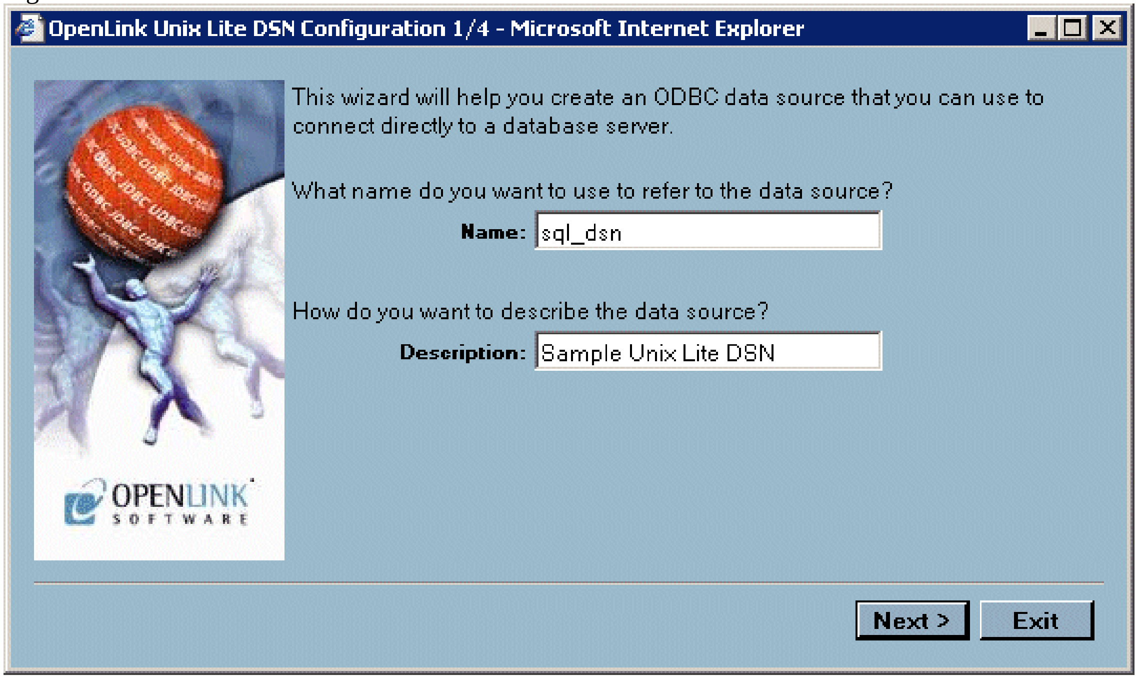
6. Enter values into the "Name" and "Description" fields as follows:

   Name. Enter a value that uniquely identifies the DSN being created. This example uses the name "sqlserver_dsn" to indicate that this DSN will be connecting to SQL Server database.

   Description. Enter a value that provides additional information that helps in describing the purpose of the DSN that you are creating.

   Once completed click on the "Next" button.

   Figure 5.87.


OpenLink Unix Lite DSN Configuration 1/4 - Microsoft Internet Explorer

This wizard will help you create an ODBC data source that you can use to connect directly to a database server.

What name do you want to use to refer to the data source?

Name: sql_dsn

How do you want to describe the data source?

Description: Sample Unix Lite DSN

7. Enter values into the "Database Name", "Server", and "Username" fields as follows:

   Database Name. Enter the name of the database you which to make a connection to. Note in the case of the ODBC-JDBC Bridge this would be the name of the JDBC Driver to be used.

7.2.1.1.1 Connection Options

Enter database server connection values for the database that your are connecting to.

The label shown named Server will change according to the ServerType selected on the previous wizard page to provide a more suitable cue. The table below shows the alternative descriptions and there significance.

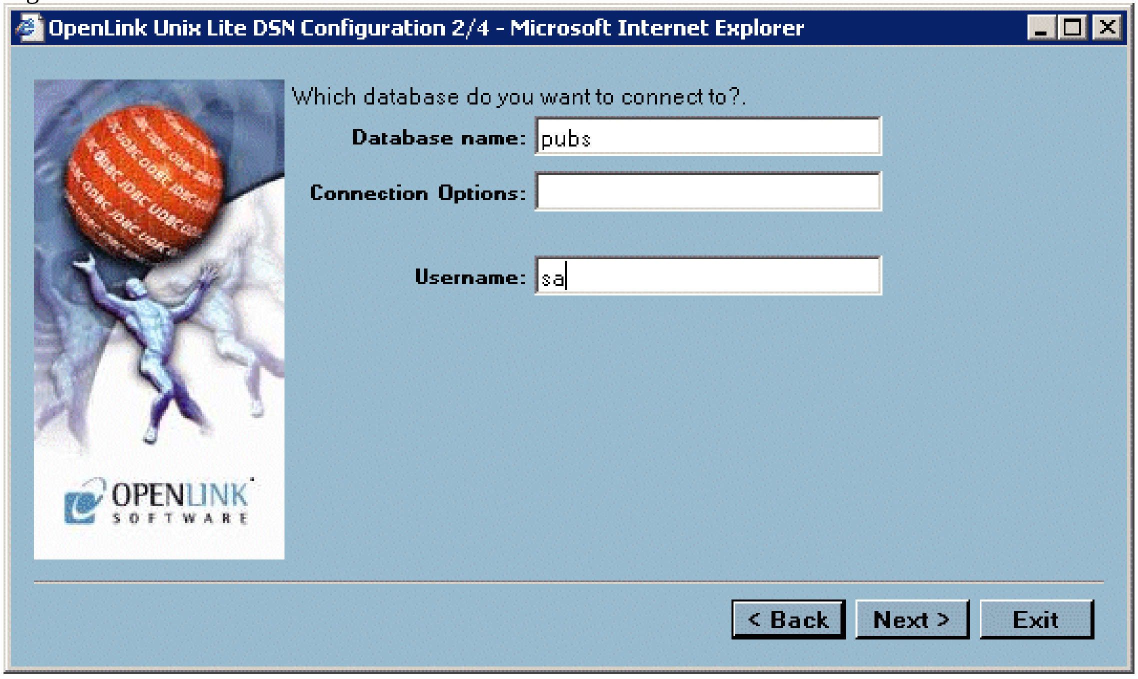
Table 5.1. OpenLink Lite for Unix Server Types

Server Type	Label Name	Description
DB2	Server/Adapter	Name of DB2 Instance.
Informix	Server	Informix Connect connection parameters.
Ingres & OpenIngres	Ingres Net (vnode)	Name of Ingres vnode to connect to.
Oracle	NET 8 Service Name	Name of Oracle 8 service as defined with TNS Listener or Oracle 8 SID.
Progress	DB Connection Options	Progress connection options.
SQLServer	Server	SQLServer server name.
ODBC-JDBC Bridge	URL String	JDBC Connect String

Username. Enter a valid username for the database that you are connecting to, you can leave this blank and be prompted for values at actual database connect time.

Click on the "Next" button.

Figure 5.88.



OpenLink Unix Lite DSN Configuration 2/4 - Microsoft Internet Explorer

Which database do you want to connect to?

Database name: pubs

Connection Options:

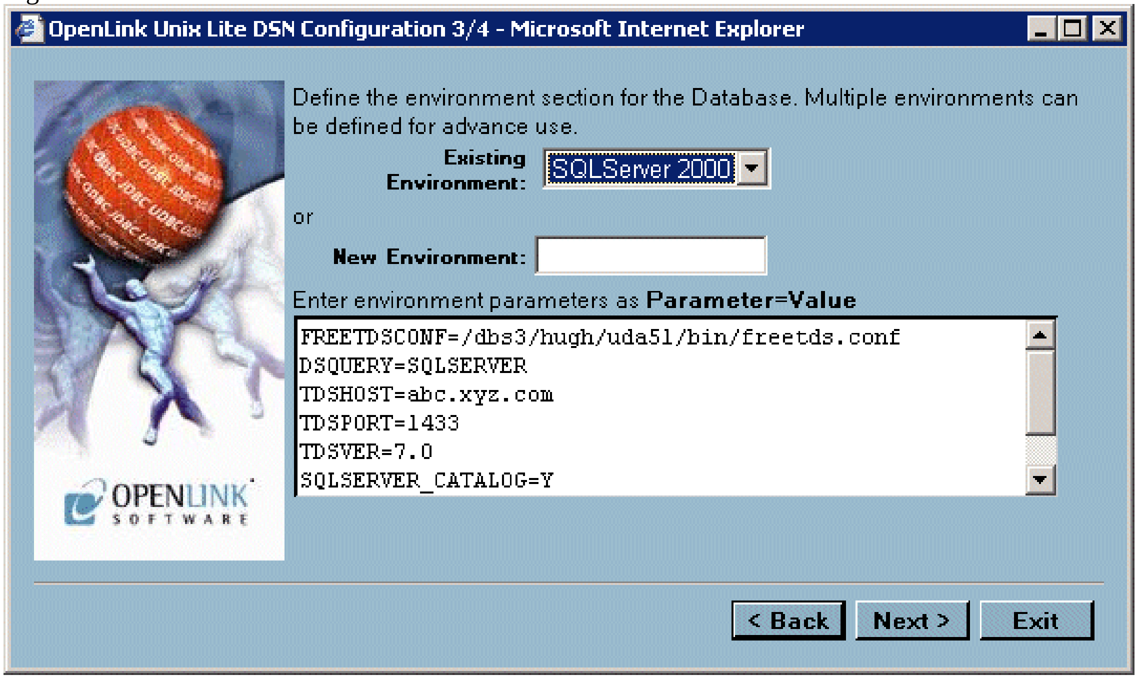
Username: sa

8. Select the Environment section name used to identify the group of environment parameters for the Database. In most cases this does not need to be changed. For advanced use, multiple environments may be defined. The pick list of existing Environment groups contains only the currently defined Environments that are associated with the same Driver currently being configured. Choose from an existing environment, or create a new environment by entering a name.

   Enter environment values into the text area as parameter=value with each parameter on a separate line.

   Once completed click on the "Next" button.

Figure 5.89.


OpenLink Unix Lite DSN Configuration 3/4 - Microsoft Internet Explorer
OPENLINK SOFTWARE
< Back
Next >
Exit

Define the environment section for the Database. Multiple environments can be defined for advance use.

Existing Environment: SQLServer 2000

or

New Environment:

Enter environment parameters as **Parameter=Value**

```
FREETDSCONF=/dbs3/hugh/uda51/bin/freetds.conf
DSQUERY=SQLSERVER
TDSHOST=abc.xyz.com
TDSPORT=1433
TDSVER=7.0
SQLSERVER_CATALOG=Y
```

These environment varable values are database specific and are described in detail later in this section. The list below will allow you to quickly jump to the relevant section:

DB2

Informix

Ingres & OpenIngres

Oracle

Progress SQL92

Microsoft or Sybase SQL Server

ODBC-JDBC Bridge for Java

9. Enter values into the following fields:

Read-only connection. Check this box if you require a read only session.

Disable Interactive Login. Check this box if you do not want to be presented with a login dialog window.

Defer fetching of long data. Check this box to defer the fetching of long data. See the Release Notes section for more details.

Once completed click on the "Next" button.

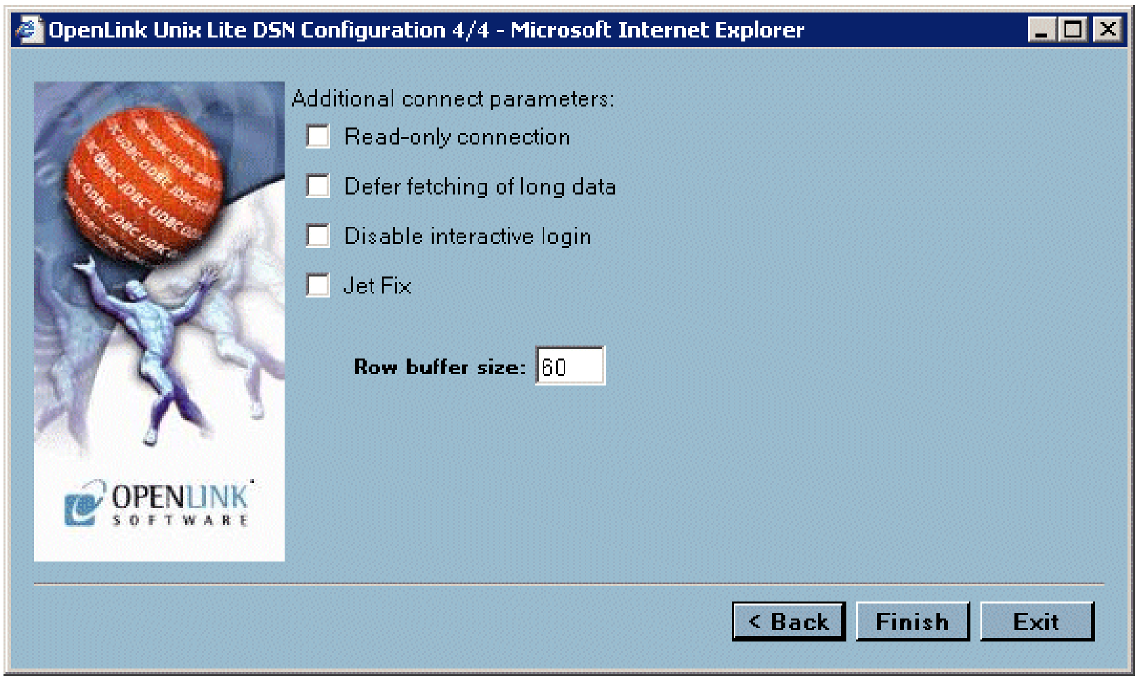
Enter values into the "Row Buffer Size", and "Jet Fix" fields as follows:

Row Buffer Size. Enter a value that represents the number of records that you would like your ODBC driver to retrieve during each network hop. A network hop represents the number of times your OpenLink ODBC send a message across the network to retrieve records from your remote database server. The feature can be used to improve ODBC record retrieval performance.

Jet Fix. Check this box to overcome an old Jet Engine problem of large numeric types mapped to TEXT (drivers will return SQLServer as database type)

Once completed click on the "Finish" button to save the DSN.

Figure 5.90.

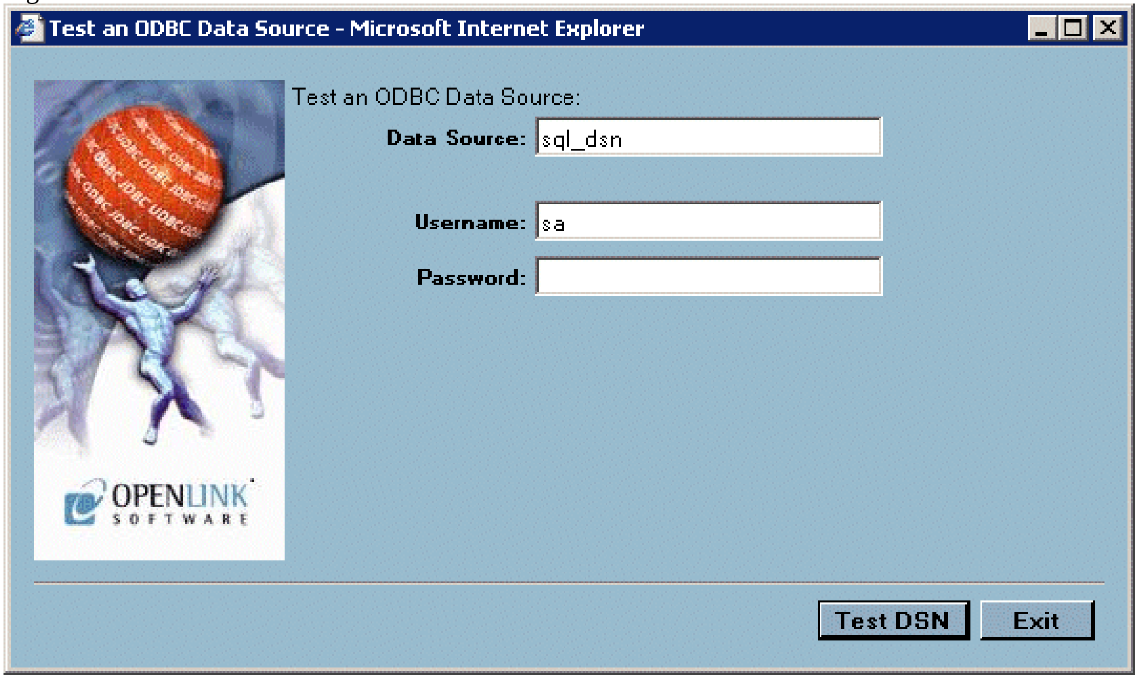

OpenLink Unix Lite DSN Configuration 4/4 - Microsoft Internet Explorer
OPENLINK SOFTWARE
< Back
Finish
Exit

Additional connect parameters:
- [ ] Read-only connection
- [ ] Defer fetching of long data
- [ ] Disable interactive login
- [ ] Jet Fix

Row buffer size: 60

10. Now that the DSN has been saved, it can be verified. Select the DSN to test and hit the "Test" button .

Figure 5.91.



Test an ODBC Data Source:

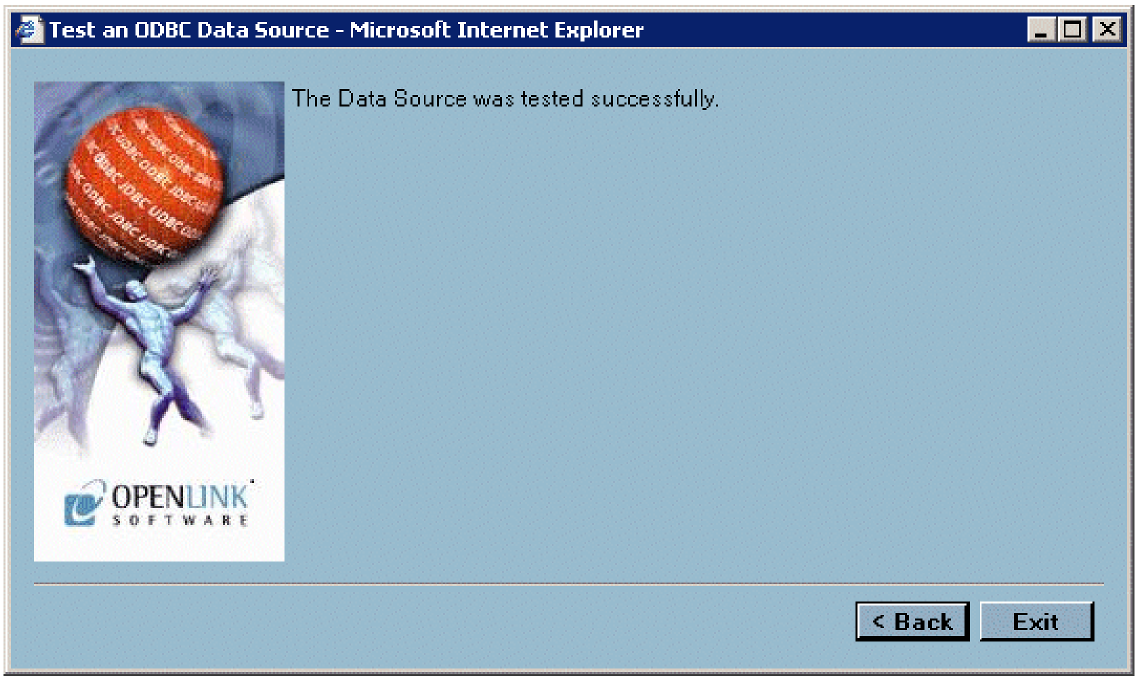
Data Source: sql_dsn

Username: sa

Password:

11. Click the "Test" button to actually commence the ODBC DSN Test process, you will be presented with dialogs that indicate success or failure at the end of this process.

Figure 5.92.



The Data Source was tested successfully.

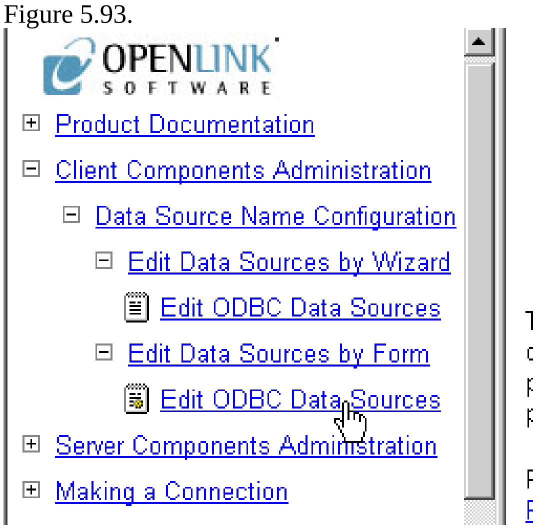
12. Click on the "exit" button to exit the ODBC DSN configuration wizard

7.2.1.2 Form Based Configuration

The OpenLink HTTP based iODBC Administrator also allows the more experienced OpenLink ODBC user to manage ODBC DSNs via a forms based interface. Like the wizard based approach, this is done entirely from within your browser. In the sections that follow, a step by guide and illustrative screen shots are used to demonstrate the process of creating the same Lite ODBC DSN created in the prior section using the Wizard approach.

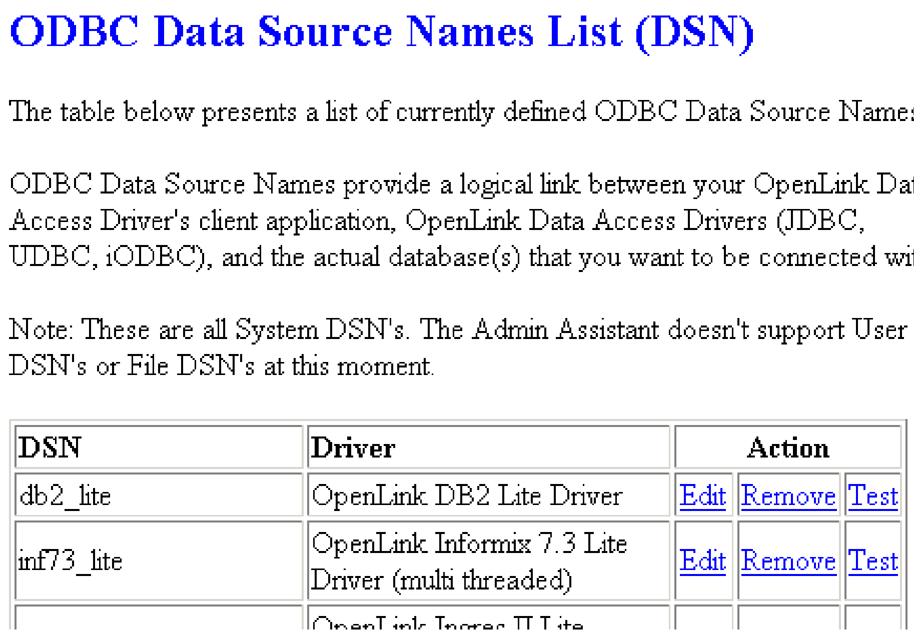
1. Start up the HTTP based iODBC Administrator, as explained earlier.
2. Open up your Internet Browser and then enter the following URL: http://localhost:8000/ (note the OpenLink HTTP based iODBC Administrator listens at port 8000 by default, this value is set at installation time).
3. Expand the menu by clicking on the "Client Components Administration", then "Data Source Name Configuration", and "Edit Data Sources by Form".
4. Click on the "Edit ODBC Data Sources" hyperlink to commence the process of creating a new ODBC DSN.

Figure 5.93.


OPENLINK SOFTWARE
Product Documentation
Client Components Administration
Data Source Name Configuration
Edit Data Sources by Wizard
Edit ODBC Data Sources
Edit Data Sources by Form
Edit ODBC Data Sources
Server Components Administration
Making a Connection

5. On the right side of the HTTP based iODBC Administrator pane is your start page for configuring Lite DSNs using the Forms approach. This page presents to you a list of currently configured ODBC DSNs on the machine. Click the "Add" hyperlink in the Action Column

Figure 5.94.



ODBC Data Source Names List (DSN)

The table below presents a list of currently defined ODBC Data Source Names.

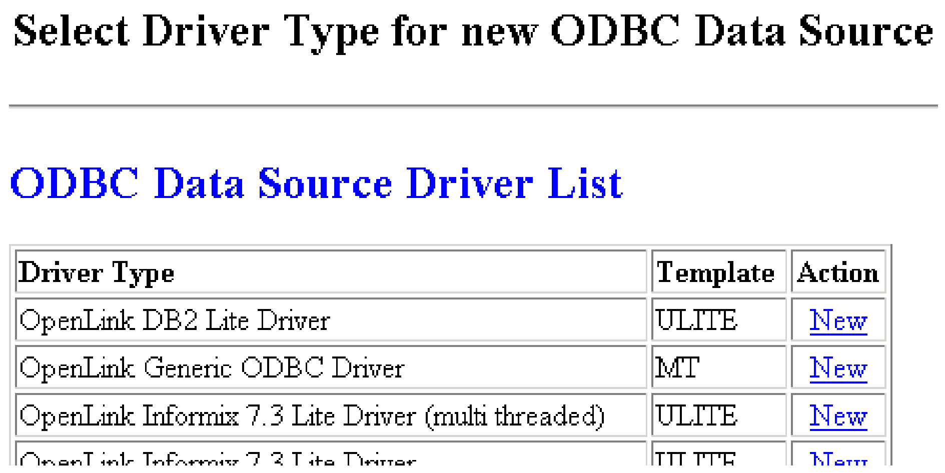
ODBC Data Source Names provide a logical link between your OpenLink Data Access Driver's client application, OpenLink Data Access Drivers (JDBC, UDBC, iODBC), and the actual database(s) that you want to be connected with.

Note: These are all System DSN's. The Admin Assistant doesn't support User DSN's or File DSN's at this moment.

DSN	Driver	Action		
db2_lite	OpenLink DB2 Lite Driver	Edit	Remove	Test
inf73_lite	OpenLink Informix 7.3 Lite Driver (multi threaded)	Edit	Remove	Test
	OpenLink Ingres II Lite			

6. You are now presented with a table listing that comprises ODBC Drivers installed on your system, move on to the row that identifies the ODBC Driver that you will be creating your DSN for, then click on the "New" hyperlink.

   Figure 5.95.

   Select Driver Type for new ODBC Data Source

   ODBC Data Source Driver List

Driver Type	Template	Action
OpenLink DB2 Lite Driver	ULITE	New
OpenLink Generic ODBC Driver	MT	New
OpenLink Informix 7.3 Lite Driver (multi threaded)	ULITE	New
OpenLink Informix 7.3 Lite Driver	ULITE	New

7. Enter values into the fields presented on the ODBC DSN form as follows:

   Name. Enter a value that uniquely identifies the DSN being created. This example uses the name "sqlserver2" to indicate that this DSN will be connecting to SQL Server database.

   Description. Enter a value that provides additional information that helps in describing the purpose of the DSN that you are creating.

   Username. Enter a valid username for the database that you are connecting to, you can leave this blank and be prompted for values at actual database connect time.

   Database Name. Enter the name of an actual SQL Server database.

   Read-only connection. Check this box if you require a read only session.

   No Login Dialog Box. Check this box if you do not want to be presented with a login dialog window.

   Defer fetching of long data. Check this box to defer the fetching of long data. See the Release Notes section for more details.

Jet Fix. Check this box to overcome an old Jet Engine problem of large numeric types mapped to TEXT (drivers will return SQLServer as database type)

Server. Enter database server connection values for the database that your are connecting to.

Row Buffer Size. Enter a value that represents the number of records that you would like your ODBC driver to retrieve during each network hop. A network hop represents the number of times your OpenLink ODBC send a message across the network to retrieve records from your remote database server. The feature can be used to improve ODBC record retrieval performance.

7.2.1.2.1 Environment

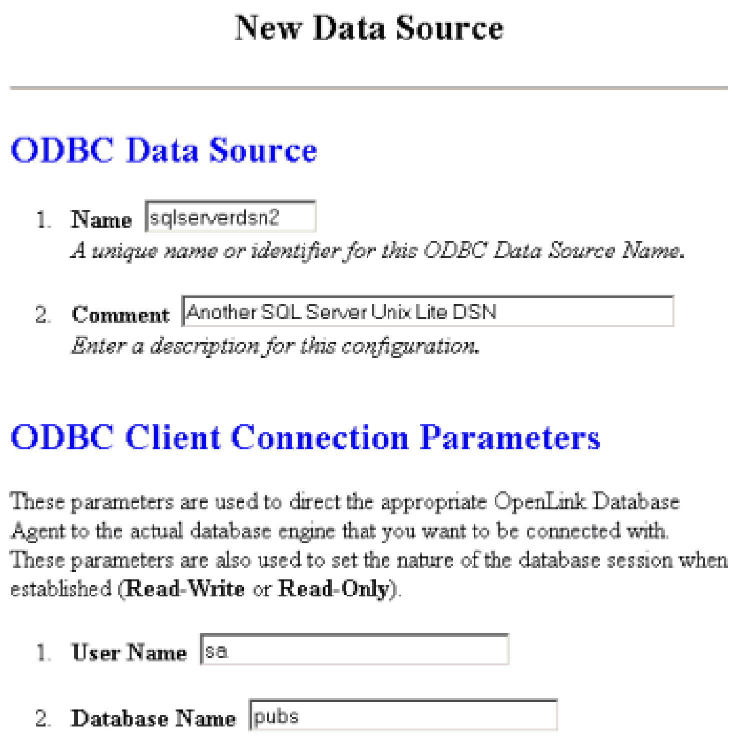
Select the Environment section name used to identify the group of environment parameters for the Database. In most cases this does not need to be changed. For advanced use, multiple environments may be defined. The pick list of existing Environment groups contains only the currently defined Environments that are associated with the same Driver currently being configured. Choose from an existing environment, or create a new environment by entering a name.

Enter environment values into the text area as parameter=value with each parameter on a separate line.

These environment varable values are database specific and are described in detail later in this section. The list below will allow you to quickly jump to the relevant section:

DB2
Informix
Ingres & OpenIngres
Oracle
Progress SQL92
Microsoft or Sybase SQL Server
ODBC-JDBC Bridges for Java

Figure 5.96.


New Data Source

ODBC Data Source

1. **Name** sqlserverdsn2
A unique name or identifier for this ODBC Data Source Name.

2. **Comment** Another SQL Server Unix Lite DSN
Enter a description for this configuration.

ODBC Client Connection Parameters

These parameters are used to direct the appropriate OpenLink Database Agent to the actual database engine that you want to be connected with. These parameters are also used to set the nature of the database session when established (**Read-Write** or **Read-Only**).

1. **User Name** sa

2. **Database Name** pubs

8. Click on the "Add" button at the foot of the page to complete the creation of your new ODBC DSN.
9. The DSN may then be tested, or you can return to the DSN list.

7.2.2 Manual Configuration

1. Edit the file bin/openlink.ini, and make sure the environment section for the driver contains the right entries. In case of the SQLServer Lite Driver this section looks like this:

   ```
   [Environment SQLServer 2000]
   FREETDSCONF        = /home/openlink/bin/freetds.conf
   DSQUERY            = SQLSERVER   ; Load this section from freetds.conf
   TDSHOST            = host.domain ; Point this to your SQLServer machine
   TDSPORT            = 1433
   TDSVER             = 7.0
   SQLSERVER_CATALOG  = Y
   CURSOR_SENSITIVITY = LOW         ; Set to HIGH after loading oplrvc.sql
   ```

   These environment varable values are database specific and are described in detail later in this section. The list below will allow you to quickly jump to the relevant section:

   DB2
   Informix
   Ingres & OpenIngres
   Oracle
   Progress SQL92
   Microsoft or Sybase SQL Server (TDS)
   ODBC-JDBC Bridges for Java

   In the case of SQLServer Driver, you only need to set the TDSHOST variable correctly. The FREETDSCONF variable is automatically set by the installer. Under normal conditions you do not have to modify the freetds.conf file nor the DSQUERY variable.
2. Edit the file bin/odbc.ini and add the correct settings to the sample DSN that is created:

   ```
   [sql_lite]
   Driver          = /home/openlink/lib/sql_st_lt.so
   Description     = Sample SQLServer 2000 Lite Connection
   ServerType      = SQLServer 2000
   Username        =
   Password        =
   Database        =
   ReadOnly        = no
   FetchBufferSize = 60
   ```

   In the case of SQLServer Driver, you only need to modify Username, Password and Database. All modifications except the Driver keyword will be saved when reinstalling this or any other Lite Driver.
3. For most Lite drivers the LD_LIBRARY_PATH (or SHLIB_PATH or LIBPATH) environment variables must be set before you can load the driver. Therefore you will not find any mention of them in the openlink.ini file, as these settings are set by the driver after it is properly loaded.

   If the installer finds the right environment variables e.g. INFORMIXDIR, it will note the appropriate LD_LIBRARY_PATH settings, and add them automatically to the openlink.sh script. This file must therefore be run before you can do anything with the Lite Drivers, e.g.:

   ```
   . ./openlink.sh
   ```

   If you this is not executed, then the system loader library will give an error message stating it cannot find some dependent shared libraries to load.

7.2.3 DB2

OpenLink Lite Drivers for Unix can be configured in 3 ways:

Web Based Wizard

Web Based Forms

Manually

Once you have configured the generic parts of the data source using one of the above listed methods, you will need to define the driver environment. Below are the common options with their descriptions for the environment section:

```
[Environment DB2]
DB2DIR             = /dbs/DB2
DB2INSTANCE        = DB2        ; default instance
CURSOR_SENSITIVITY = LOW        ; Set to HIGH after loading oplrvc.sql
```

7.2.4 Informix

OpenLink Lite Drivers for Unix can be configured in 3 ways:

Web Based Wizard

Web Based Forms

Manually

Once you have configured the generic parts of the data source using one of the above listed methods, you will need to define the driver environment. Below are the common options with their descriptions for the environment section:

```
[Environment Informix 7.3]
INFORMIXDIR        = /dbs/informix73
INFORMIXSERVER     = alpha
DELIMIDENT         = Y  ; Allow quoted identifiers
OPL_INF_MULTISESS  = Y  ; Allow multiple sessions
OPL_SPACEPADCHAR   = Y  ; Pad CHAR fields with spaces
CURSOR_SENSITIVITY = LOW        ; Set to HIGH after loading oplrvc.sql
;FET_BUF_SIZE           = 65535         ; Size of the fetch buffer
;FORCE_ONLINE_DATABASE  = 1             ; Force mode to (0) SE or (1) ONLINE


[Environment Informix 2000]
INFORMIXDIR        = /dbs/informix2000
INFORMIXSERVER     = alpha
DELIMIDENT         = Y  ; Allow quoted identifiers
OPL_INF_MULTISESS  = Y  ; Allow multiple sessions
OPL_SPACEPADCHAR   = Y  ; Pad CHAR fields with spaces
CURSOR_SENSITIVITY = LOW        ; Set to HIGH after loading oplrvc.sql
;FET_BUF_SIZE           = 65535         ; Size of the fetch buffer
;FORCE_ONLINE_DATABASE  = 1             ; Force mode to (0) SE or (1) ONLINE
```

7.2.5 Ingres

OpenLink Lite Drivers for Unix can be configured in 3 ways:

Web Based Wizard

Web Based Forms

Manually

Once you have configured the generic parts of the data source using one of the above listed methods, you will need to define the driver environment. Below are the common options with their descriptions for the environment section:

```
[Environment Ingres II]
II_SYSTEM          = /dbs
II_DATE_FORMAT     = US
ING_SET            = set lockmode session where readlock=nolock
CURSOR_SENSITIVITY = LOW        ; Set to HIGH after loading oplrvc.sql
```

7.2.6 Oracle

OpenLink Lite Drivers for Unix can be configured in 3 ways:

Web Based Wizard
Web Based Forms
Manually
Once you have configured the generic parts of the data source using one of the above listed methods, you will need to define the driver environment. Below are the common options with their descriptions for the environment section:

```
[Environment Oracle 8.0.x]
ORACLE_HOME        = /dbs/oracle80
ORACLE_SID         = ORCL
;ORACLE_SERVER          = T
;TWO_TASK               = P:
;ODBC_CATALOGS          = Y     ; Uncomment after loading odbccat8.sql
;MULTIPLEX_LDA          = 5     ; Allow 5 OpenLink clients on a single lda
;OPL_USR_TBLS_FIRST     = Y     ; Sort SQLTables starting with user tables
SHOW_REMARKS       = N  ; Retrieve SQLColumns REMARKS field
CURSOR_SENSITIVITY = LOW        ; Set to HIGH after loading odbccat8.sql
;OCI_PREFETCH_ROWS      = 100   ; Number of rows to prefetch
;OCI_PREFETCH_MEMORY    = 65535 ; Amount of memory to use for prefetching


[Environment Oracle 8.1.x]
ORACLE_HOME        = /dbs/oracle81
ORACLE_SID         = ORCL
;ORACLE_SERVER          = T
;TWO_TASK               = P:
;ODBC_CATALOGS          = Y     ; Uncomment after loading odbccat8.sql
;MULTIPLEX_LDA          = 5     ; Allow 5 OpenLink clients on a single lda
;OPL_USR_TBLS_FIRST     = Y     ; Sort SQLTables starting with user tables
SHOW_REMARKS       = N  ; Retrieve SQLColumns REMARKS field
CURSOR_SENSITIVITY = LOW        ; Set to HIGH after loading odbccat8.sql
;OCI_PREFETCH_ROWS      = 100   ; Number of rows to prefetch
;OCI_PREFETCH_MEMORY    = 65535 ; Amount of memory to use for prefetching


[Environment Oracle 8.1.x]
ORACLE_HOME        = /dbs/oracle81
ORACLE_SID         = ORCL
;ORACLE_SERVER          = T
;TWO_TASK               = P:
;ODBC_CATALOGS          = Y     ; Uncomment after loading odbccat8.sql
;MULTIPLEX_LDA          = 5     ; Allow 5 OpenLink clients on a single lda
;OPL_USR_TBLS_FIRST     = Y     ; Sort SQLTables starting with user tables
SHOW_REMARKS       = N  ; Retrieve SQLColumns REMARKS field
CURSOR_SENSITIVITY = LOW        ; Set to HIGH after loading odbccat8.sql
;OCI_PREFETCH_ROWS      = 100   ; Number of rows to prefetch
;OCI_PREFETCH_MEMORY    = 65535 ; Amount of memory to use for prefetching
```

7.2.7 PostgreSQL

OpenLink Lite Drivers for Unix can be configured in 3 ways:

Web Based Wizard
Web Based Forms
Manually
Once you have configured the generic parts of the data source using one of the above listed methods, you will need to define the driver environment. Below are the common options with their descriptions for the environment section:

```
[Environment PostgreSQL]
CURSOR_SENSITIVITY = LOW        ; Set to HIGH after loading oplrvc.sql
;ODBC_CATALOGS          = Y             ; Uncomment after loading odbccat defs
```

The following options can be used in the *ConnectOptions* or *Options* field of the client configuration:

- -H <hostname>. Connect to postmaster on <hostname>. This defaults to localhost if unspecified
- -P <port>. Contact postmaster on port <port>, which defaults to PGPORT (5432) is unspecified.

- -T. Disable ODBC transaction management. All transactions will be automatically committed. This prevents palloc() failures with out-of-memory errors when doing really big transactions such as Exporting 10000 records from MS/Access.

7.2.7.1 Datatype Mapping from ODBC Datatypes to Postgres Datatypes

This information can be queried by the SQLTypeInfo catalog call.

Table 5.2. Default Rule Book settings

SQL type	Postgres type
SQL_CHAR	char
SQL_VARCHAR	varchar
SQL_LONGVARCHAR	text
SQL_DECIMAL	varchar
SQL_NUMERIC	varchar
SQL_BIT	bit
SQL_TINYINT	int2
SQL_SMALLINT	int2
SQL_INTEGER	int4
SQL_BIGINT	varchar
SQL_REAL	float4
SQL_DOUBLE	float8
SQL_FLOAT	float8
SQL_BINARY	not supported
SQL_VARBINARY	not supported
SQL_LONGVARBINARY	not supported
SQL_DATE	not supported
SQL_TIME	not supported
SQL_TIMESTAMP	not supported

7.2.7.2 Datatype Mapping from Postgres Datatypes to ODBC Datatypes

This information can be queried by the SQLColumns catalog call.

Table 5.3. Default Rule Book settings

Postgres type	SQL type	Precision
bool	SQL_CHAR	1
char	SQL_CHAR	1
name	SQL_VARCHAR	32
char16	SQL_CHAR	16
int2	SQL_SMALLINT	
int4	SQL_INTEGER	
regproc	SQL_VARCHAR	16
text	SQL_LONGVARCHAR	8000
oid	SQL_INTEGER	(*)
tid	SQL_VARCHAR	19
xid	SQL_VARCHAR	12
cid	SQL_VARCHAR	3
oid8	SQL_VARCHAR	89
smgr	SQL_VARCHAR	12
char2	SQL_VARCHAR	2
char4	SQL_VARCHAR	4

Postgres type	SQL type	Precision
char8	SQL_VARCHAR	8
filename	SQL_VARCHAR	255
float4	SQL_REAL	
float8	SQL_DOUBLE	
abstime	SQL_VARCHAR	60
reltime	SQL_VARCHAR	60
tinterval	SQL_VARCHAR	60
unknown	SQL_VARCHAR	255
bpchar	SQL_CHAR	255
varchar	SQL_VARCHAR	255
date	SQL_CHAR	10
time	SQL_CHAR	16
other type	SQL_LONGVARCHAR	8000

(*) Note: An oid is returned as a SQL_INTEGER, because otherwise it would not be useable for SQLSpecialColumns.

Binary data / large objects are not supported in this release.

7.2.8 MySQL

OpenLink Lite Drivers for Unix can be configured in 3 ways:

Web Based Wizard
Web Based Forms
Manually

Once you have configured the generic parts of the data source using one of the above listed methods, you will need to define the driver environment. Below are the common options with their descriptions for the environment section:

```
[Environment MySQL]
CURSOR_SENSITIVITY = LOW        ; Set to HIGH after loading oplrvc.sql
;ODBC_CATALOGS          = Y             ; Uncomment after loading odbccat defs
```

The following options can be used in the *ConnectOptions* or *Options* field of the client configuration:

- -H <hostname>. Connect to server running on <hostname>. This defaults to localhost if unspecified
- -P <port>. Contact server on port <port>, which defaults to (3306) is unspecified.
- -T. Disable all ODBC transaction support. The driver will never issue any extra statements for transaction management (commit, rollback, modification of transaction isolation level)

7.2.8.1 Datatype Mapping from ODBC Datatypes to MySQL Datatypes

This information can be queried by the SQLTypeInfo catalog call.

Table 5.4. Default Rule Book settings

SQL type	MySQL type
SQL_CHAR	char
SQL_VARCHAR	varchar
SQL_LONGVARCHAR	text
SQL_DECIMAL	decimal
SQL_NUMERIC	decimal
SQL_BIT	not supported
SQL_TINYINT	tinyint

SQL type	MySQL type
SQL_SMALLINT	smallint
SQL_INTEGER	integer
SQL_BIGINT	bigint
SQL_REAL	real
SQL_DOUBLE	double
SQL_FLOAT	double
SQL_BINARY	tinyblob
SQL_VARBINARY	tinyblob
SQL_LONGVARBINARY	longblob
SQL_DATE	date
SQL_TIME	time
SQL_TIMESTAMP	timestamp

7.2.8.2 Datatype Mapping from MySQL Datatypes to ODBC Datatypes

This information can be queried by the SQLColumns catalog call.

Table 5.5. Default Rule Book settings

MySQL type	SQL type	Precision
bigint	SQL_BIGINT	19
blob	SQL_VARBINARY	2^16-1
char(n)	SQL_CHAR	n
date	SQL_CHAR	32
datetime	SQL_CHAR	32
decimal(p,s)	SQL_DECIMAL	p
double	SQL_DOUBLE	15
enum	SQL_VARCHAR	255
float	SQL_REAL	7
int	SQL_INTEGER	10
longblob	SQL_LONGVARBINARY	2^32-1
longtext	SQL_LONGVARCHAR	2^32-1
mediumblob	SQL_VARBINARY	2^24-1
mediumint	SQL_INTEGER	8
mediumtext	SQL_LONGVARCHAR	2^24-1
set	SQL_VARCHAR	255
smallint	SQL_SMALLINT	5
text	SQL_LONGVARCHAR	2^16-1
time	SQL_VARCHAR	32
timestamp(n)	SQL_VARCHAR	n
tinyblob	SQL_VARBINARY	255
tinyint	SQL_TINYINT	3
tinytext	SQL_VARCHAR	255
varchar(n)	SQL_VARCHAR	n
varchar(n) binary	SQL_VARCHAR	n
year	SQL_VARCHAR	4

7.2.9 Progress SQL92

OpenLink Lite Drivers for Unix can be configured in 3 ways:

Web Based Wizard

Web Based Forms

Manually

Once you have configured the generic parts of the data source using one of the above listed methods, you will need to define the driver environment. Below are the common options with their descriptions for the environment section:

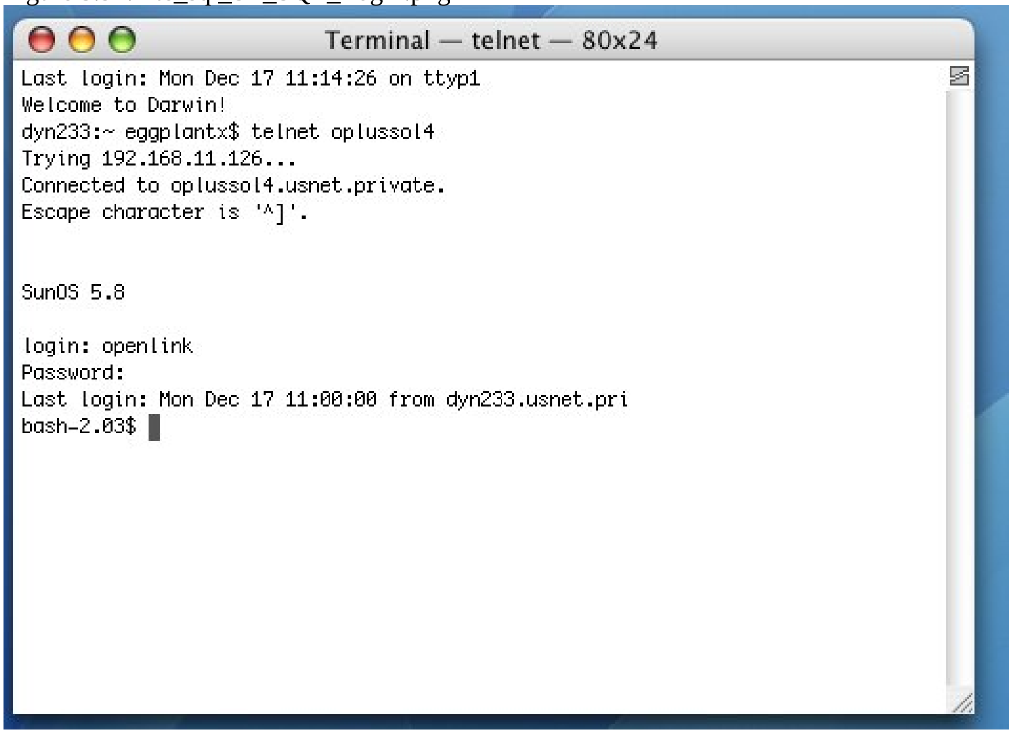
```
[Environment Progress 91SQL]
DLC                = /dbs/dlc9.1C
PROCFG             = /dbs/dlc9.1C/progress.cfg
CURSOR_SENSITIVITY = LOW        ; Set to HIGH after loading oplrvc.sql
```

7.2.10 Microsoft or Sybase SQL Server (TDS)

7.2.10.1 Installation

Login to your Unix or Linux client machine.

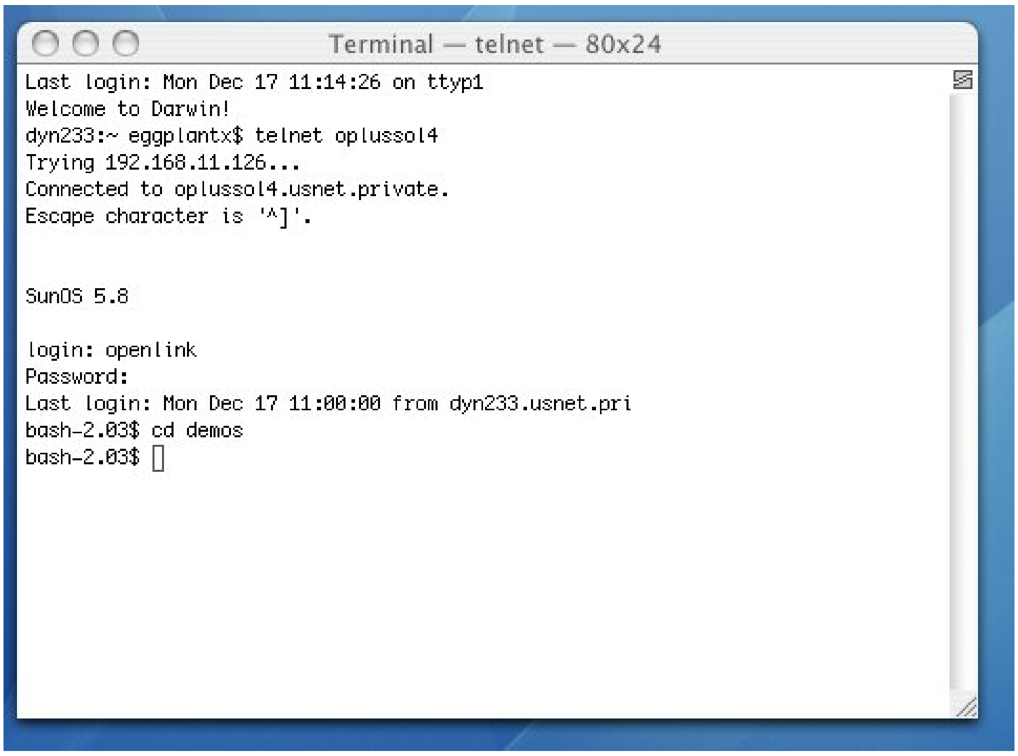
Figure 5.97. lite_sql_ST_SQL_Login.png



```
Last login: Mon Dec 17 11:14:26 on ttyp1
Welcome to Darwin!
dyn233:~ eggplantx$ telnet oplussol4
Trying 192.168.11.126...
Connected to oplussol4.usnet.private.
Escape character is '^]'.


SunOS 5.8

login: openlink
Password:
Last login: Mon Dec 17 11:00:00 from dyn233.usnet.pri
bash-2.03$
```

cd into the installation directory.

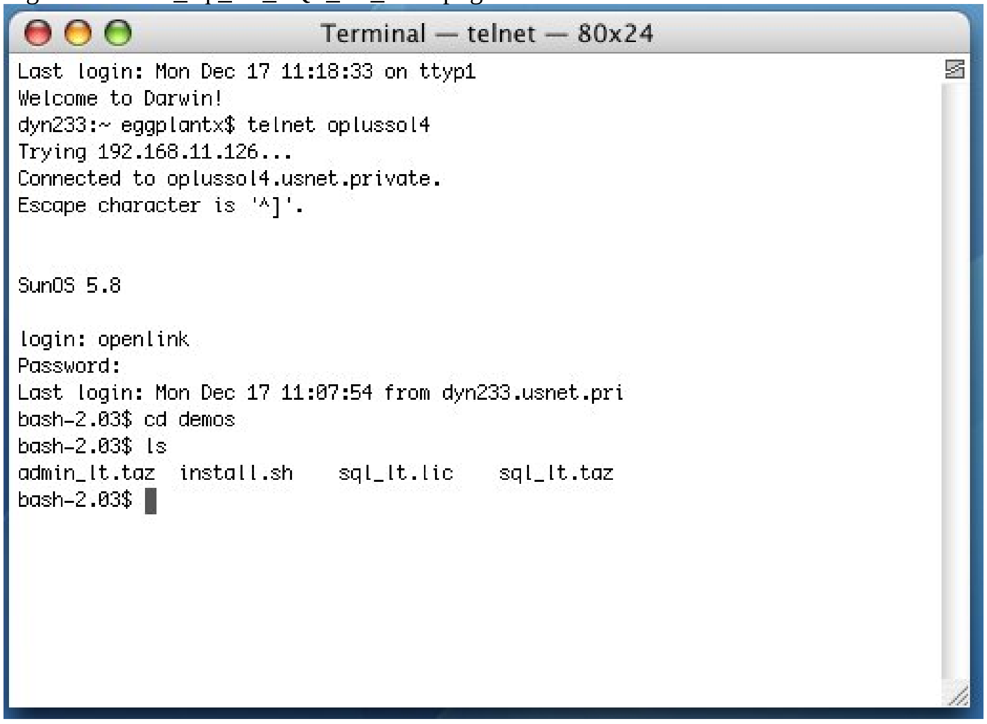
Figure 5.98. lite_sql_ST_SQL_CD_Demos.png



```
Last login: Mon Dec 17 11:14:26 on ttyp1
Welcome to Darwin!
dyn233:~ eggplantx$ telnet oplussol4
Trying 192.168.11.126...
Connected to oplussol4.usnet.private.
Escape character is '^]'.


SunOS 5.8

login: openlink
Password:
Last login: Mon Dec 17 11:00:00 from dyn233.usnet.pri
bash-2.03$ cd demos
bash-2.03$
```

The installation files ship as an installation shell script, a driver and admin .taz file, and a license .lic file. The installation shell script should be ftp'd in ascii. The rest of the files should be ftp'd in binary, where applicable.

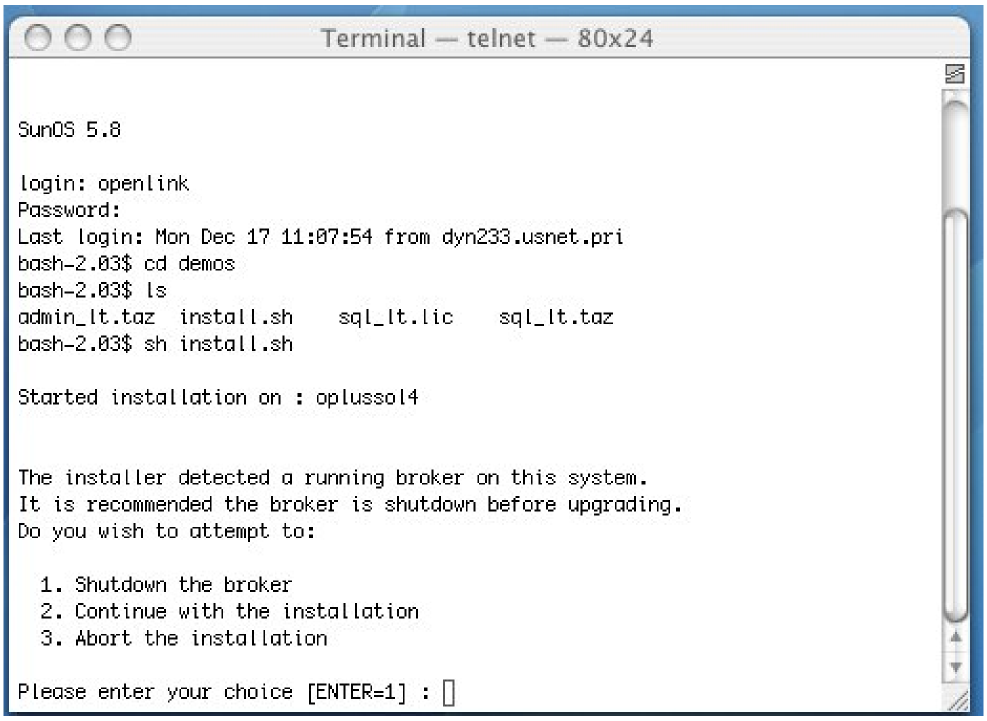
Figure 5.99. lite_sql_ST_SQL_LS_Files.png



```
Last login: Mon Dec 17 11:18:33 on ttyp1
Welcome to Darwin!
dyn233:~ eggplantx$ telnet oplussol4
Trying 192.168.11.126...
Connected to oplussol4.usnet.private.
Escape character is '^]'.


SunOS 5.8

login: openlink
Password:
Last login: Mon Dec 17 11:07:54 from dyn233.usnet.pri
bash-2.03$ cd demos
bash-2.03$ ls
admin_lt.taz  install.sh    sql_lt.lic    sql_lt.taz
bash-2.03$
```

Run the following command to start the installation: sh install.sh

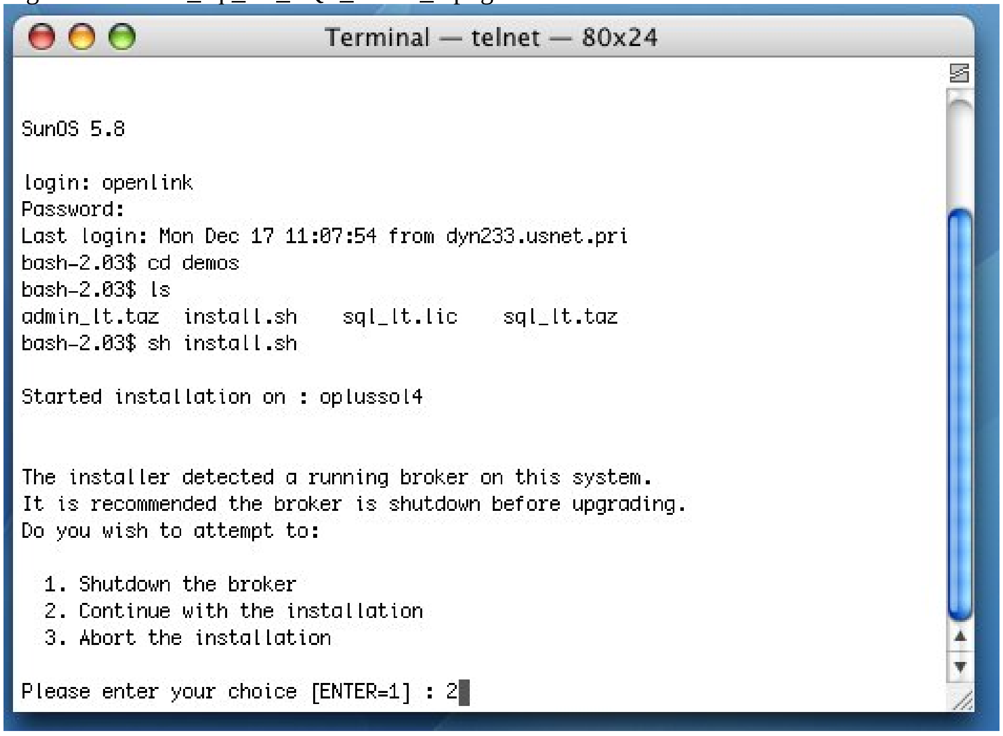
Figure 5.100. lite_sql_ST_SQL_Start_Install.png



```
SunOS 5.8

login: openlink
Password:
Last login: Mon Dec 17 11:07:54 from dyn233.usnet.pri
bash-2.03$ cd demos
bash-2.03$ ls
admin_lt.taz  install.sh    sql_lt.lic    sql_lt.taz
bash-2.03$ sh install.sh

Started installation on : oplussol4


The installer detected a running broker on this system.
It is recommended the broker is shutdown before upgrading.
Do you wish to attempt to:

  1. Shutdown the broker
  2. Continue with the installation
  3. Abort the installation

Please enter your choice [ENTER=1] :
```

If you have a pre-existing installation running on the machine, you will be presented with the following options.

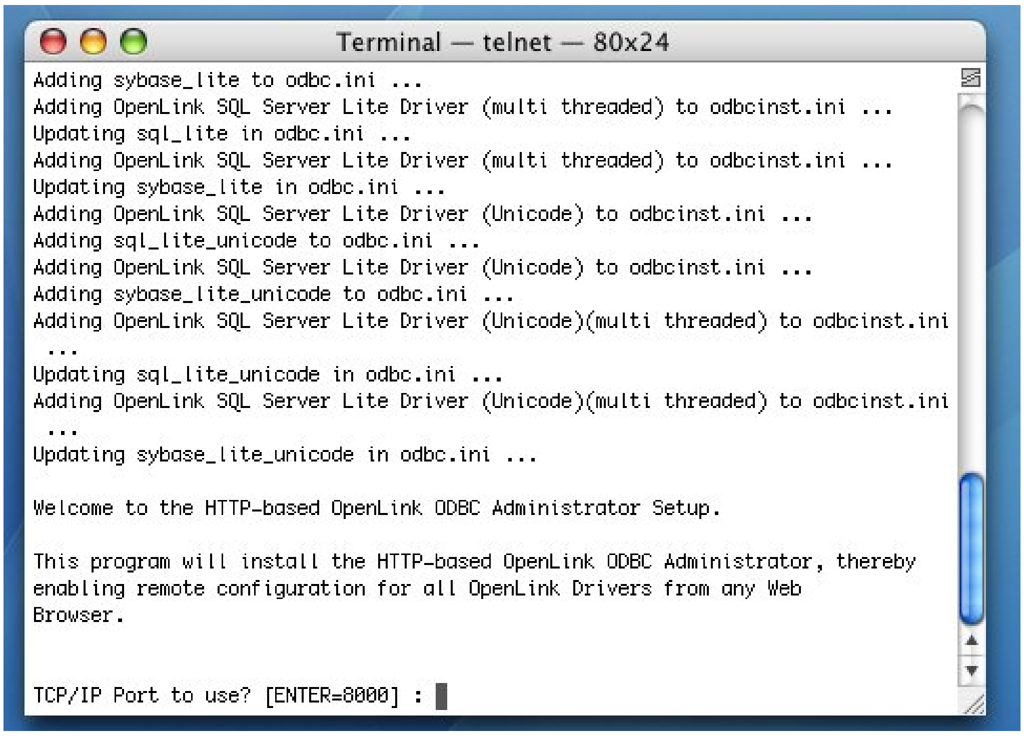
Figure 5.101. lite_sql_ST_SQL_Install_2.png



```
SunOS 5.8

login: openlink
Password:
Last login: Mon Dec 17 11:07:54 from dyn233.usnet.pri
bash-2.03$ cd demos
bash-2.03$ ls
admin_lt.taz  install.sh    sql_lt.lic    sql_lt.taz
bash-2.03$ sh install.sh

Started installation on : oplussol4


The installer detected a running broker on this system.
It is recommended the broker is shutdown before upgrading.
Do you wish to attempt to:

  1. Shutdown the broker
  2. Continue with the installation
  3. Abort the installation

Please enter your choice [ENTER=1] : 2
```

You must choose a TCP port on which to run your HTTP-based iODBC Data Sources Administrator. The default is 8000. You will need to know this port number and your local machine's IP address or hostname to access your Admistrator in a Web browser. This is how you call it: http://machine:portnumber

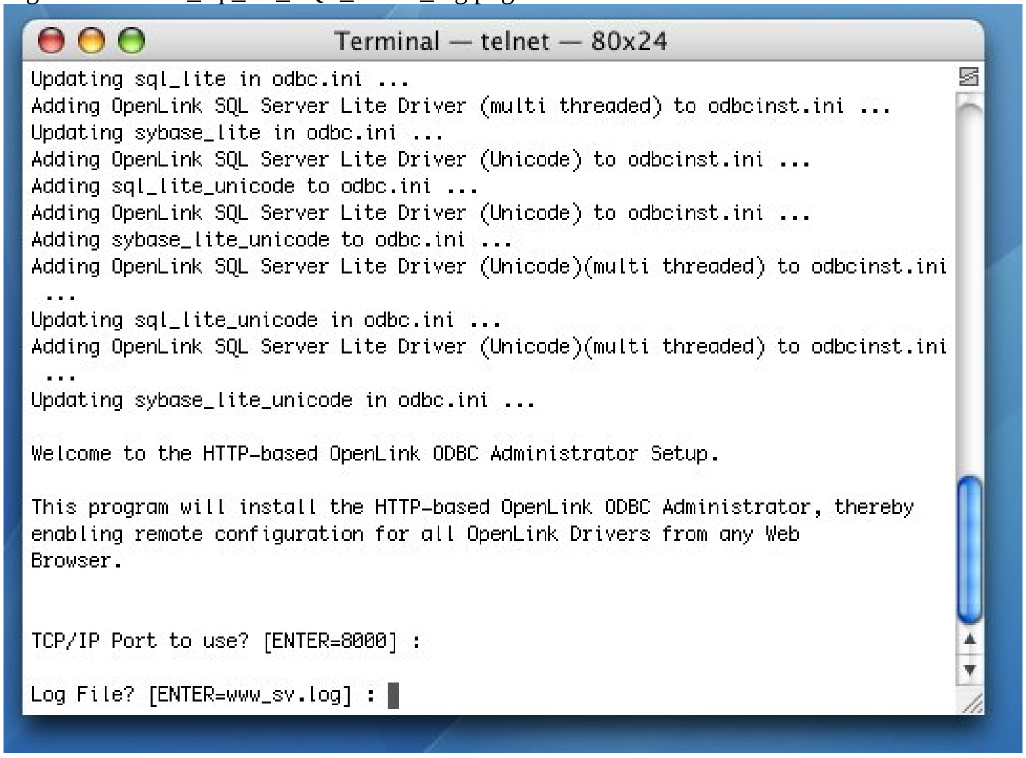
Figure 5.102. lite_sql_ST_SQL_Install_8000.png



```
Adding sybase_lite to odbc.ini ...
Adding OpenLink SQL Server Lite Driver (multi threaded) to odbcinst.ini ...
Updating sql_lite in odbc.ini ...
Adding OpenLink SQL Server Lite Driver (multi threaded) to odbcinst.ini ...
Updating sybase_lite in odbc.ini ...
Adding OpenLink SQL Server Lite Driver (Unicode) to odbcinst.ini ...
Adding sql_lite_unicode to odbc.ini ...
Adding OpenLink SQL Server Lite Driver (Unicode) to odbcinst.ini ...
Adding sybase_lite_unicode to odbc.ini ...
Adding OpenLink SQL Server Lite Driver (Unicode)(multi threaded) to odbcinst.ini
 ...
Updating sql_lite_unicode in odbc.ini ...
Adding OpenLink SQL Server Lite Driver (Unicode)(multi threaded) to odbcinst.ini
 ...
Updating sybase_lite_unicode in odbc.ini ...

Welcome to the HTTP-based OpenLink ODBC Administrator Setup.

This program will install the HTTP-based OpenLink ODBC Administrator, thereby
enabling remote configuration for all OpenLink Drivers from any Web
Browser.


TCP/IP Port to use? [ENTER=8000] :
```

This enables you to name your administrator's log file. It is best to go with the default.

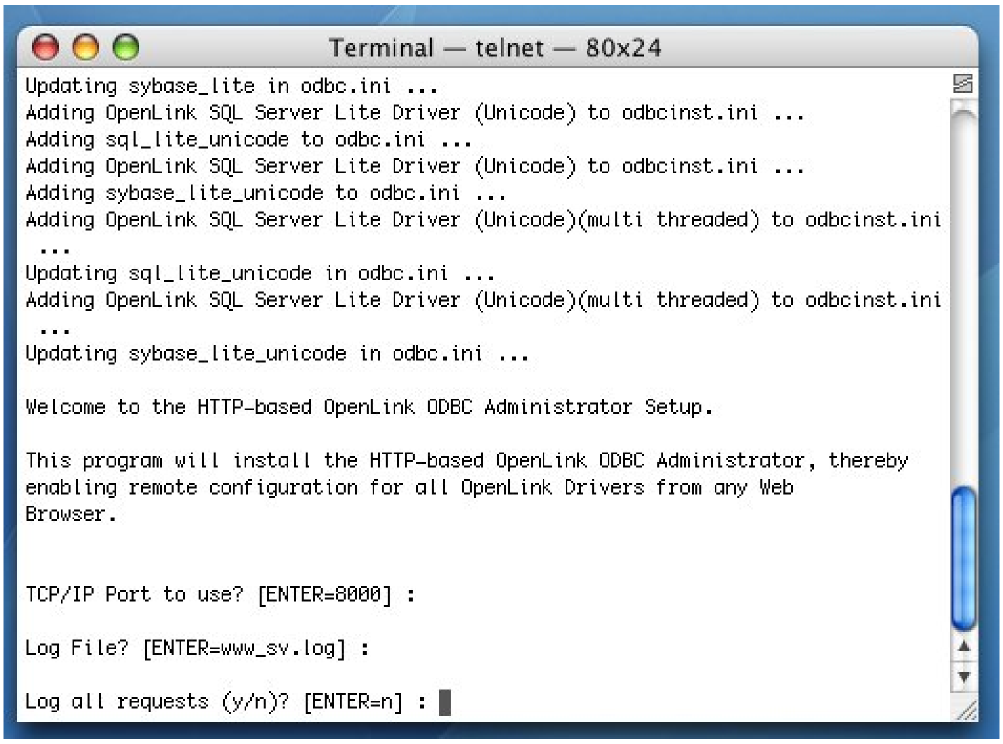
Figure 5.103. lite_sql_ST_SQL_Install_log.png



```
Updating sql_lite in odbc.ini ...
Adding OpenLink SQL Server Lite Driver (multi threaded) to odbcinst.ini ...
Updating sybase_lite in odbc.ini ...
Adding OpenLink SQL Server Lite Driver (Unicode) to odbcinst.ini ...
Adding sql_lite_unicode to odbc.ini ...
Adding OpenLink SQL Server Lite Driver (Unicode) to odbcinst.ini ...
Adding sybase_lite_unicode to odbc.ini ...
Adding OpenLink SQL Server Lite Driver (Unicode)(multi threaded) to odbcinst.ini
 ...
Updating sql_lite_unicode in odbc.ini ...
Adding OpenLink SQL Server Lite Driver (Unicode)(multi threaded) to odbcinst.ini
 ...
Updating sybase_lite_unicode in odbc.ini ...

Welcome to the HTTP-based OpenLink ODBC Administrator Setup.

This program will install the HTTP-based OpenLink ODBC Administrator, thereby
enabling remote configuration for all OpenLink Drivers from any Web
Browser.


TCP/IP Port to use? [ENTER=8000] :

Log File? [ENTER=www_sv.log] :
```

You can choose to log all requests. This is not diagnostic-level odbc tracing or connection logging. The default is no.

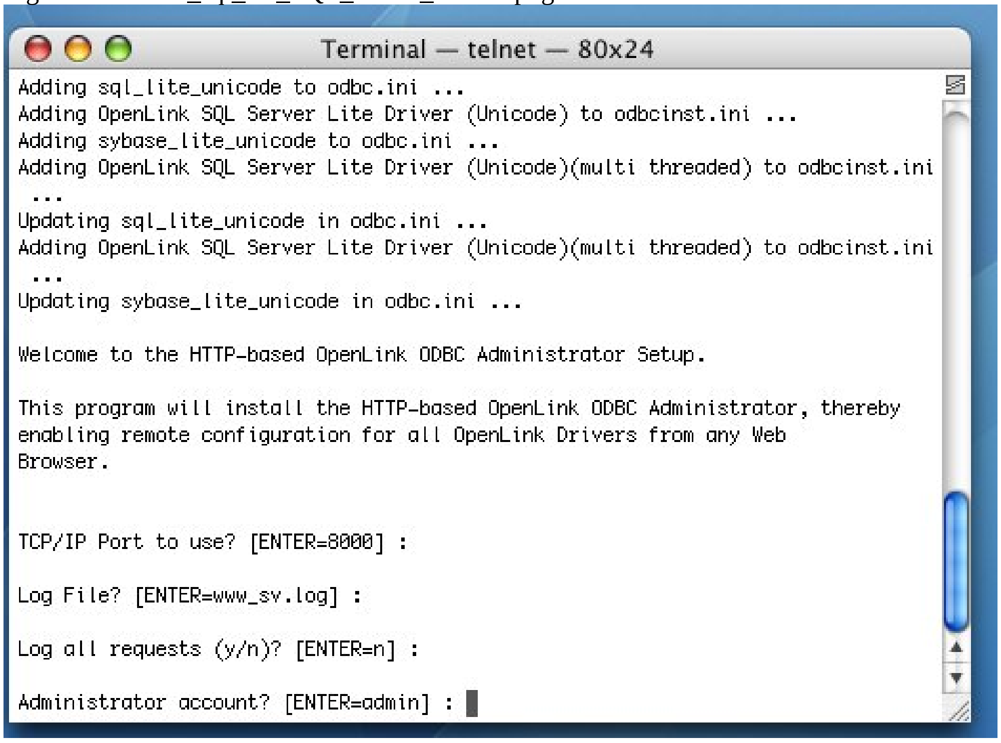
Figure 5.104. lite_sql_ST_SQL_Install_Requests.png



```
Updating sybase_lite in odbc.ini ...
Adding OpenLink SQL Server Lite Driver (Unicode) to odbcinst.ini ...
Adding sql_lite_unicode to odbc.ini ...
Adding OpenLink SQL Server Lite Driver (Unicode) to odbcinst.ini ...
Adding sybase_lite_unicode to odbc.ini ...
Adding OpenLink SQL Server Lite Driver (Unicode)(multi threaded) to odbcinst.ini
 ...
Updating sql_lite_unicode in odbc.ini ...
Adding OpenLink SQL Server Lite Driver (Unicode)(multi threaded) to odbcinst.ini
 ...
Updating sybase_lite_unicode in odbc.ini ...

Welcome to the HTTP-based OpenLink ODBC Administrator Setup.

This program will install the HTTP-based OpenLink ODBC Administrator, thereby
enabling remote configuration for all OpenLink Drivers from any Web
Browser.


TCP/IP Port to use? [ENTER=8000] :

Log File? [ENTER=www_sv.log] :

Log all requests (y/n)? [ENTER=n] :
```

You can change the iODBC Data Source Administrator's default username from "admin". This is the name that you will need to login to OpenLink's HTTP-based iODBC Data Sources Administrator.

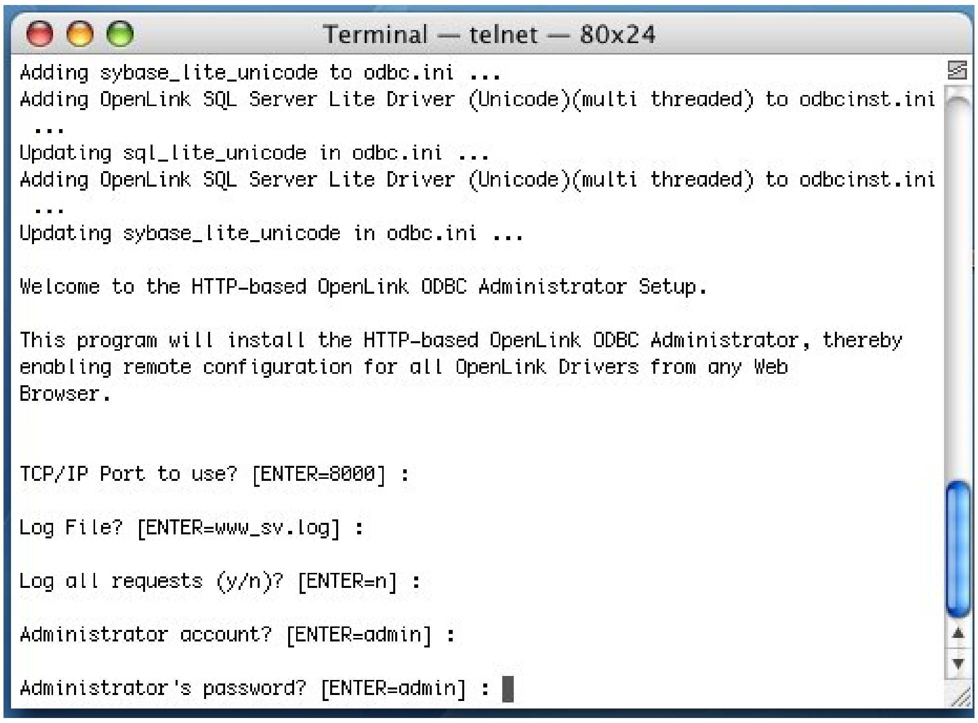
Figure 5.105. lite_sql_ST_SQL_Install_Admin.png



```
Adding sql_lite_unicode to odbc.ini ...
Adding OpenLink SQL Server Lite Driver (Unicode) to odbcinst.ini ...
Adding sybase_lite_unicode to odbc.ini ...
Adding OpenLink SQL Server Lite Driver (Unicode)(multi threaded) to odbcinst.ini
 ...
Updating sql_lite_unicode in odbc.ini ...
Adding OpenLink SQL Server Lite Driver (Unicode)(multi threaded) to odbcinst.ini
 ...
Updating sybase_lite_unicode in odbc.ini ...

Welcome to the HTTP-based OpenLink ODBC Administrator Setup.

This program will install the HTTP-based OpenLink ODBC Administrator, thereby
enabling remote configuration for all OpenLink Drivers from any Web
Browser.


TCP/IP Port to use? [ENTER=8000] :

Log File? [ENTER=www_sv.log] :

Log all requests (y/n)? [ENTER=n] :

Administrator account? [ENTER=admin] :
```

You can change the iODBC Data Source Administrator's default password from "admin".

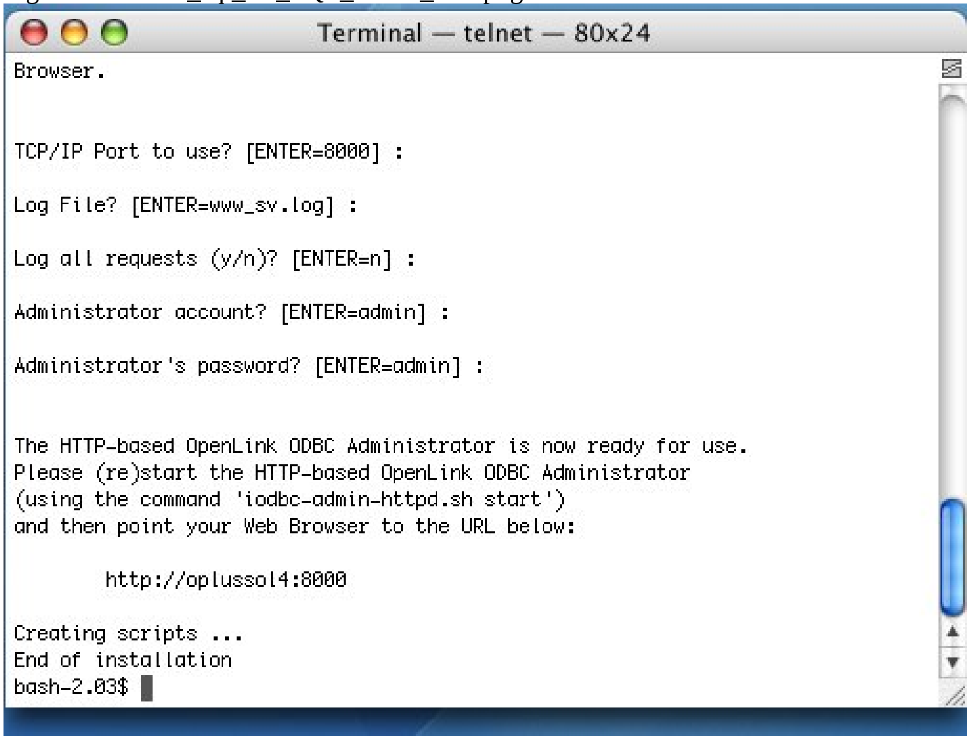
Figure 5.106. lite_sql_ST_SQL_Admin_PWD.png



```
Adding sybase_lite_unicode to odbc.ini ...
Adding OpenLink SQL Server Lite Driver (Unicode)(multi threaded) to odbcinst.ini
 ...
Updating sql_lite_unicode in odbc.ini ...
Adding OpenLink SQL Server Lite Driver (Unicode)(multi threaded) to odbcinst.ini
 ...
Updating sybase_lite_unicode in odbc.ini ...

Welcome to the HTTP-based OpenLink ODBC Administrator Setup.

This program will install the HTTP-based OpenLink ODBC Administrator, thereby
enabling remote configuration for all OpenLink Drivers from any Web
Browser.


TCP/IP Port to use? [ENTER=8000] :

Log File? [ENTER=www_sv.log] :

Log all requests (y/n)? [ENTER=n] :

Administrator account? [ENTER=admin] :

Administrator's password? [ENTER=admin] :
```

The installation is complete.

Figure 5.107. lite_sql_ST_SQL_Install_End.png

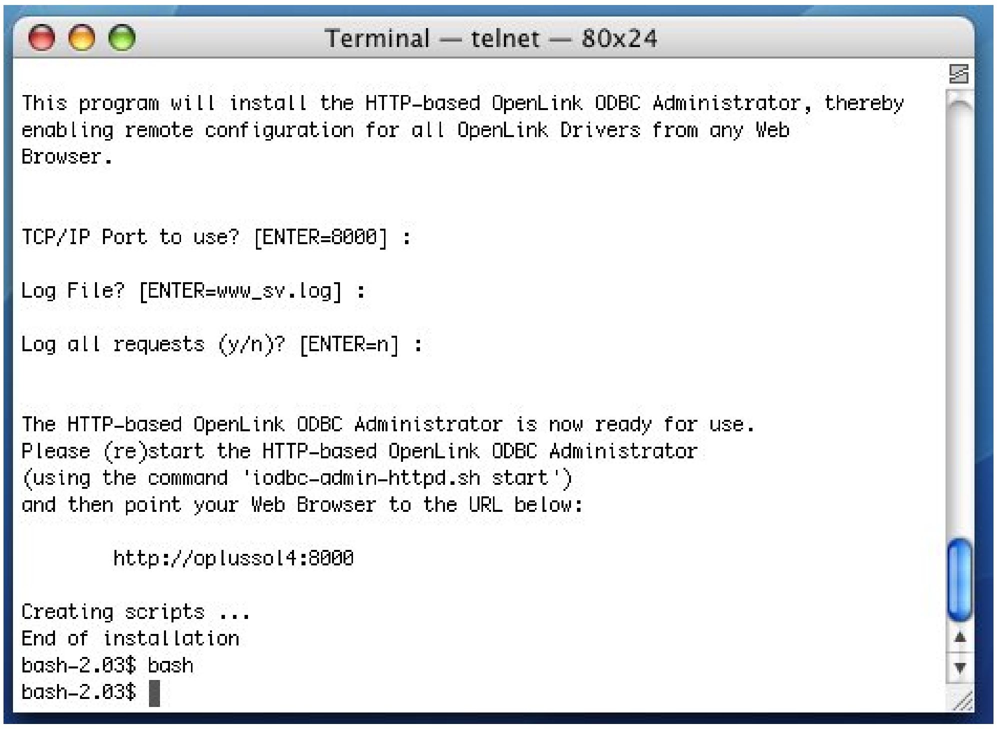


```
Browser.


TCP/IP Port to use? [ENTER=8000] :

Log File? [ENTER=www_sv.log] :

Log all requests (y/n)? [ENTER=n] :

Administrator account? [ENTER=admin] :

Administrator's password? [ENTER=admin] :


The HTTP-based OpenLink ODBC Administrator is now ready for use.
Please (re)start the HTTP-based OpenLink ODBC Administrator
(using the command 'iodbc-admin-httpd.sh start')
and then point your Web Browser to the URL below:

        http://oplussol4:8000

Creating scripts ...
End of installation
bash-2.03$
```

7.2.10.2 Configuration

Execute the bash command to open a bash shell. If you do not have have the bash shell, substitute the sh command for the bash command. This will open the bourne shell.

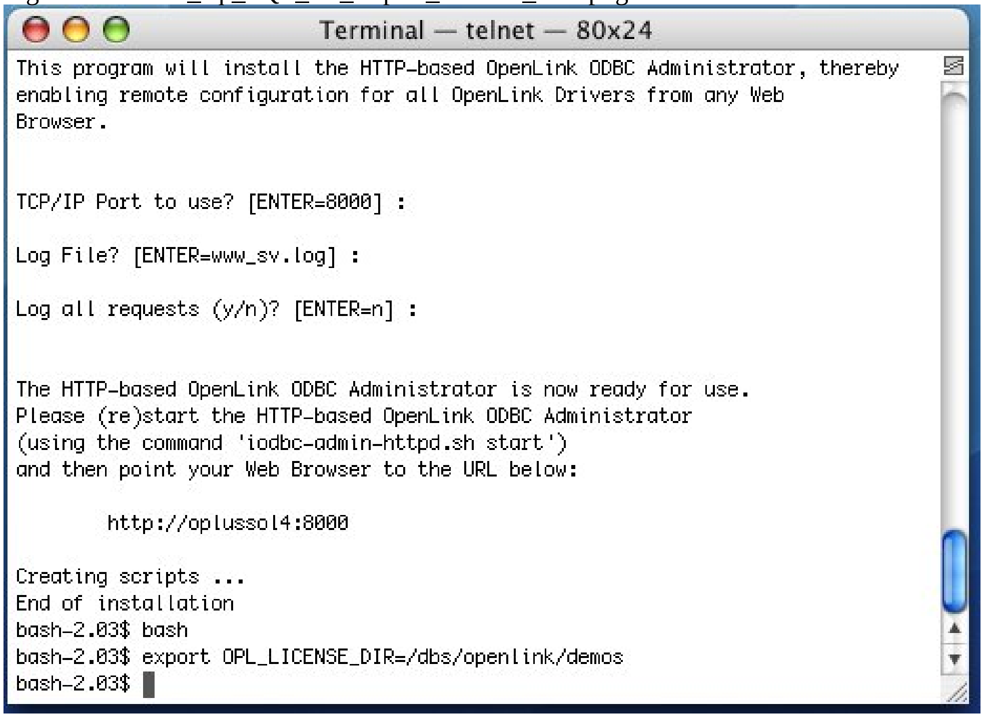
Figure 5.108. lite_sql_SQL_ST_Bash.png



```
This program will install the HTTP-based OpenLink ODBC Administrator, thereby
enabling remote configuration for all OpenLink Drivers from any Web
Browser.


TCP/IP Port to use? [ENTER=8000] :

Log File? [ENTER=www_sv.log] :

Log all requests (y/n)? [ENTER=n] :


The HTTP-based OpenLink ODBC Administrator is now ready for use.
Please (re)start the HTTP-based OpenLink ODBC Administrator
(using the command 'iodbc-admin-httpd.sh start')
and then point your Web Browser to the URL below:

        http://oplussol4:8000

Creating scripts ...
End of installation
bash-2.03$ bash
bash-2.03$
```

Use the export command to set an OPL_LICENSE_DIR variable that points to the directory that contains your OpenLink license. This is typically the bin sub-directory of the OpenLink installation. However, you can put your license files in /etc/, the root of the installation, or virtually anywhere else.

Figure 5.109. lite_sql_SQL_ST_Export_License_DIR.png

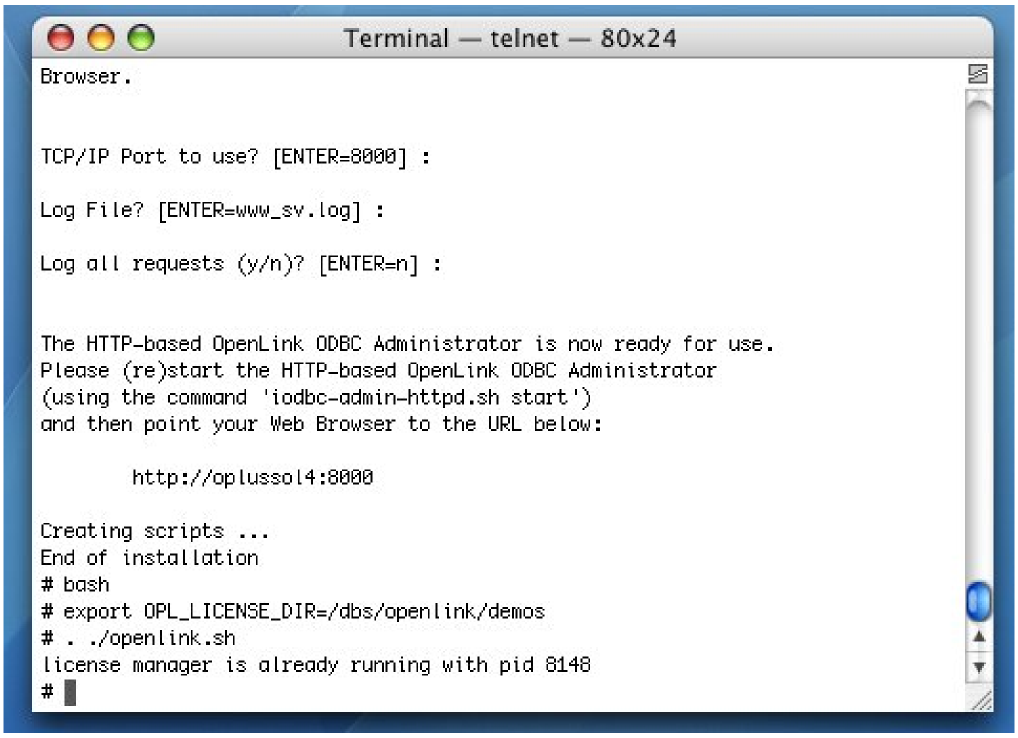


```
This program will install the HTTP-based OpenLink ODBC Administrator, thereby
enabling remote configuration for all OpenLink Drivers from any Web
Browser.


TCP/IP Port to use? [ENTER=8000] :

Log File? [ENTER=www_sv.log] :

Log all requests (y/n)? [ENTER=n] :


The HTTP-based OpenLink ODBC Administrator is now ready for use.
Please (re)start the HTTP-based OpenLink ODBC Administrator
(using the command 'iodbc-admin-httpd.sh start')
and then point your Web Browser to the URL below:

        http://oplussol4:8000

Creating scripts ...
End of installation
bash-2.03$ bash
bash-2.03$ export OPL_LICENSE_DIR=/dbs/openlink/demos
bash-2.03$
```

Run the following command to set your ODBC environment variables:

```
        . ./openlink.sh
```

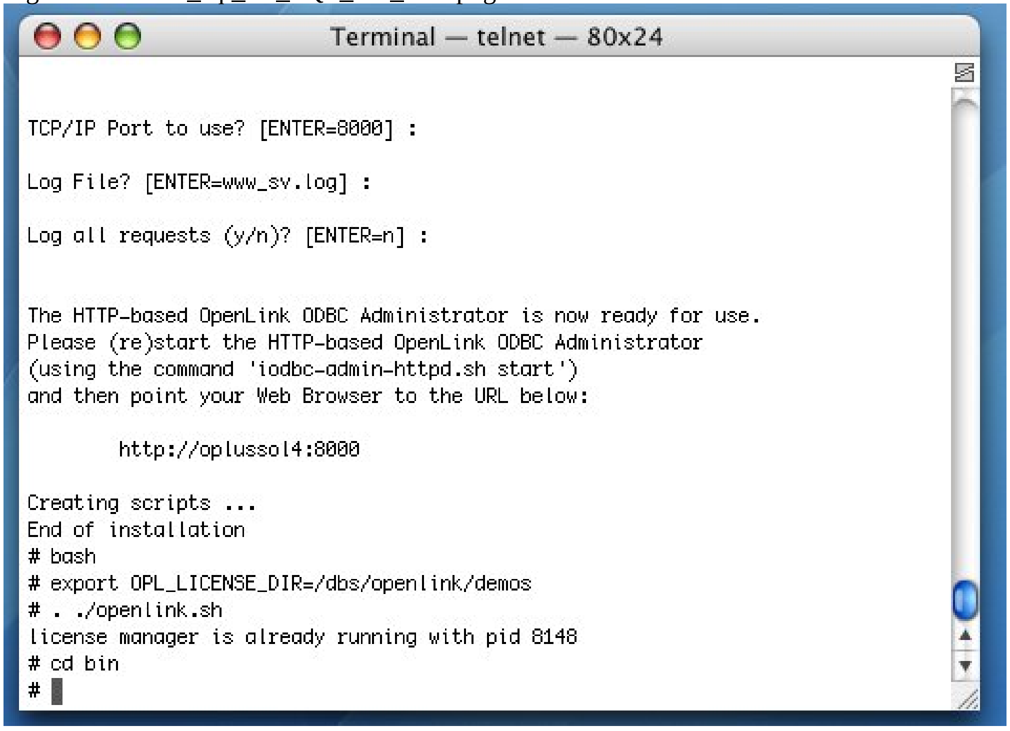
Figure 5.110. lite_sql_ST_SQL_openlinksh.png



```
Browser.


TCP/IP Port to use? [ENTER=8000] :

Log File? [ENTER=www_sv.log] :

Log all requests (y/n)? [ENTER=n] :


The HTTP-based OpenLink ODBC Administrator is now ready for use.
Please (re)start the HTTP-based OpenLink ODBC Administrator
(using the command 'iodbc-admin-httpd.sh start')
and then point your Web Browser to the URL below:

        http://oplussol4:8000

Creating scripts ...
End of installation
# bash
# export OPL_LICENSE_DIR=/dbs/openlink/demos
# . ./openlink.sh
license manager is already running with pid 8148
#
```

cd into the bin sub-directory of your OpenLink installation.

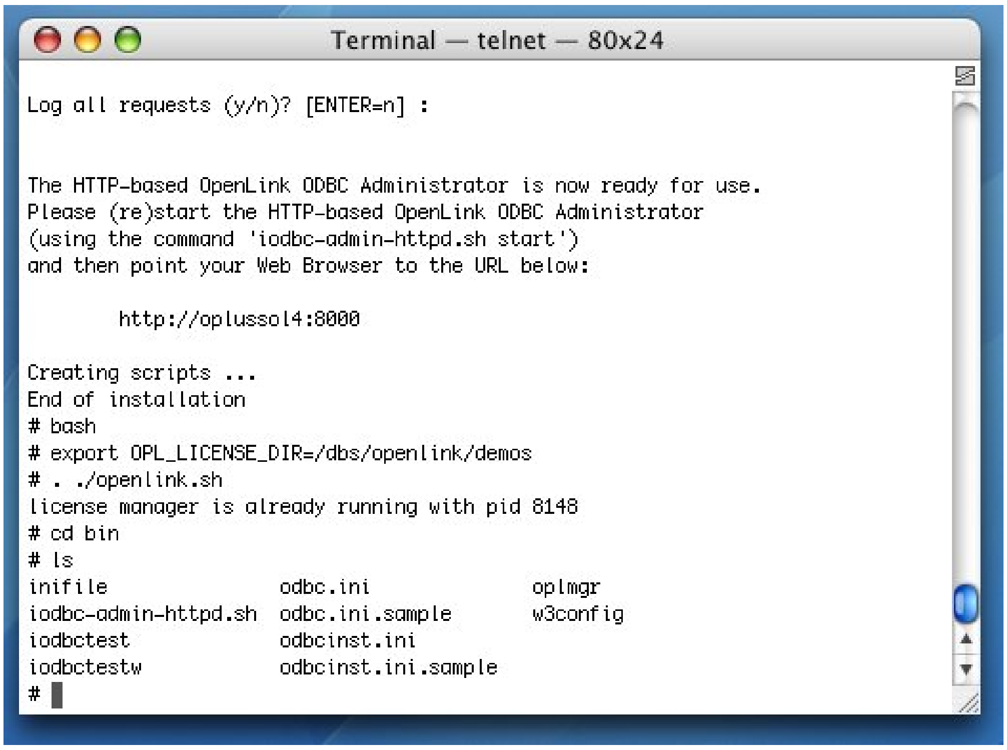
Figure 5.111. lite_sql_ST_SQL_CD_BIN.png



```


TCP/IP Port to use? [ENTER=8000] :

Log File? [ENTER=www_sv.log] :

Log all requests (y/n)? [ENTER=n] :


The HTTP-based OpenLink ODBC Administrator is now ready for use.
Please (re)start the HTTP-based OpenLink ODBC Administrator
(using the command 'iodbc-admin-httpd.sh start')
and then point your Web Browser to the URL below:

        http://oplussol4:8000

Creating scripts ...
End of installation
# bash
# export OPL_LICENSE_DIR=/dbs/openlink/demos
# . ./openlink.sh
license manager is already running with pid 8148
# cd bin
#
```

Use the ls(1) command to display your files.

Figure 5.112. lite_sql_ST_SQL_LS.png

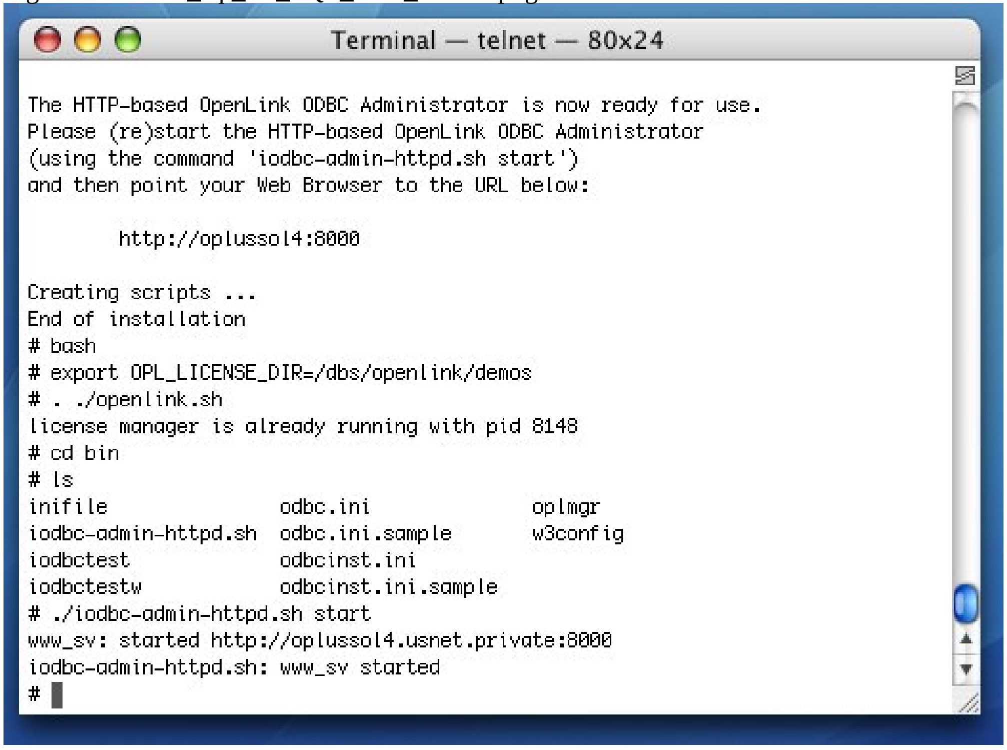


```
Log all requests (y/n)? [ENTER=n] :


The HTTP-based OpenLink ODBC Administrator is now ready for use.
Please (re)start the HTTP-based OpenLink ODBC Administrator
(using the command 'iodbc-admin-httpd.sh start')
and then point your Web Browser to the URL below:

       http://oplussol4:8000

Creating scripts ...
End of installation
# bash
# export OPL_LICENSE_DIR=/dbs/openlink/demos
# . ./openlink.sh
license manager is already running with pid 8148
# cd bin
# ls
inifile               odbc.ini              oplmgr
iodbc-admin-httpd.sh  odbc.ini.sample       w3config
iodbctest             odbcinst.ini
iodbctestw            odbcinst.ini.sample
#
```

Run the following command to start your HTTP-based iODBC Data Sources Administrator:

```
./iodbc-admin-httpd.sh start
```

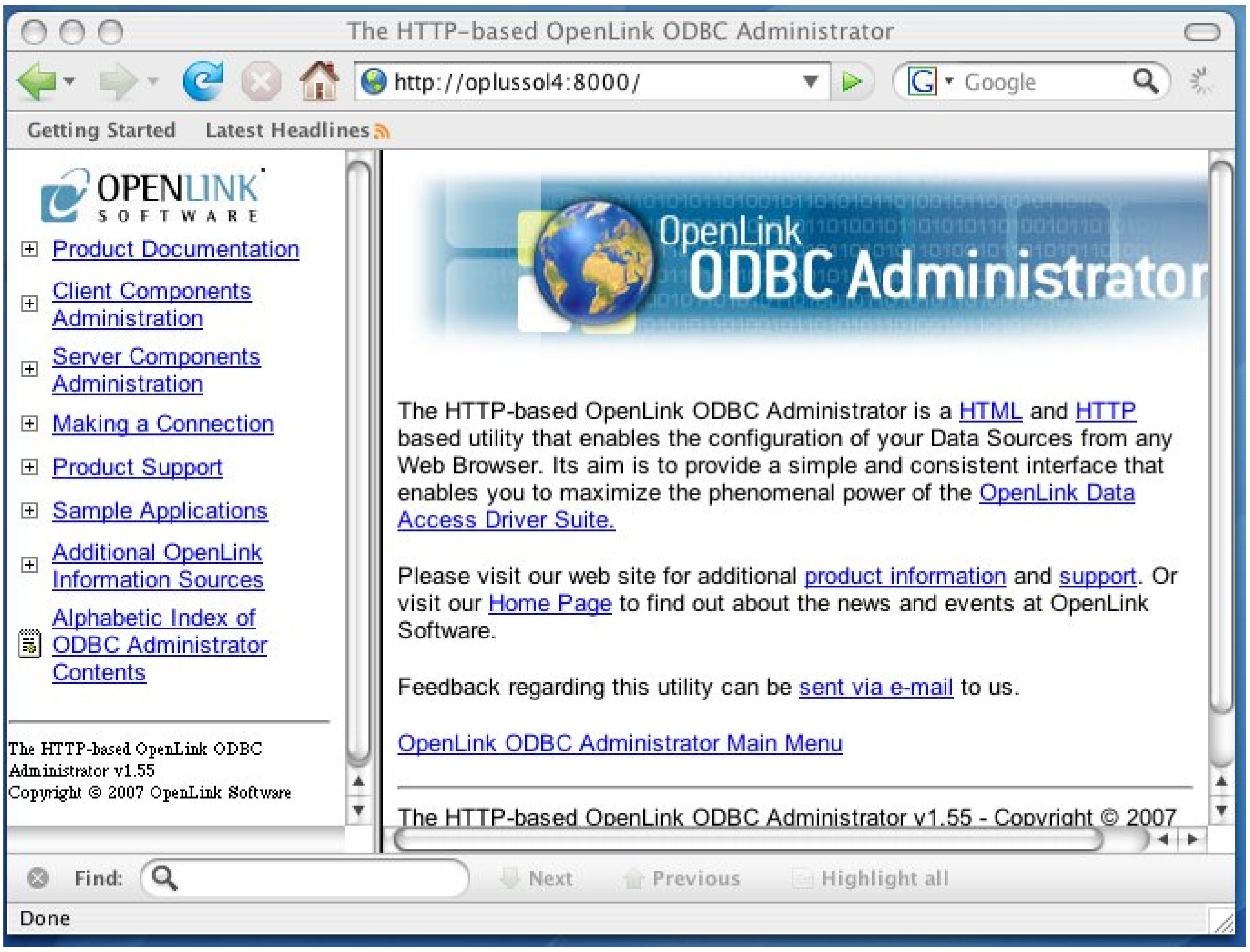
Figure 5.113. lite_sql_ST_SQL_Start_Admin.png



```
The HTTP-based OpenLink ODBC Administrator is now ready for use.
Please (re)start the HTTP-based OpenLink ODBC Administrator
(using the command 'iodbc-admin-httpd.sh start')
and then point your Web Browser to the URL below:

       http://oplussol4:8000

Creating scripts ...
End of installation
# bash
# export OPL_LICENSE_DIR=/dbs/openlink/demos
# . ./openlink.sh
license manager is already running with pid 8148
# cd bin
# ls
inifile               odbc.ini              oplmgr
iodbc-admin-httpd.sh  odbc.ini.sample       w3config
iodbctest             odbcinst.ini
iodbctestw            odbcinst.ini.sample
# ./iodbc-admin-httpd.sh start
www_sv: started http://oplussol4.usnet.private:8000
iodbc-admin-httpd.sh: www_sv started
#
```

Open a Web browser on any computer and type the URL for your administrator in the address bar.

Figure 5.114. lite_sql_ST_SQL_Open_Admin.png



Product Documentation

Client Components Administration

Server Components Administration

Making a Connection

Product Support

Sample Applications

Additional OpenLink Information Sources

Alphabetic Index of ODBC Administrator Contents

The HTTP-based OpenLink ODBC Administrator v1.55
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The HTTP-based OpenLink ODBC Administrator is a HTML and HTTP based utility that enables the configuration of your Data Sources from any Web Browser. Its aim is to provide a simple and consistent interface that enables you to maximize the phenomenal power of the OpenLink Data Access Driver Suite.

Please visit our web site for additional product information and support. Or visit our Home Page to find out about the news and events at OpenLink Software.

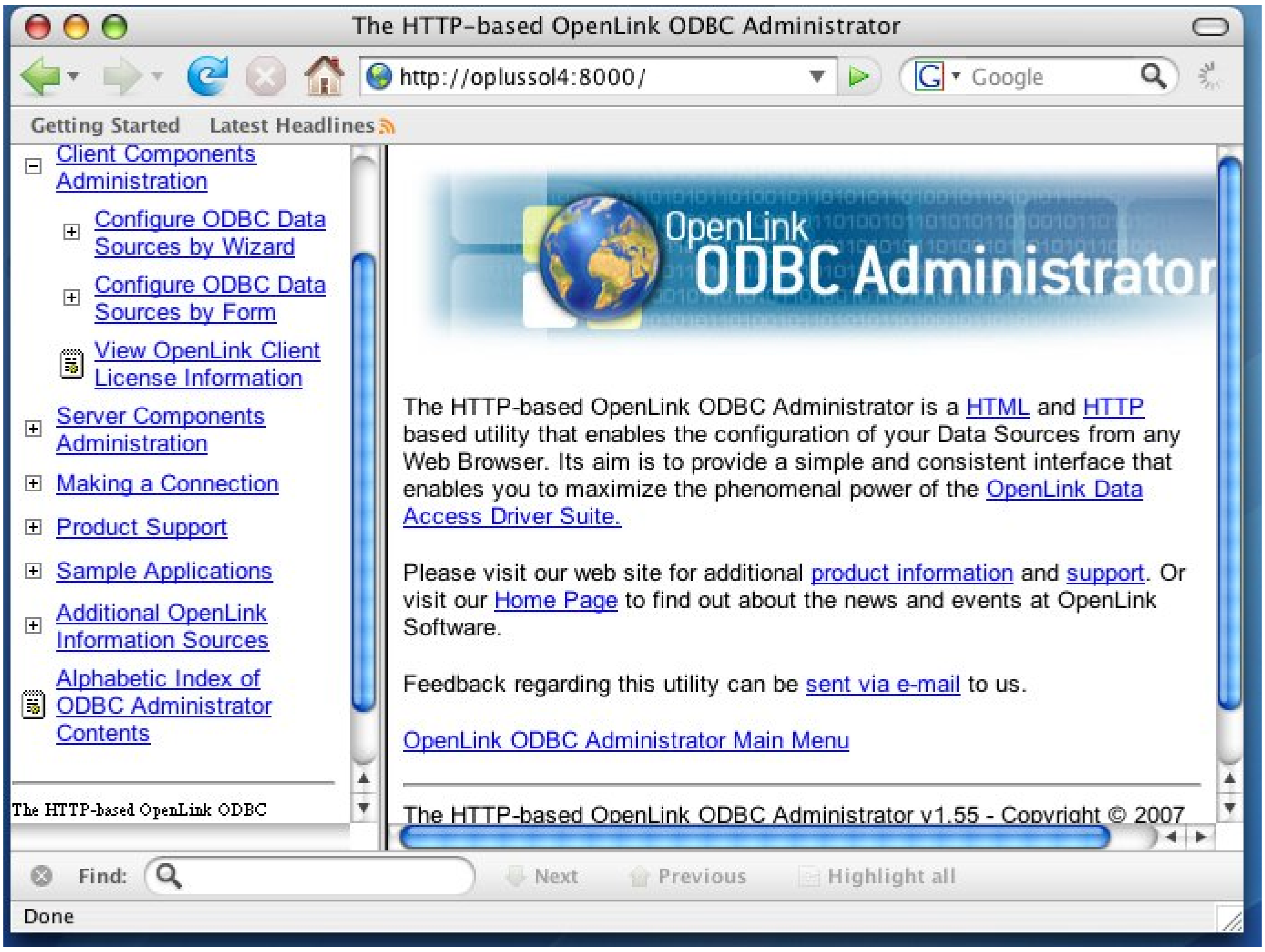
Feedback regarding this utility can be sent via e-mail to us.

OpenLink ODBC Administrator Main Menu

The HTTP-based OpenLink ODBC Administrator v1.55 - Copyright © 2007

Click the Client Components Administration link in the left hand side navigation bar.

Figure 5.115. lite_sql_ST_SQL_Client_Components_Admin.png


The HTTP-based OpenLink ODBC Administrator

http://oplussol4:8000/

Getting Started   Latest Headlines

Client Components Administration
Configure ODBC Data Sources by Wizard
Configure ODBC Data Sources by Form
View OpenLink Client License Information
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Alphabetic Index of ODBC Administrator Contents

The HTTP-based OpenLink ODBC

OpenLink ODBC Administrator

The HTTP-based OpenLink ODBC Administrator is a HTML and HTTP based utility that enables the configuration of your Data Sources from any Web Browser. Its aim is to provide a simple and consistent interface that enables you to maximize the phenomenal power of the OpenLink Data Access Driver Suite.

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Feedback regarding this utility can be sent via e-mail to us.

OpenLink ODBC Administrator Main Menu

The HTTP-based OpenLink ODBC Administrator v1.55 - Copyright © 2007

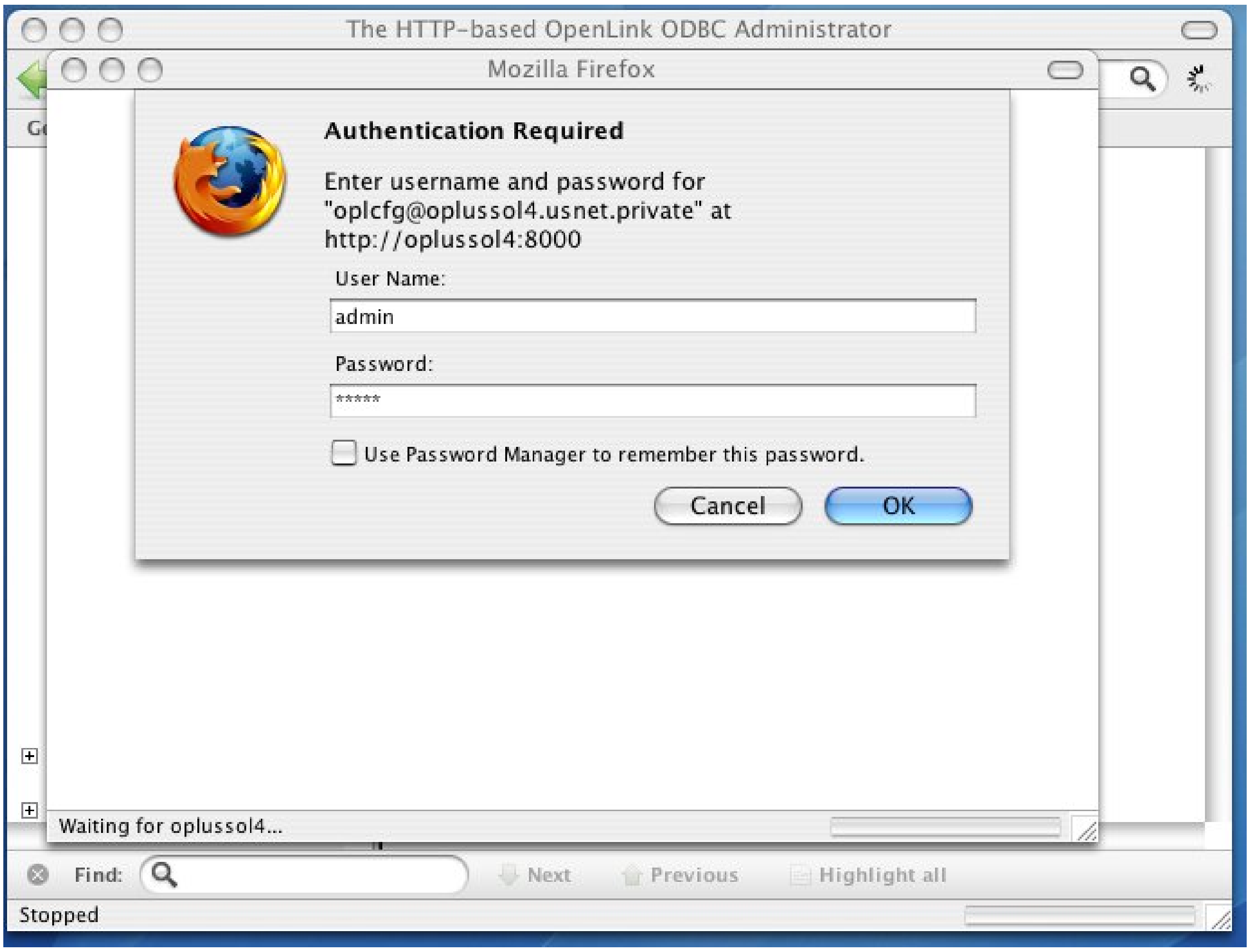
Find: Next Previous Highlight all

Done

Click the Configure ODBC Data Sources link in the left hand side navigation bar.

Then, login with your username and password.

Figure 5.116. lite_sql_ST_SQL_Admin_Login.png



Authentication Required

Enter username and password for "oplcfg@oplussol4.usnet.private" at http://oplussol4:8000

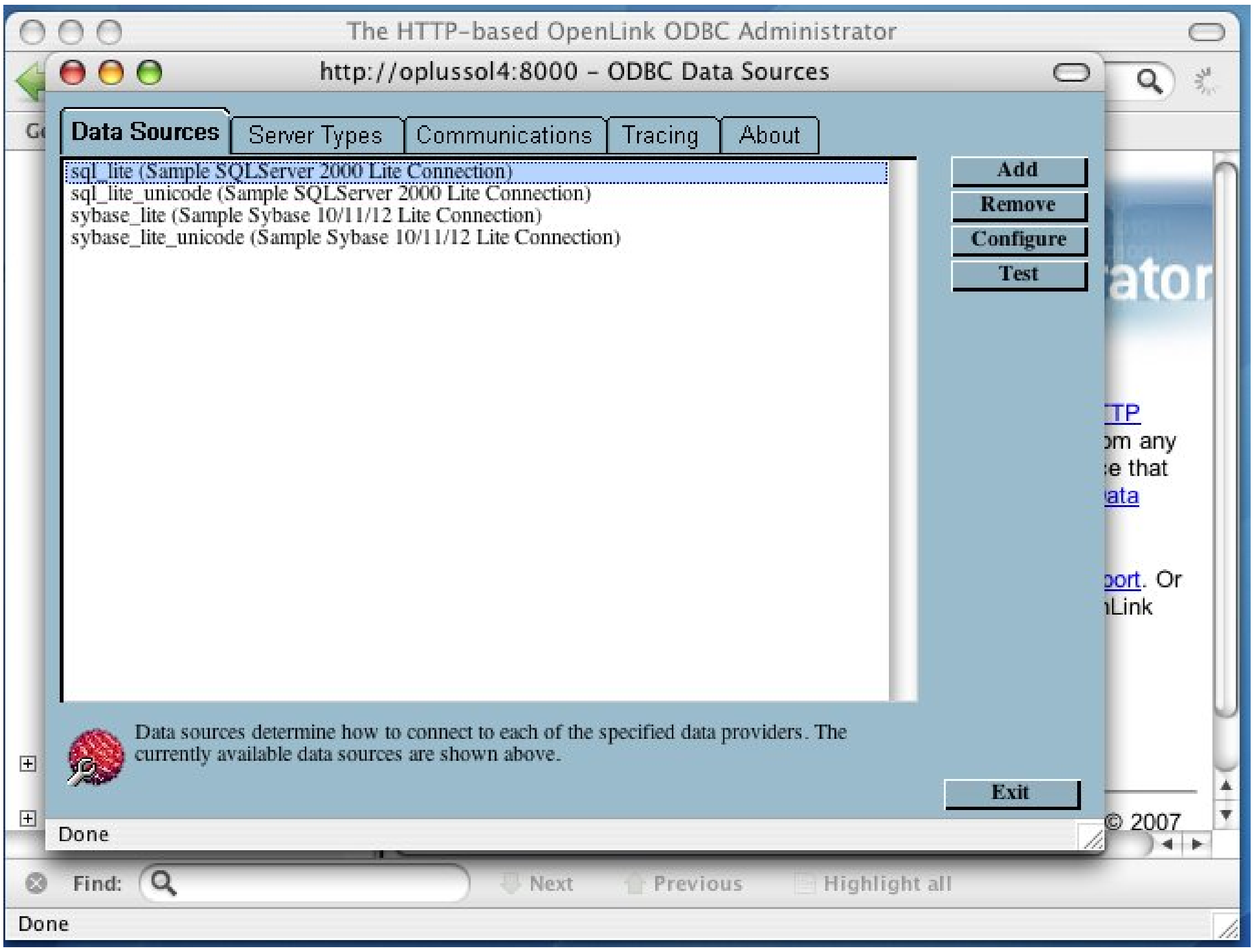
User Name: admin

Password: *****

Use Password Manager to remember this password.

Click the Add button.

Figure 5.117. lite_sql_ST_SQL_Admin_DSN_Tab.png

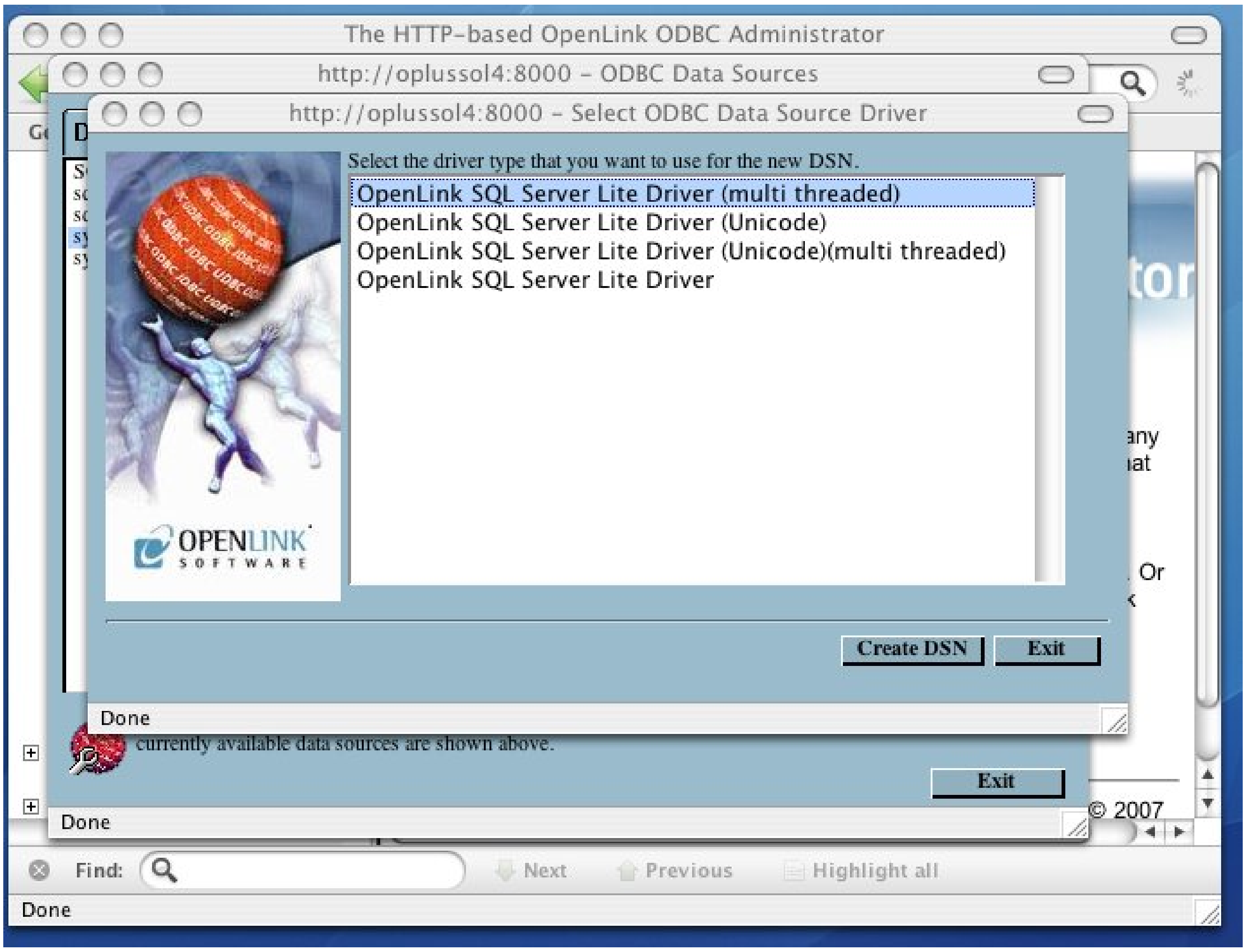


sql_lite (Sample SQLServer 2000 Lite Connection)
sql_lite_unicode (Sample SQLServer 2000 Lite Connection)
sybase_lite (Sample Sybase 10/11/12 Lite Connection)
sybase_lite_unicode (Sample Sybase 10/11/12 Lite Connection)

Data sources determine how to connect to each of the specified data providers. The currently available data sources are shown above.

Click the OpenLink SQL Server Lite Driver (multi-threaded). Then, click Create DSN.

Figure 5.118. lite_sql_ST_SQL_Choose_Driver.png


The HTTP-based OpenLink ODBC Administrator
http://oplussol4:8000 - ODBC Data Sources
http://oplussol4:8000 - Select ODBC Data Source Driver
Create DSN
Exit
Done
Find:
Next
Previous
Highlight all

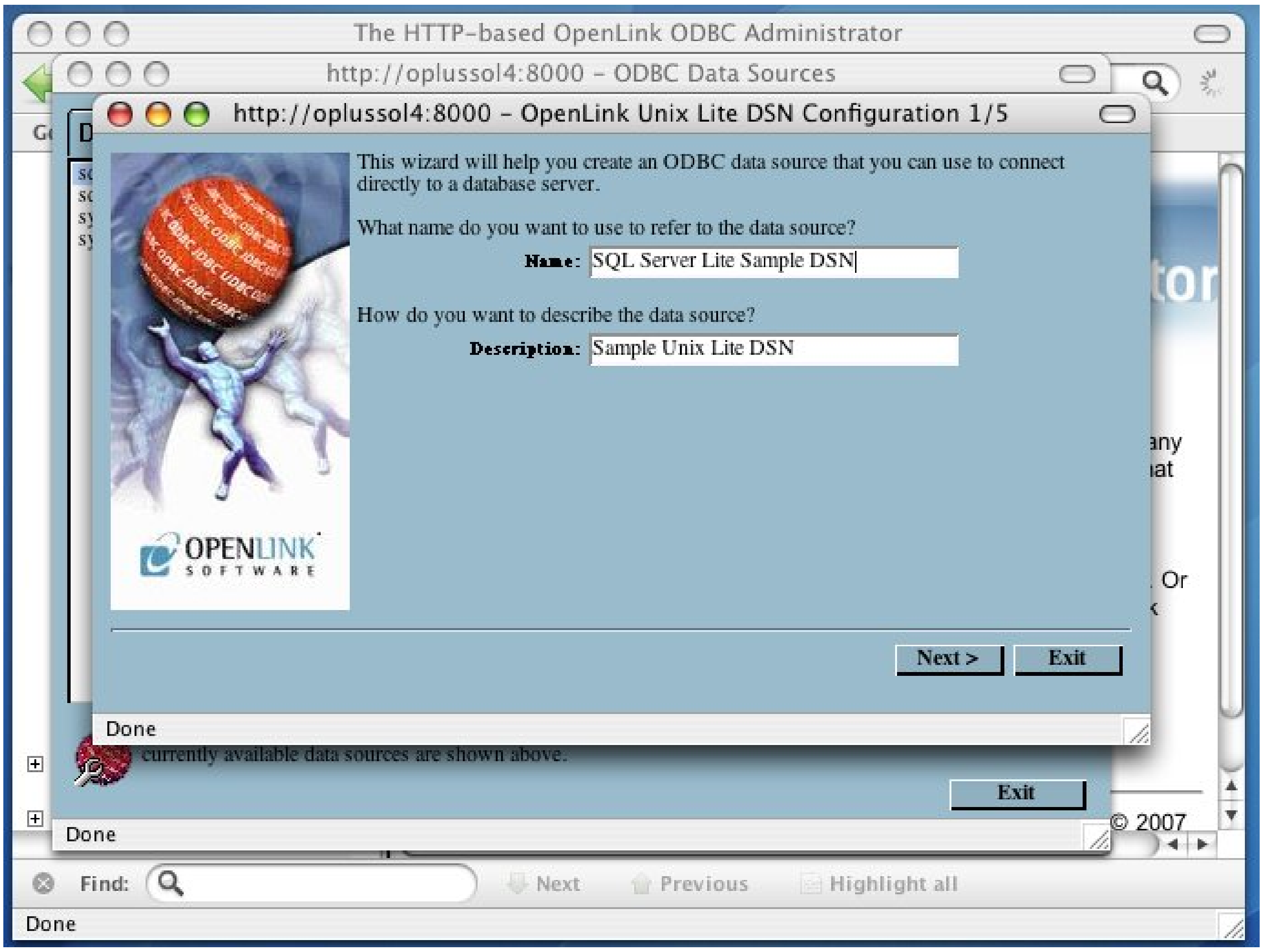
Select the driver type that you want to use for the new DSN.

OpenLink SQL Server Lite Driver (multi threaded)
OpenLink SQL Server Lite Driver (Unicode)
OpenLink SQL Server Lite Driver (Unicode)(multi threaded)
OpenLink SQL Server Lite Driver

currently available data sources are shown above.

Provide a descriptive name and optional name for your DSN. Then, click Next.

Figure 5.119. lite_sql_ST_SQL_Name_DSN.png


The HTTP-based OpenLink ODBC Administrator
http://oplussol4:8000 - ODBC Data Sources
http://oplussol4:8000 - OpenLink Unix Lite DSN Configuration 1/5
OPENLINK SOFTWARE
Next >
Exit
Done
Find:
Next
Previous
Highlight all
© 2007

This wizard will help you create an ODBC data source that you can use to connect directly to a database server.

What name do you want to use to refer to the data source?

Name: SQL Server Lite Sample DSN

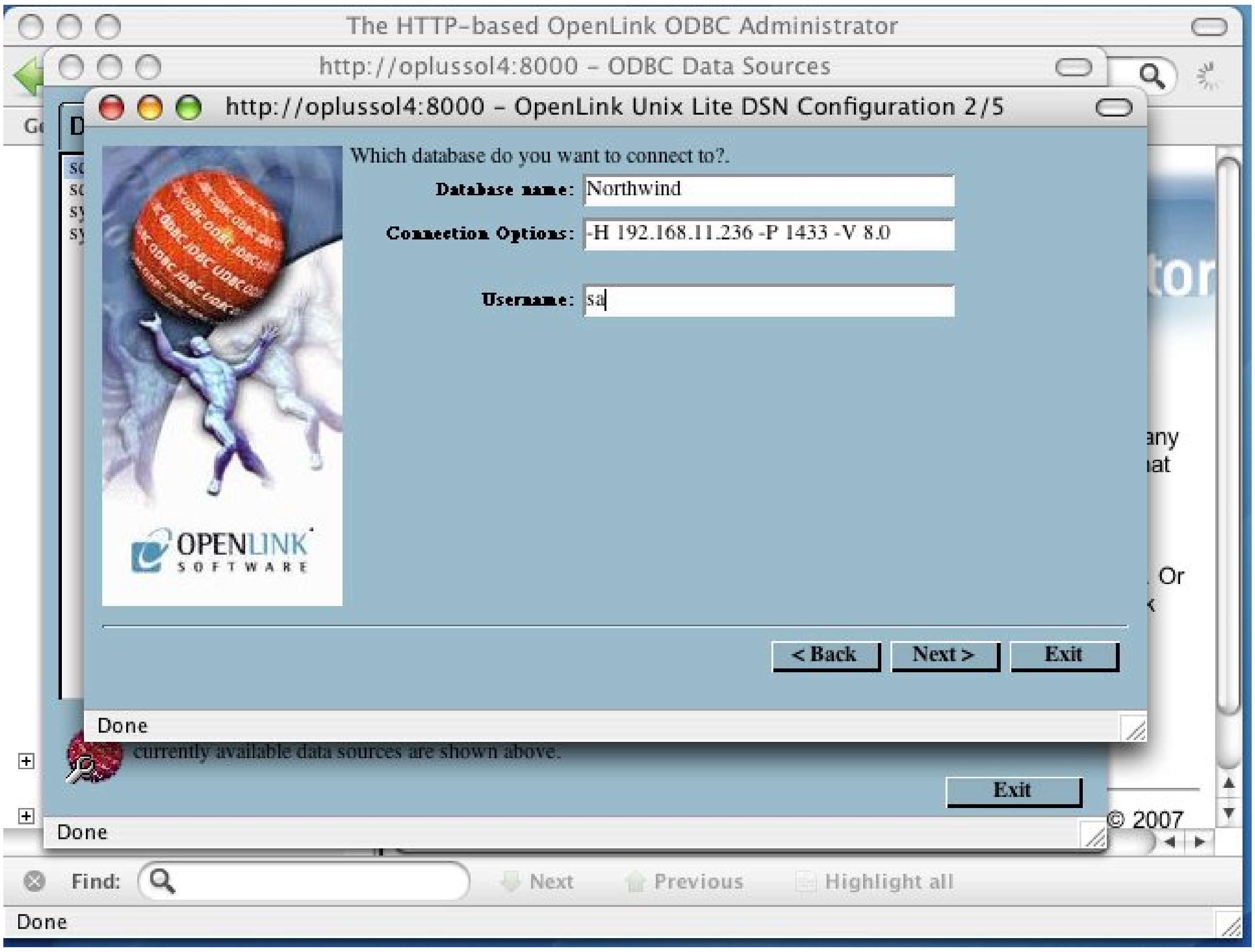
How do you want to describe the data source?

Description: Sample Unix Lite DSN

currently available data sources are shown above.

Pass the following values in the next dialog:

Figure 5.120. lite_sql_ST_SQL_Connection_Attributes.png


The HTTP-based OpenLink ODBC Administrator
http://oplussol4:8000 - ODBC Data Sources
http://oplussol4:8000 - OpenLink Unix Lite DSN Configuration 2/5
< Back
Next >
Exit
Done
Find:
Next
Previous
Highlight all

Which database do you want to connect to?.

Database name: Northwind

Connection Options: -H 192.168.11.236 -P 1433 -V 8.0

Username: sa

currently available data sources are shown above.

• *Database Name* - A valid SQL Server database name
• *Connection Options* - The driver accepts the following Connection Options:

♦ *-H* - Hostname of the machine on which SQL Server is running
♦ *-P* - SQL Server TCP Port
♦ *-V* - SQL Server version. Values supported are: 9.0 equals SQL Server 2005; 8.0 equals SQL Server 2000; 7.0 equals SQL Server 7
♦ *-S* - SQL Server name on the specified host. A SQL Server instance can also be specified by appending "\InstanceName" to the ServerName ie "ServerName\InstanceName"
♦ *-F* - Specify fail-over server name for Database Mirroring
♦ *-N* - Network Packet size, a value that determines the number of bytes per network packet transferred from the database server to the client. The correct setting of this attribute can improve performance. When set to 0, the initial default, the driver uses the default packet size as specified in the Sybase server configuration. When set to -1, the driver computes the maximum allowable packet size on the first connect to the data source and saves the value in the system information.
♦ *-O* Prepared Method, which is a value that determines whether stored procedures are created on the server for every call to SQLPrepare(). When set to Full (2), stored procedures are created for every call to SQLPrepare, which can decrease performance when processing static statements. When set to Partial(1), the initial default, the driver creates stored procedures only if the statement contains parameters. Otherwise, the statement is cached and executed directly at SQLExecute() time. When set to None (0), the driver never creates stored procedures.
♦ *-L* - The name of a Microsoft SQL Server supported national language. The default language is English.
♦ *-C* - The name of an installed character set on the server. By default it is the setting on the Microsoft SQL Server.
♦ *-A* - Turn Off ANSI NULL handling
♦ *-E* - Turn On SSL Strong Data Encryption
♦ *-R* - Turn On SSL Server Certificate Verification

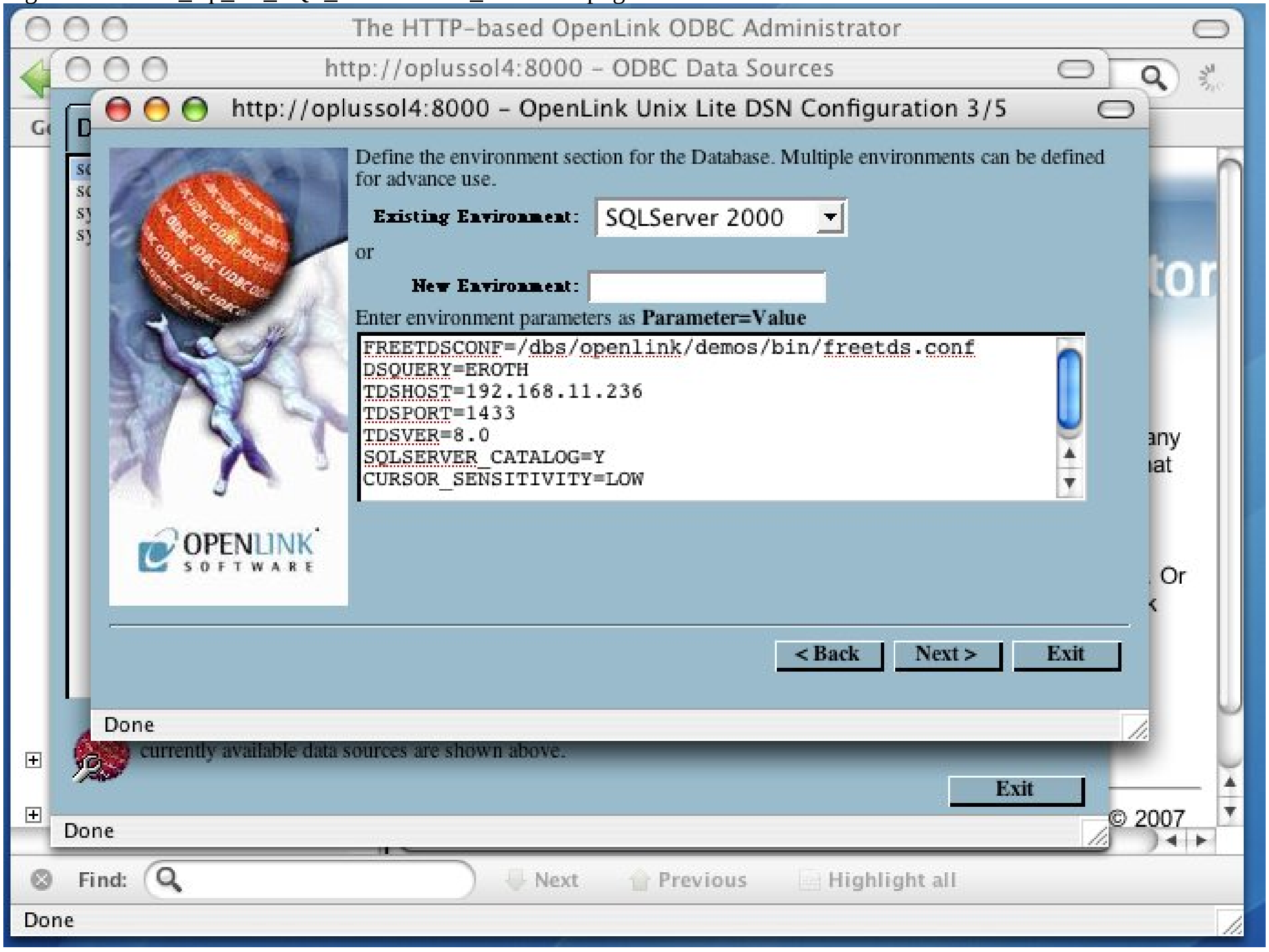
- ♦ *-D* - Specify Name of Certificate Authority file to be used for SSL Certificate Verification
- ♦ *-Z* - Turn On Snapshot Serializable Isolation
- ♦ *-M* - Turn On Multiple Active Result Sets (MARS)

- *Username* - SQL Server login

Click Next.

Set the following variables on the next dialog:

Figure 5.121. lite_sql_ST_SQL_Environment_Variables.png


The HTTP-based OpenLink ODBC Administrator
http://oplussol4:8000 - ODBC Data Sources
http://oplussol4:8000 - OpenLink Unix Lite DSN Configuration 3/5
OPENLINK SOFTWARE
< Back
Next >
Exit
Done
Find:
Next
Previous
Highlight all

Define the environment section for the Database. Multiple environments can be defined for advance use.

Existing Environment: SQLServer 2000

or

New Environment:

Enter environment parameters as **Parameter=Value**

```
FREETDSCONF=/dbs/openlink/demos/bin/freetds.conf
DSQUERY=EROTH
TDSHOST=192.168.11.236
TDSPORT=1433
TDSVER=8.0
SQLSERVER_CATALOG=Y
CURSOR_SENSITIVITY=LOW
```

currently available data sources are shown above.

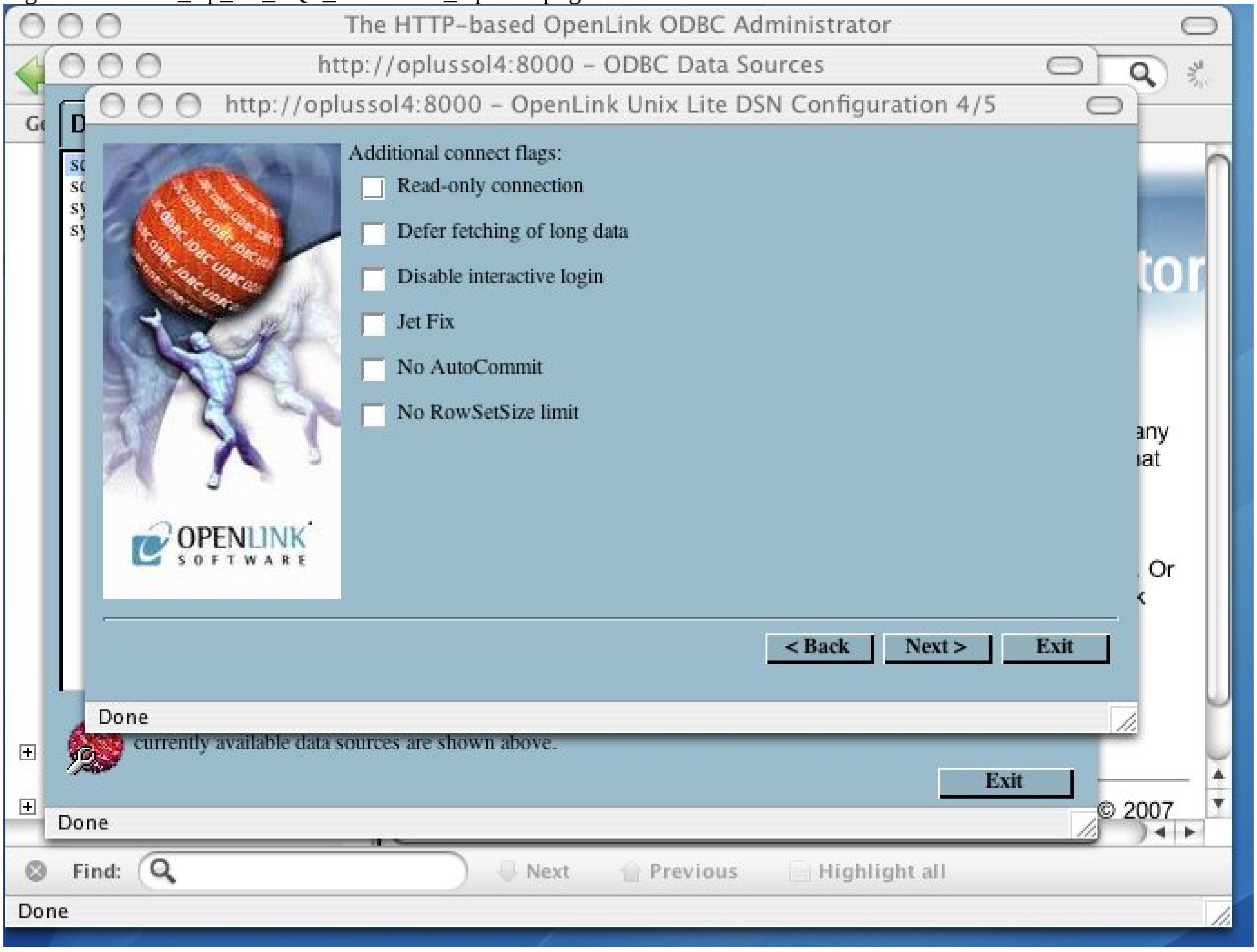
- *Existing Environment* - This arbitrary heading for a collection of DBMS-related environment variables usually corresponds with the DBMS version
- *New Environment* - You can choose a new heading
- *FREETDSCONF* - The full path to the freetds file that installs with OpenLink's Single-Tier drivers
- *DSQUERY* - SQL Server instance name
- *TDSHOST* - SQL Server database server hostname or IP address
- *TDSPORT* - SQL Server listen port
- *TDSVER* - The SQL Server TDS version
- *SQLSERVER_CATALOG* -
- *CURSOR_SENSITIVITY* - Enables or disables the row version cache used with dynamic cursors. When dynamic cursor sensitivity is set high, the Cursor Library calculates checksums for each row in the current rowset and compares these with the checksums (if any) already stored in the row version cache for the same rows when fetched previously. If the checksums differ for a row, the row has been updated since it was last fetched and the row status flag is set to SQL_ROW_UPDATED. The row version cache is then updated with the latest checksums for the rowset. From the user's point of view, the only visible difference between the two sensitivity settings is that a row status flag can never be set to SQL_ROW_UPDATED when the cursor sensitivity is low. (The row status is instead displayed as SQL_ROW_SUCCESS.) In all other respects, performance aside, the two settings are the same. Deleted rows don't appear in the rowset. Updates to the row since the row was last

fetched are reflected in the row data, and inserted rows appear in the rowset, if their keys fall within the span of the rowset. If your application does not need to detect the row status SQL_ROW_UPDATED, you should leave the 'High Cursor Sensitivity' checkbox unchecked, as performance is improved. The calculation and comparison of checksums for each row fetched carries an overhead. If this option is enabled, the table oplrvc must have been created beforehand using the appropriate script for the target database.

Click Next.

You can set the following, optional values on the fourth dialog:

Figure 5.122. lite_sql_ST_SQL_Additional_Options.png


The HTTP-based OpenLink ODBC Administrator
http://oplussol4:8000 - ODBC Data Sources
http://oplussol4:8000 - OpenLink Unix Lite DSN Configuration 4/5
OPENLINK SOFTWARE
< Back
Next >
Exit
Done
Find:
Next
Previous
Highlight all

Additional connect flags:
- [ ] Read-only connection
- [ ] Defer fetching of long data
- [ ] Disable interactive login
- [ ] Jet Fix
- [ ] No AutoCommit
- [ ] No RowSetSize limit

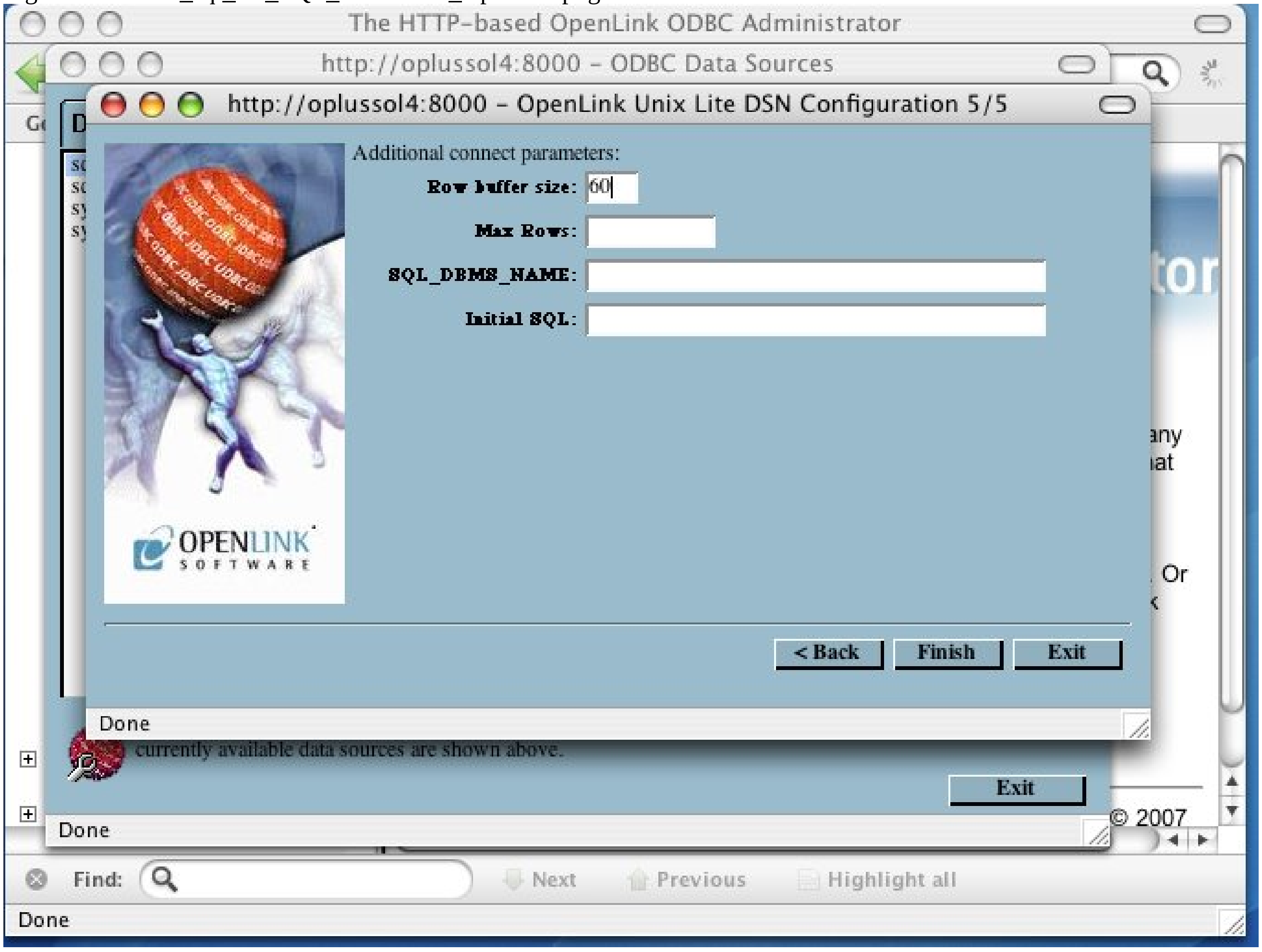
currently available data sources are shown above.

- *Read-only connection* - Specifies whether the connection is "Read-only." Make sure the checkbox is unchecked to request a "Read/Write" connection.
- *Defer fetching of long data* - Defers fetching of LONG (BINARY, BLOB etc.) data unless explicitly requested in a query. This provides significant performance increases when fields in query do not include LONG data fields.
- *Disable interactive login* - Suppresses the ODBC "Username" and "Password" login dialog boxes when interacting with your ODBC DSN from within an ODBC compliant application.
- *Jet fix* - Check this checkbox if you intend to use this driver with Microsoft Access.
- *No AutoCommit* - Changes the default commit behaviour of the OpenLink driver. The default mode is AutoCommit (box unchecked).
- *No RowSetSize limit* - Disables a limitation enforced by the cursor library. This limitation is enforced by default. It prevents the driver from claiming all available memory in the event that a resultset generated from an erroneous query is very large. The limit is normally never reached.

Click Next.

Additional, optional parameters appear on the fifth, and final dialog:

Figure 5.123. lite_sql_ST_SQL_Additional_Options2.png


The HTTP-based OpenLink ODBC Administrator
http://oplussol4:8000 - ODBC Data Sources
http://oplussol4:8000 - OpenLink Unix Lite DSN Configuration 5/5
< Back
Finish
Exit
Done
Find:
Next
Previous
Highlight all

Additional connect parameters:

Row buffer size: 60

Max Rows:

SQL_DBMS_NAME:

Initial SQL:

currently available data sources are shown above.

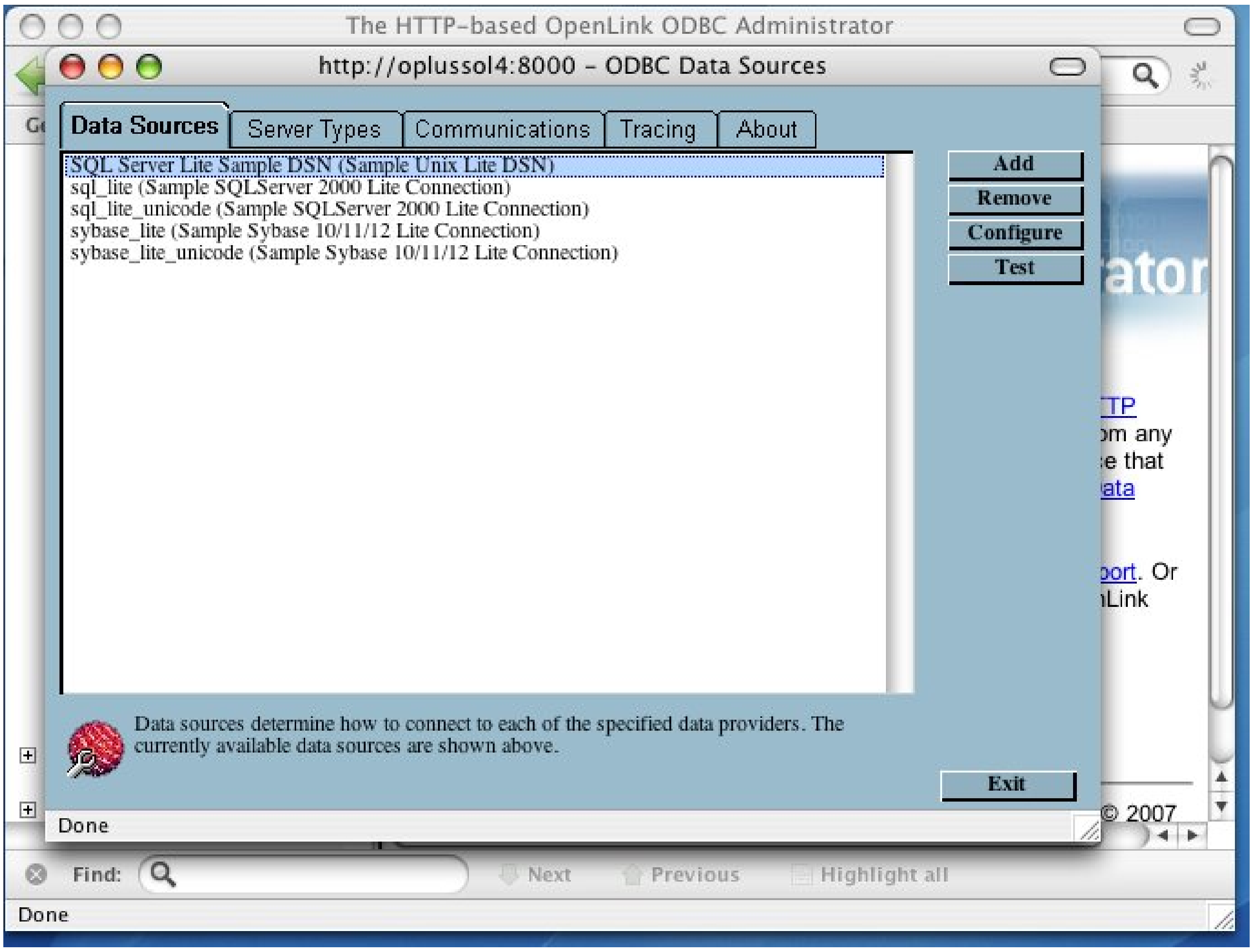
© 2007

- *Row buffer size* - This attribute specifies the number of records to be transported over the network in a single network hop. Values can range from 1 to 99.
- *Max Rows* - Allows you to define a limit on the maximum number of rows to be returned from a query. The default value of 0 means no limit.
- *SQL_DBMS_Name* - Manually overrides the SQLGetInfo(SQL_DBMS_NAME) response returned by the driver. This is required for products like Microsoft InfoPath for which the return the value should be "SQL Server".
- *Initial SQL* - Lets you specify a file containing SQL statements that will be run automatically against the database upon connection.

Click Next.

Your new DSN is highlighted and persisted on the the Data Sources tab. Click the Test tab.

Figure 5.124. lite_sql_ST_SQL_Saved_DSN.png

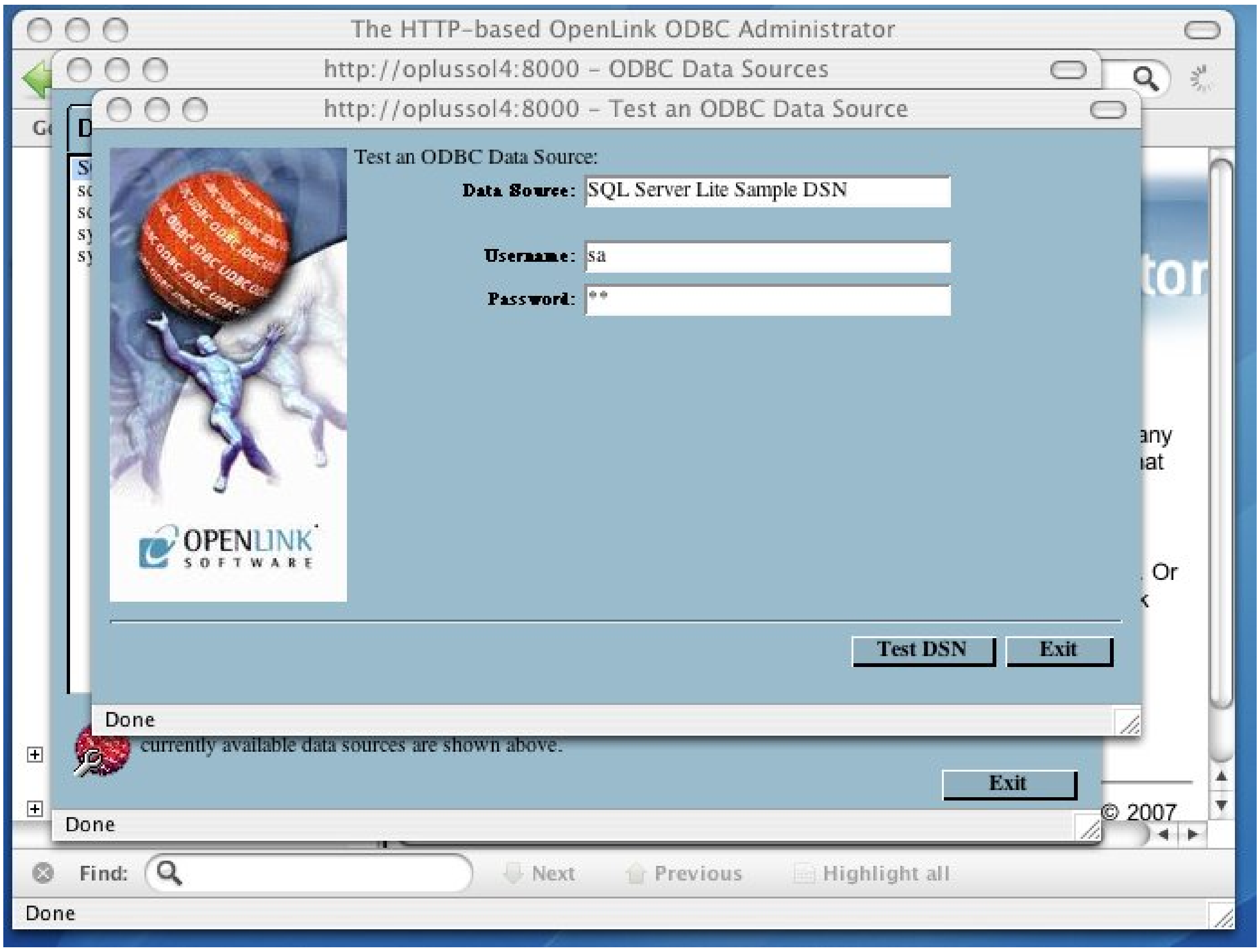


SQL Server Lite Sample DSN (Sample Unix Lite DSN)
sql_lite (Sample SQLServer 2000 Lite Connection)
sql_lite_unicode (Sample SQLServer 2000 Lite Connection)
sybase_lite (Sample Sybase 10/11/12 Lite Connection)
sybase_lite_unicode (Sample Sybase 10/11/12 Lite Connection)

Data sources determine how to connect to each of the specified data providers. The currently available data sources are shown above.

Type your password in the password field and click test.

Figure 5.125. lite_sql_ST_SQL_Authenticate.png


The HTTP-based OpenLink ODBC Administrator

http://oplussol4:8000 - ODBC Data Sources

http://oplussol4:8000 - Test an ODBC Data Source

Test an ODBC Data Source:

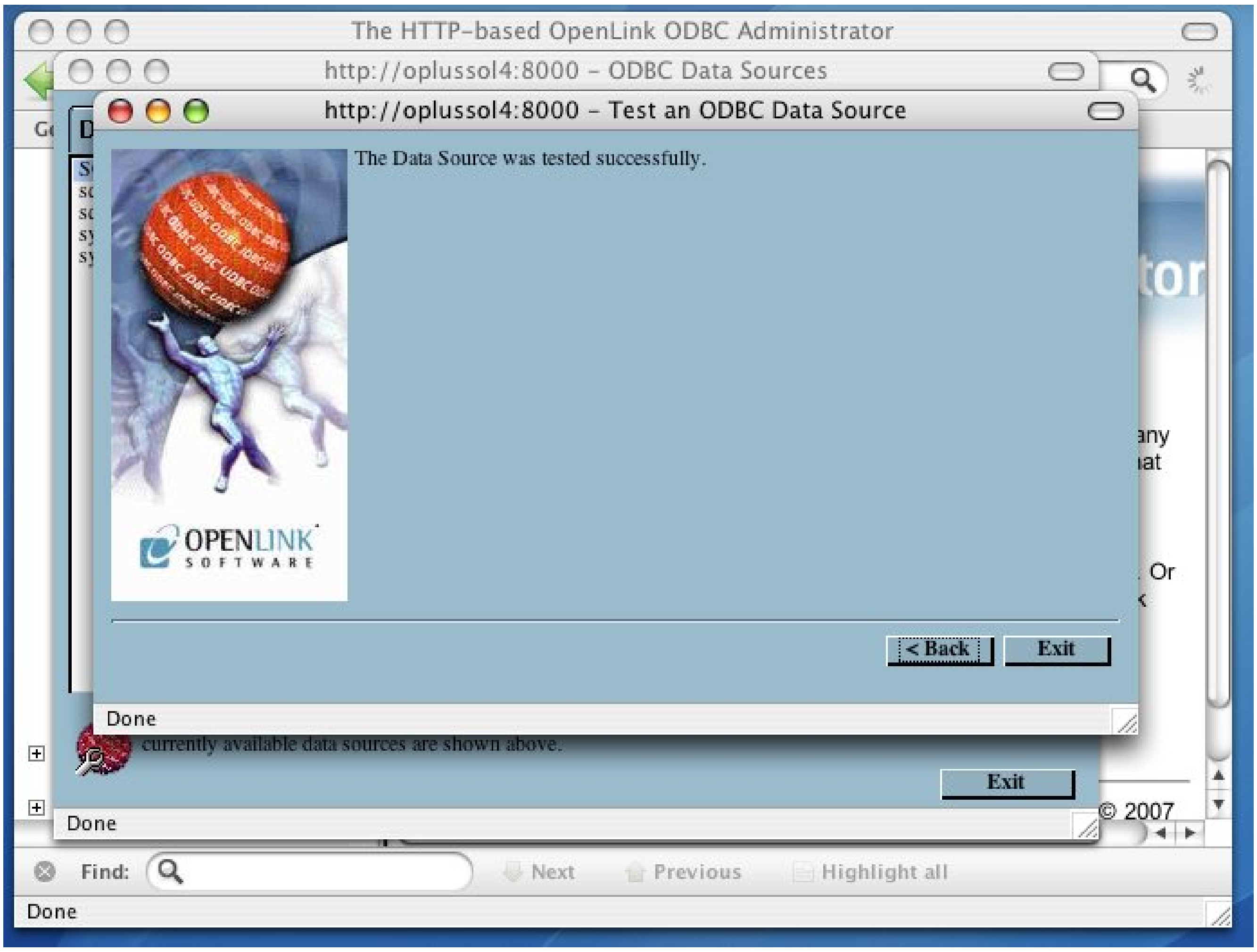
Data Source: SQL Server Lite Sample DSN

Username: sa

Password: **

You have established a connection.

Figure 5.126. lite_sql_ST_SQL_Connected.png


The HTTP-based OpenLink ODBC Administrator
http://oplussol4:8000 - ODBC Data Sources
http://oplussol4:8000 - Test an ODBC Data Source
< Back
Exit
Done
Find:
Next
Previous
Highlight all
© 2007

The Data Source was tested successfully.

currently available data sources are shown above.

7.2.11 ODBC-JDBC Bridges for Java

OpenLink Lite Drivers for Unix can be configured in 3 ways:

Web Based Wizard
Web Based Forms
Manually

Once you have configured the generic parts of the data source using one of the above listed methods, you will need to define the driver environment. Below are the common options with their descriptions for the environment section:

```
[Environment Jdbc14]
CLASSPATH =.;c:\Program Files\OpenLink\Virtuoso 3.0\jdk14\virtjdbc3.jar
;PATH =
;JET_DROPCATALOGFROMDBMETACALLS  = YES
;JET_DROPSCHEMAFROMDBMETACALLS   = YES
;JET_NOSUPPORTOFQUOTEDIDENTIFIER = YES
;PATCHNULLSIZEOFSQLCHAR = 4096
;JET_SQLSTATISTICSOFF   = YES
```

Note that CLASSPATH is the critical environment variable that must be set to enable the JDBC driver class files to be located.

7.3 Mac OS X Data Source Configuration

7.3.1 Creating ODBC Data Sources

OpenLink Software's components are fully supported on Mac OS X version 10.1.x ("Puma") and 10.2.x ("Jaguar"). In most ways, this looks the same to users. However, there are some significant differences to be aware of between these Operating Systems.

As shipped from Apple, Mac OS X did not include any ODBC support until Jaguar. The ODBC Driver Manager, Data Source Administrator, etc. - all had to be delivered with the Drivers.

When Apple introduced Darwin, an Open-Source project meant to form the kernel of Mac OS X, OpenLink determined to port its open-source iODBC Driver Manager to the new platform. With the introduction of the Preview Release of Mac OS X, the traditional set of dynamic libraries was broadened to include a system of Frameworks to encourage the development of fully ODBC compliant, native Mac OS X drivers and client applications.

That set of Frameworks, along with the OpenLink ODBC Administrator (then known as the iODBC Administrator), has been included with all OpenLink installations for Mac OS X since 10.0. The OpenLink ODBC Administrator supports all core features of ODBC, and presents driver-specific DSN configuration panels, as defined by the Driver developer, through the use of Setup Libraries.

Jaguar's release marked Apple's recognition that Data Access was an important part of an Enterprise Operating System. Already part of the standard distribution of Darwin, the basic iODBC dynamic libraries are now a part of the standard installation of Mac OS X 10.2. Apple also included their own version of an ODBC Administrator, as a proof-of-concept. Apple's Administrator permits Driver Registration, Tracing, and all other core features of ODBC; however, among other hard edges, all DSN configuration must be done by manually entering Keyword-Value pairs. Further, the user must know what Keywords to use, along with their acceptable Values.

7.3.1.1 Mac OS X ODBC Data Sources

The OpenLink ODBC Administrator for Mac OS X currently supports creation of User and System Data Source Names (DSNs). Support for File DSNs will be delivered in a future release.

A User DSN is only available to the user who creates the data source. Its parameters are stored in that user's settings file ~/Library/Preferences/ODBC.preference .

A System DSN is available to the whole system so that any user, including the system itself, will be able to use that data source. Its parameters are stored in the System settings file /Library/Preferences/ODBC.preference.

A File DSN is a special 'mobile' data source that stores the data source information associated with the Driver in a file, which may then be copied and shared among different users and ODBC application host machines.

The steps for creating a DSN are as follows:-

1. Launch the OpenLink ODBC Administrator, found in the /Applications/Utilities/ directory.

   Figure 5.127. OpenLink ODBC Administrator icon

2. Click the tab for the kind of DSN you wish to create -- User or System. Press the Add button to begin creating a new Data source.

   Figure 5.128. iODBC Data Source Administrator

3. Select the Driver to be used to create your ODBC DSN. In this example the "OpenLink SQL Server Lite Driver" is highlighted. Then click the Finish button.

   Figure 5.129. Choose an ODBC Driver

4. You will now be presented with the ODBC Data Source Configuration dialog for the driver selected. Generally, there will be several tabs, most of which will need some information.

7.3.1.2 Common Data Source Tab

First is the Data Source Tab. The parameters on this tab are similar (not identical) for all OpenLink Single-Tier drivers. This tab always holds the Name and Description parameters. Generally, it will also include parameters describing the target database host - Hostname, Port, and, if the Driver handles more than one DBMS, Server Type. Specific information will be presented for each Driver, below.

- DSN. The name of the ODBC DSN. This is how you will generally refer to this data source, from within ODBC client applications.
- Description. Any extra information you wish to note about the DSN you are creating. This is generally not displayed by ODBC client applications, though it is available to them.
- Hostname. This is the fully qualified hostname, or IP address, of the machine hosting the DBMS you wish to access, e.g., dbms-server.example.com, or 192.168.155.123. Any hostname which will be resolved by your local DNS is acceptable.
- Server Type. Select the version and/or vendor of the DBMS engine you will be accessing, from the list presented. If your exact version is not listed, try the closest version available. If that fails, please contact OpenLink Technical Support.

7.3.1.3 Common Connection Tab

The second and possibly third tab hold fields specific to the database communications layer. The name(s) of the tab(s), the fields, and their data, are specific to each database. The database specific settings are detailed further in the text. The following list will allow you to quick jump to the relevent section (if reading on-line):

MySQL
Oracle 8 (or 9)
PostgreSQL
SQL Server
Virtuoso

Common fields are:

- User name. This specifies the default username to be used when attempting to make a connection. You may override this at run time.
- Row Buffer Size. This attribute specifies the number of records to be returned in a chunk. Values may range from 1 to 999. Setting this value too high or too low can significantly impact performance. Generally, best results are achieved with values between 50 and 150.
- Hide Login Dialog. Suppress the ODBC "Username" and "Password" login dialog box when interacting with your ODBC DSN from within an ODBC compliant application. Please note - this requires that these values be correctly specified within the DSN, which can open a security hole.
- Read Only connection. Specify whether the connection is to be "Read-only". Make sure the checkbox is unchecked to request a "Read/Write" connection.

7.3.1.4 Common Preferences Tab

The Preferences tab parameters are also generally common across all OpenLink Single-Tier Drivers for ODBC. All Preferences parameters are defined here, though they may not all appear on your Driver.

- Initialization SQL. Lets you specify a file containing SQL statements that will be run against the database upon connection, automatically.
- MaxRows Override. Allows you to limit the maximum number of rows to return from a query. The default value of 0 means no limit.
- Enable Microsoft Jet Engine Options. Extra support or altered functionality for better compatibility with Microsoft Jet using applications such as Microsoft Access. This generally doesn't apply to Macintosh applications; however, we retain the option.
- Disable AutoCommit. Change the default commit behaviour of the OpenLink Lite Driver. The default mode is AutoCommit mode (box unchecked).
- Disable Rowset Size Limit. Disable any limitation enforced by the cursor library. The limitation is enforced by default, to prevent the Driver claiming all available memory when a result set is very large. The limit is normally never reached.

- **7.3.1.4.1 High Cursor Sensitivity**

  Enables or disables the row version cache used with dynamic cursors.

  When dynamic cursor sensitivity is set high, the Cursor Library calculates checksums for each row in the current rowset and compares these with the checksums (if any) already stored in the row version cache for the same rows when fetched previously. If the checksums differ for a row, the row has been updated since it was last fetched and the row status flag is set to SQL_ROW_UPDATED. The row version cache is then updated with the latest checksums for the rowset.

  From the user's point of view, the only visible difference between the two sensitivity settings is that a row status flag can never be set to SQL_ROW_UPDATED when the cursor sensitivity is low. (The row status is instead displayed as SQL_ROW_SUCCESS.) In all other respects, performance aside, the two settings are the same - deleted rows don't appear in the rowset, updates to the row since the row was last fetched are reflected in the row data, and inserted rows appear in the rowset if their keys fall within the span of the rowset.

  If your application does not need to detect the row status SQL_ROW_UPDATED, you should leave the 'High Cursor Sensitivity' checkbox unchecked, as performance is improved. The calculation and comparison of checksums for each row fetched carries an overhead.

  For this option to take effect, the table 'oplrvc' must already have been created, using the appropriate script for the target database.
- Defer fetching of long data. Checked by default, this parameter determines whether long-data fields are retrieved after all other fields in a query, or in whatever order they appear in the query. Performance is generally best with this enabled; hence the default setting.

7.3.2 MySQL

7.3.2.1 Data Source tab

Figure 5.130. MySQL Data Source tab

7.3.2.2 Connection tab

Figure 5.131. MySQL Connection tab

7.3.2.3 Preferences tab

Figure 5.132. MySQL Preferences tab

7.3.3 Oracle 8 (or 9)

7.3.3.1 Data Source tab

Figure 5.133. Oracle Data Source tab

Figure 5.134. Choose Oracle Directory dialog

Figure 5.135. Net Service Name Editor tab

7.3.3.2 Connection tab

Figure 5.136. Oracle Connection tab

7.3.3.3 Preferences tab

Figure 5.137. Oracle Preferences tab

7.3.4 PostgreSQL

7.3.4.1 Data Source tab

Figure 5.138. PostgreSQL Data Source tab

7.3.4.2 Connection tab

Figure 5.139. PostgreSQL Connection tab

7.3.4.3 Preferences tab

Figure 5.140. PostgreSQL Preferences tab

7.3.5 ODBC-JDBC Lite Bridges for Java

7.3.5.1 Data Source tab

Figure 5.141. ODBC-JDBC Lite Bridge Data Source tab

7.3.5.2 Connection tab

Figure 5.142. ODBC-JDBC Lite Bridge Connection tab

7.3.5.3 Options tab

Figure 5.143. ODBC-JDBC Lite Bridge Options tab

7.3.5.4 Preferences tab

Figure 5.144. ODBC-JDBC Lite Bridge Preferences tab

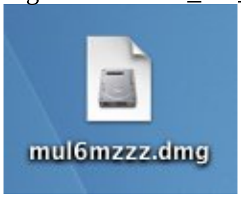
7.3.6 Microsoft or Sybase SQL Server (TDS)

7.3.6.1 Installation

The OpenLink ODBC Driver for Microsoft SQL Server for Mac OS X is distributed in a single disk image (.dmg) file, which contains a Macintosh Installer mpkg.

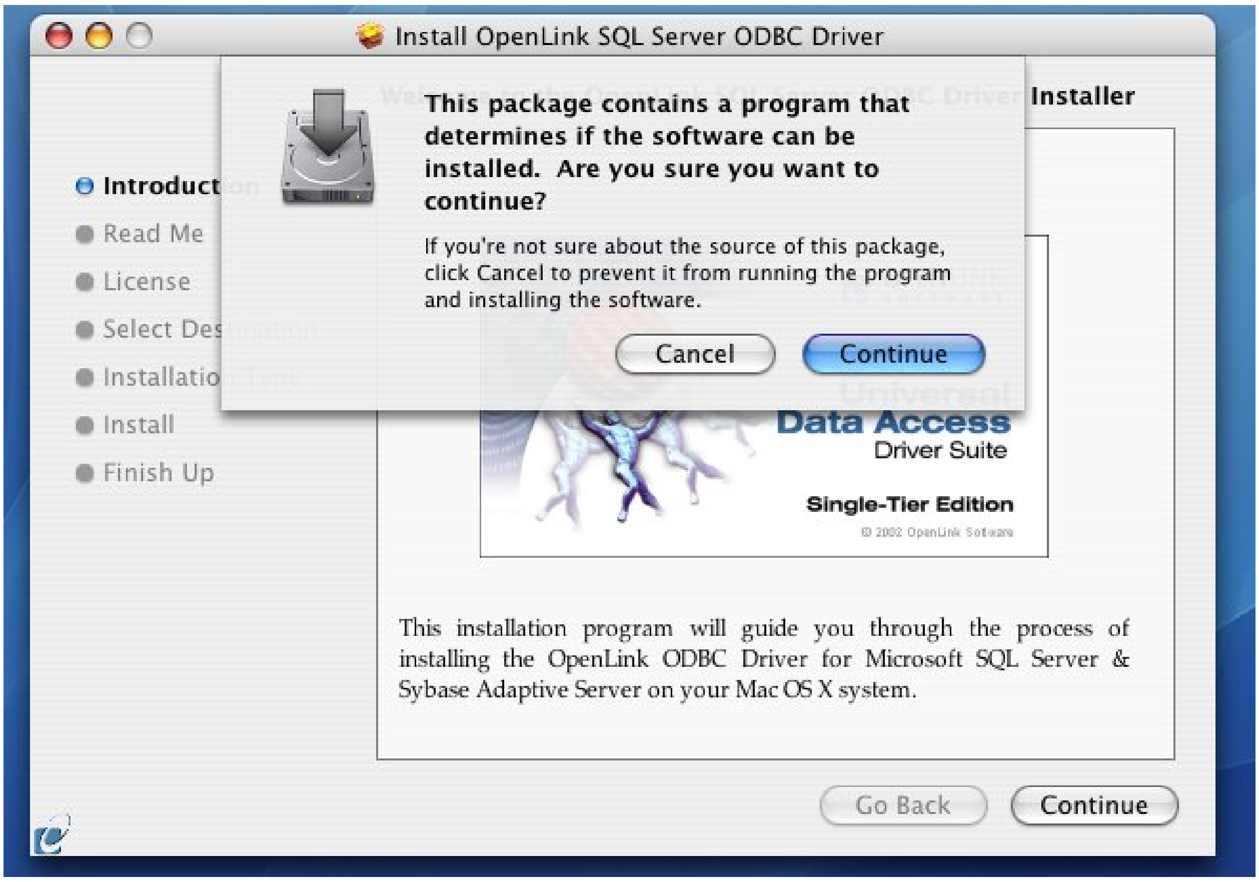
Double-click the mpkg to start the installation process.

Figure 5.145. lite_osx_sql_SQL_Dmgfile.png



You will encounter a warning message that will ask you if you are sure that you want to install the software click to continue.

Figure 5.146. lite_osx_sql_SQL_Warning.png



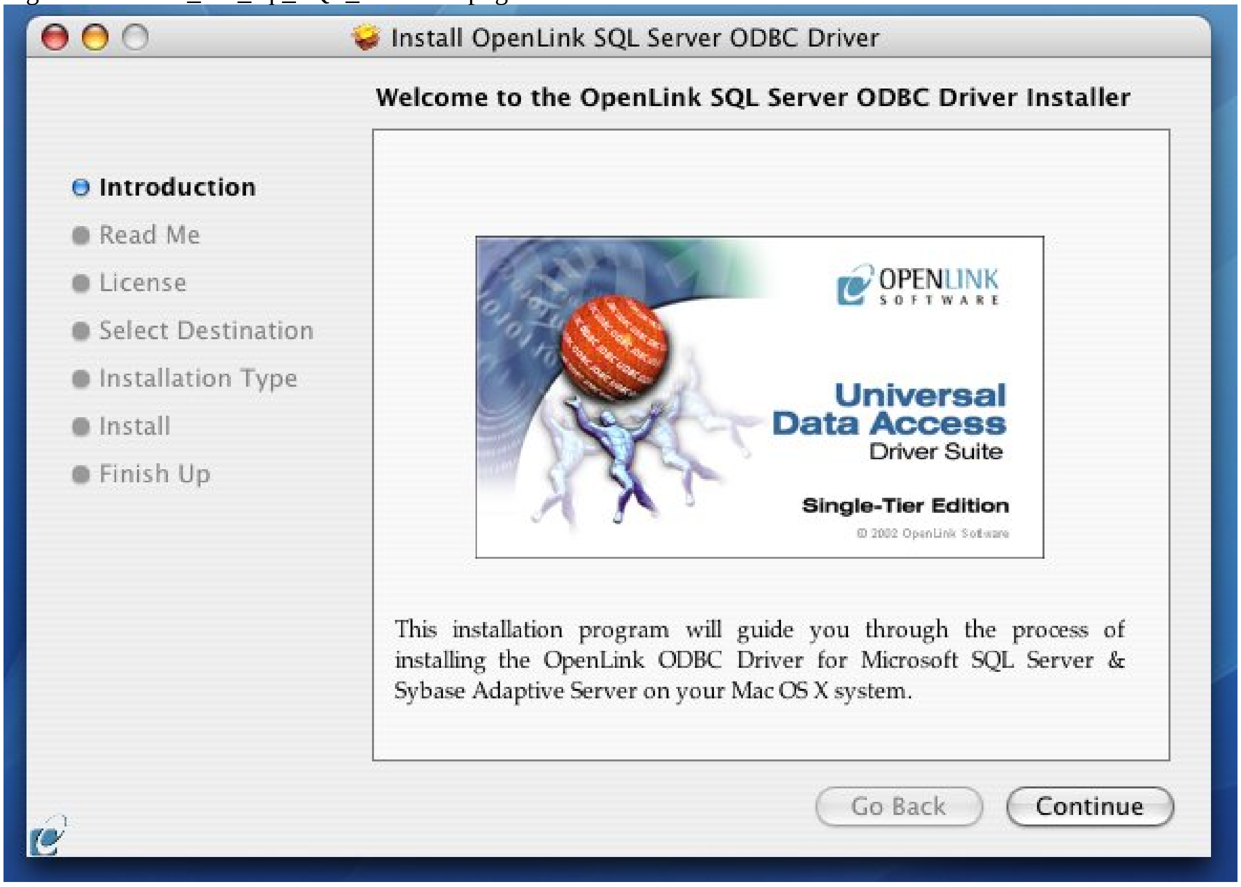
This package contains a program that determines if the software can be installed. Are you sure you want to continue?

If you're not sure about the source of this package, click Cancel to prevent it from running the program and installing the software.

This installation program will guide you through the process of installing the OpenLink ODBC Driver for Microsoft SQL Server & Sybase Adaptive Server on your Mac OS X system.

The installer will display a "Welcome" message. Click "Continue."

Figure 5.147. lite_osx_sql_SQL_Welcome.png

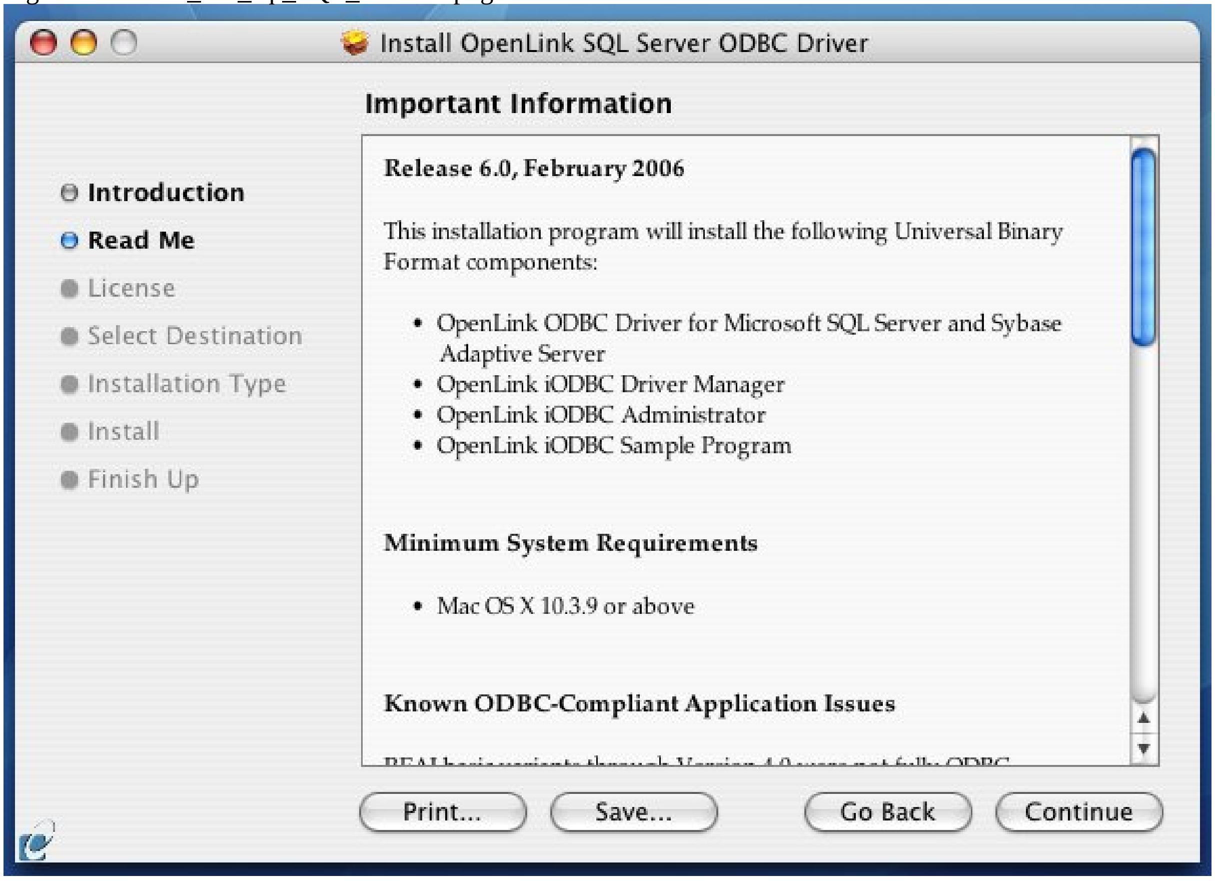


Welcome to the OpenLink SQL Server ODBC Driver Installer

This installation program will guide you through the process of installing the OpenLink ODBC Driver for Microsoft SQL Server & Sybase Adaptive Server on your Mac OS X system.

The next screen will display the Read-Me file, including any last-minute updates to these documents. Please read carefully and click "Continue" when finished.

Figure 5.148. lite_osx_sql_SQL_Readme.png



Release 6.0, February 2006

This installation program will install the following Universal Binary Format components:

- OpenLink ODBC Driver for Microsoft SQL Server and Sybase Adaptive Server
- OpenLink iODBC Driver Manager
- OpenLink iODBC Administrator
- OpenLink iODBC Sample Program

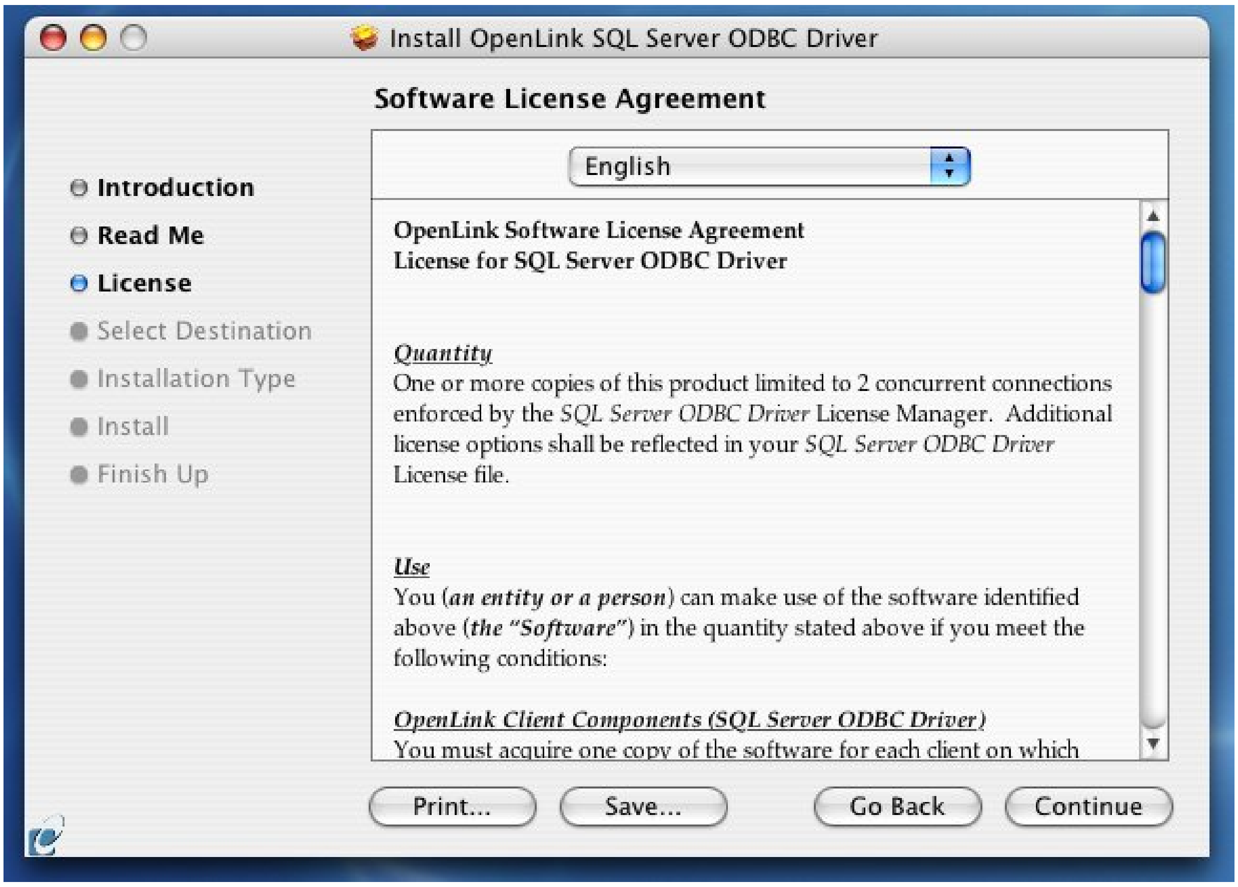
Minimum System Requirements

- Mac OS X 10.3.9 or above

Known ODBC-Compliant Application Issues

The next screen will display the License Agreement for the OpenLink Single-Tier Driver for ODBC. Please read and click "Continue".

Figure 5.149. lite_osx_sql_SQL_License.png



OpenLink Software License Agreement
License for SQL Server ODBC Driver

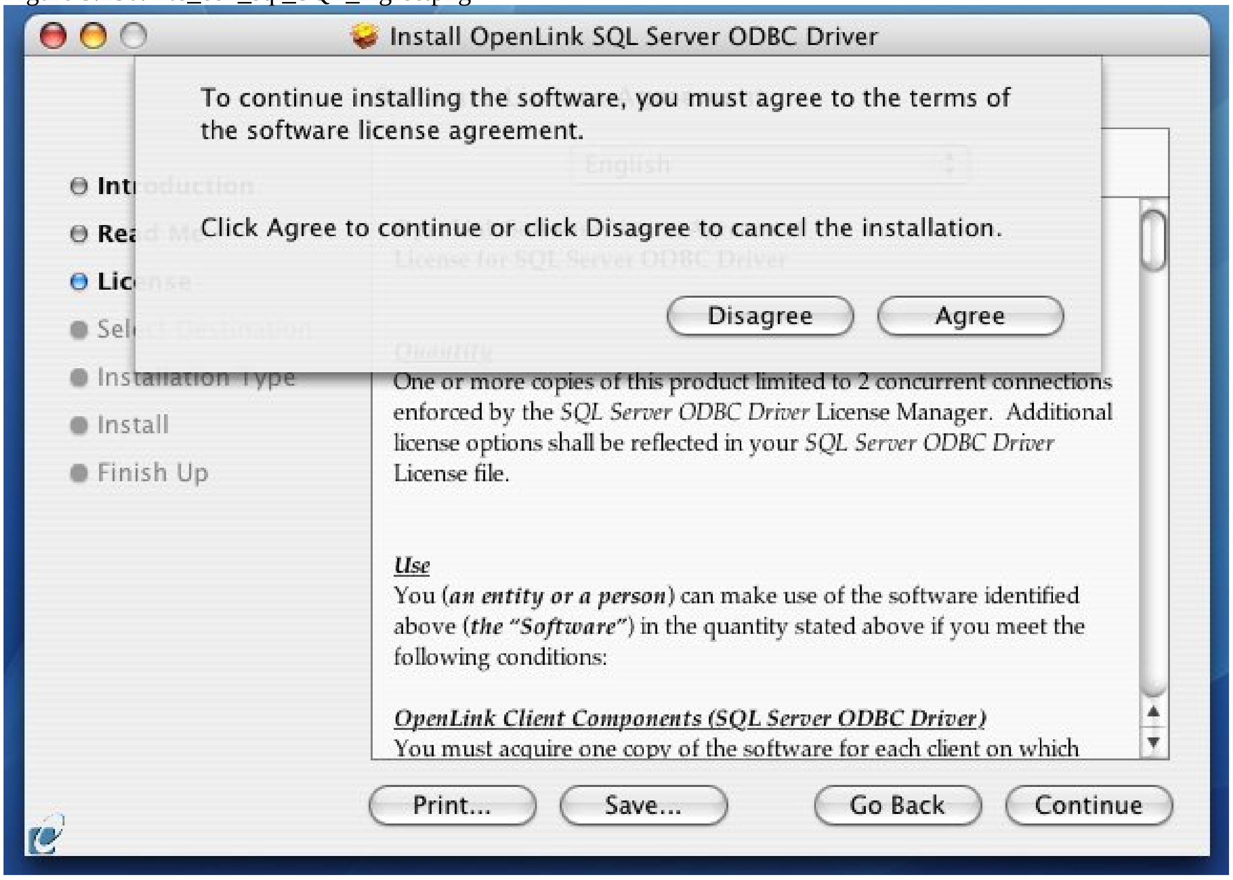
Quantity
One or more copies of this product limited to 2 concurrent connections enforced by the *SQL Server ODBC Driver* License Manager. Additional license options shall be reflected in your *SQL Server ODBC Driver* License file.

Use
You (***an entity or a person***) can make use of the software identified above (***the "Software"***) in the quantity stated above if you meet the following conditions:

OpenLink Client Components (SQL Server ODBC Driver)
You must acquire one copy of the software for each client on which

You will be prompted to "Agree" to continue the installation or "Disagree" to abort.

Figure 5.150. lite_osx_sql_SQL_Agree.png

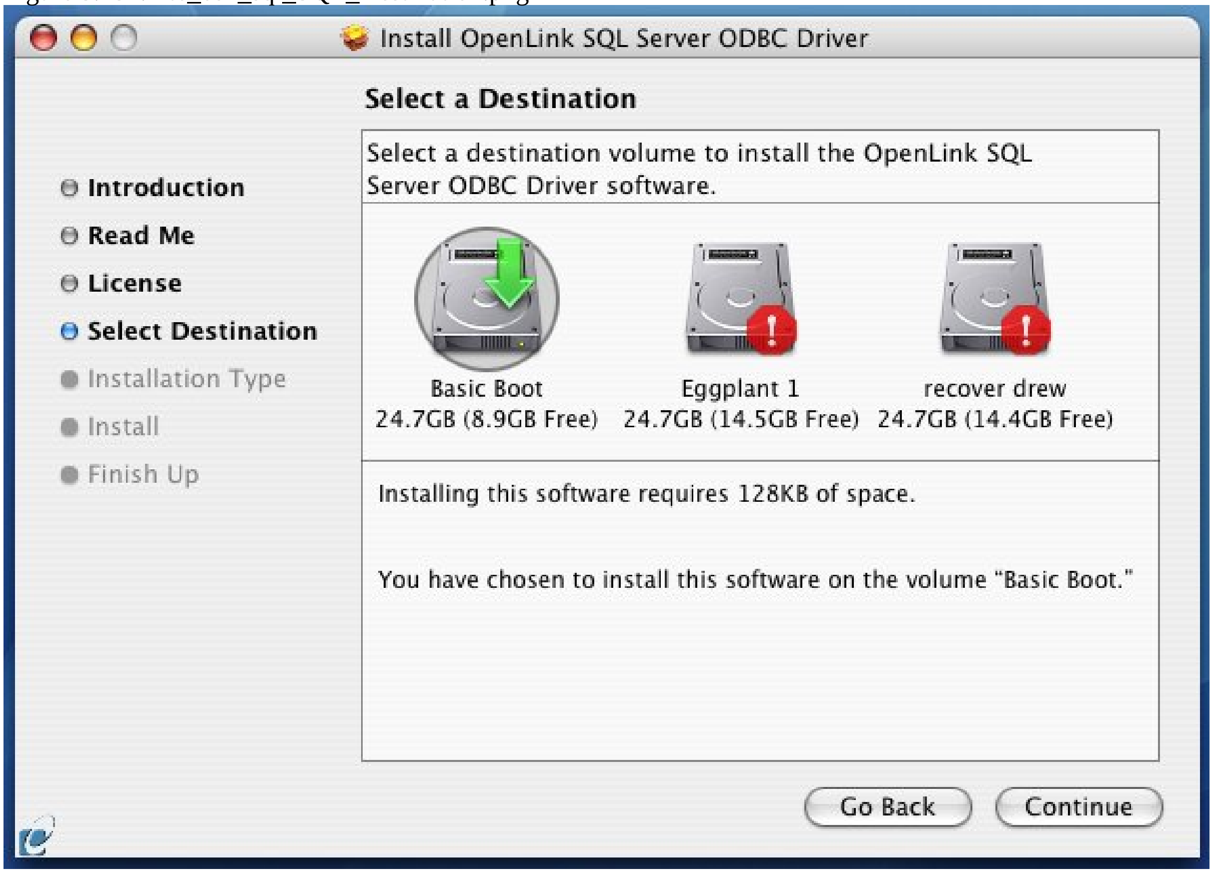


To continue installing the software, you must agree to the terms of the software license agreement.

Click Agree to continue or click Disagree to cancel the installation.

You will be asked to select a Destination Volume. Generally, this should be your Mac OS X boot volume. Click on the desired disk icon and then click "Continue".

Figure 5.151. lite_osx_sql_SQL_Destination.png



Select a Destination

Select a destination volume to install the OpenLink SQL Server ODBC Driver software.

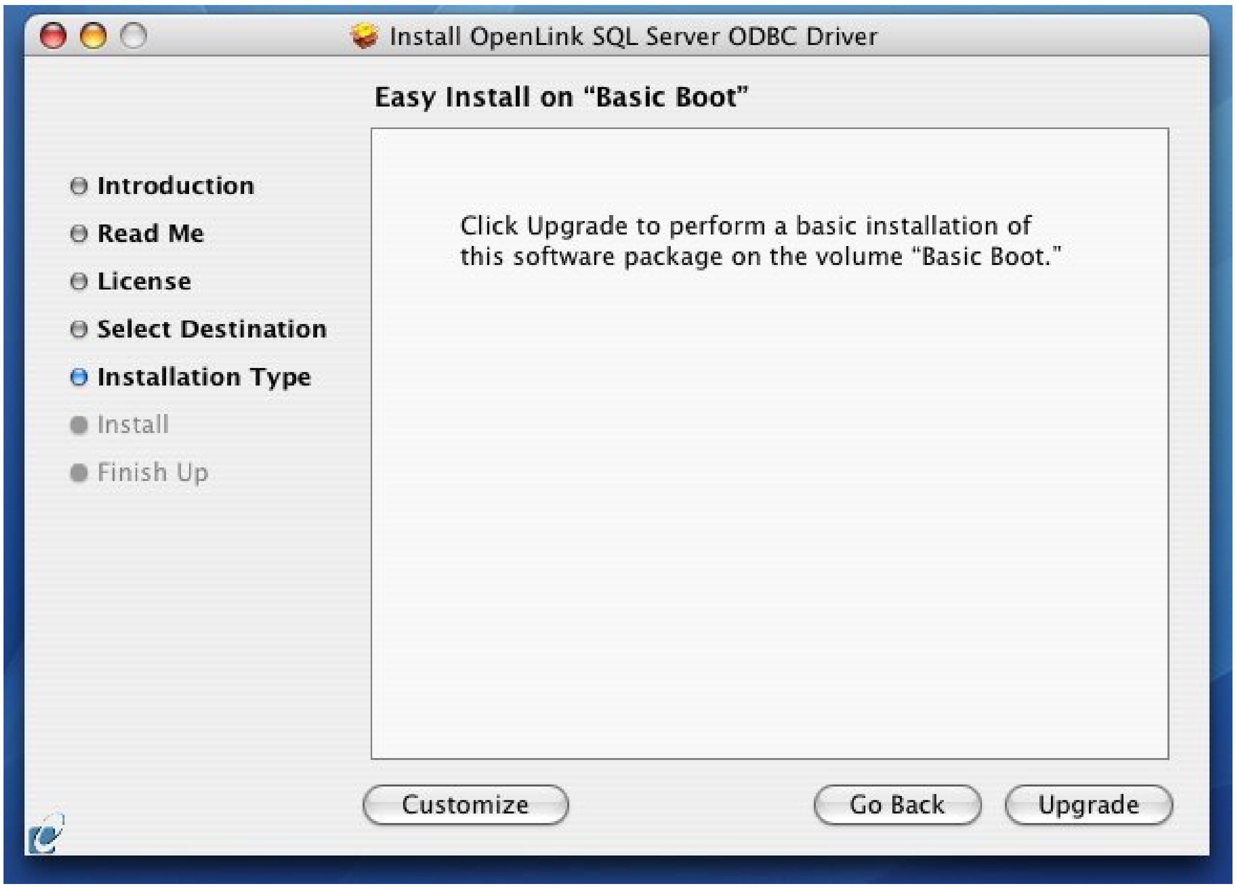
Installing this software requires 128KB of space.

You have chosen to install this software on the volume "Basic Boot."

You may now choose the Easy Install, or if you are an experienced user, you may Customize which components are installed. OpenLink generally recommends the Easy Install.

If you have installed OpenLink or iODBC components in the past, click "Upgrade" to continue; otherwise, click "Install".

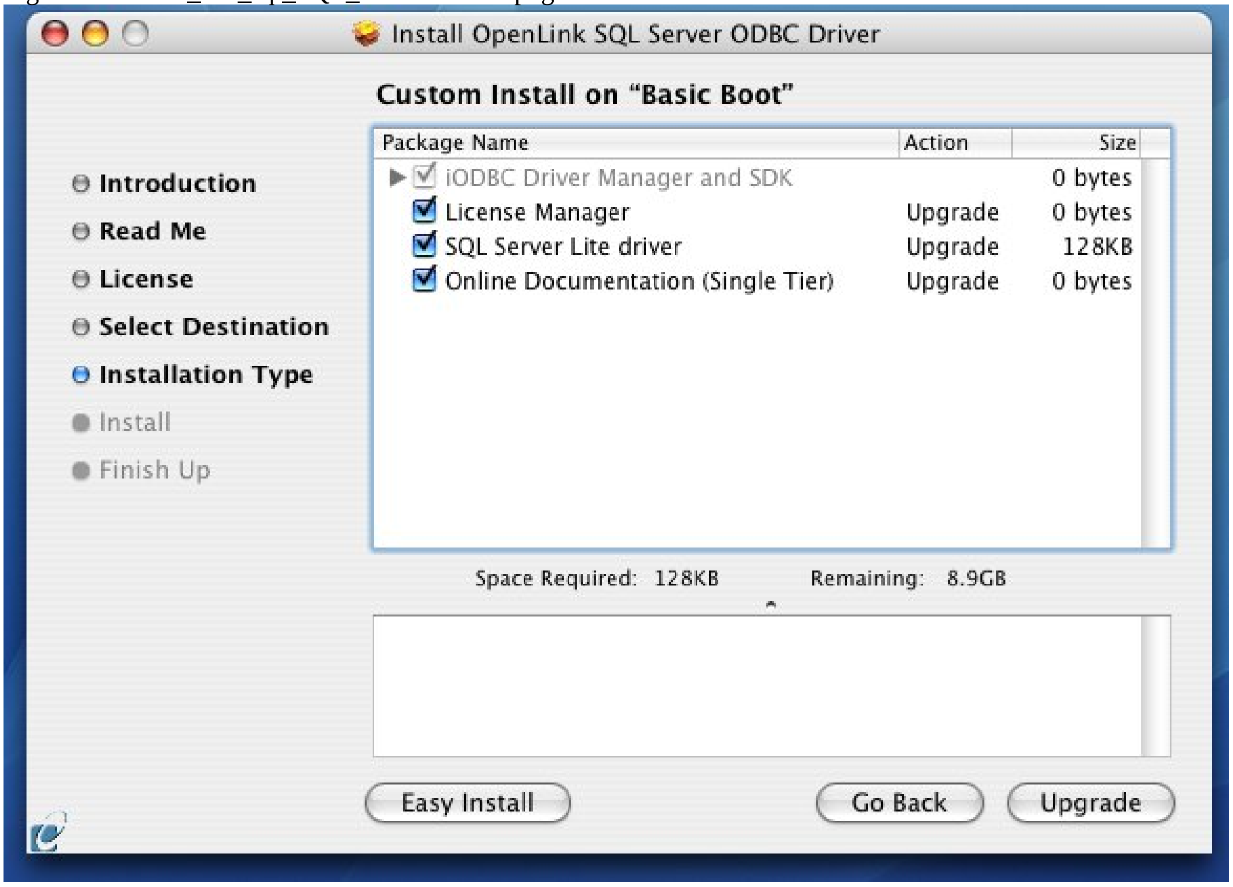
Figure 5.152. lite_osx_sql_SQL_Easyinstall.png



Easy Install on “Basic Boot”

Click Upgrade to perform a basic installation of this software package on the volume “Basic Boot.”

Figure 5.153. lite_osx_sql_SQL_Custominstall.png



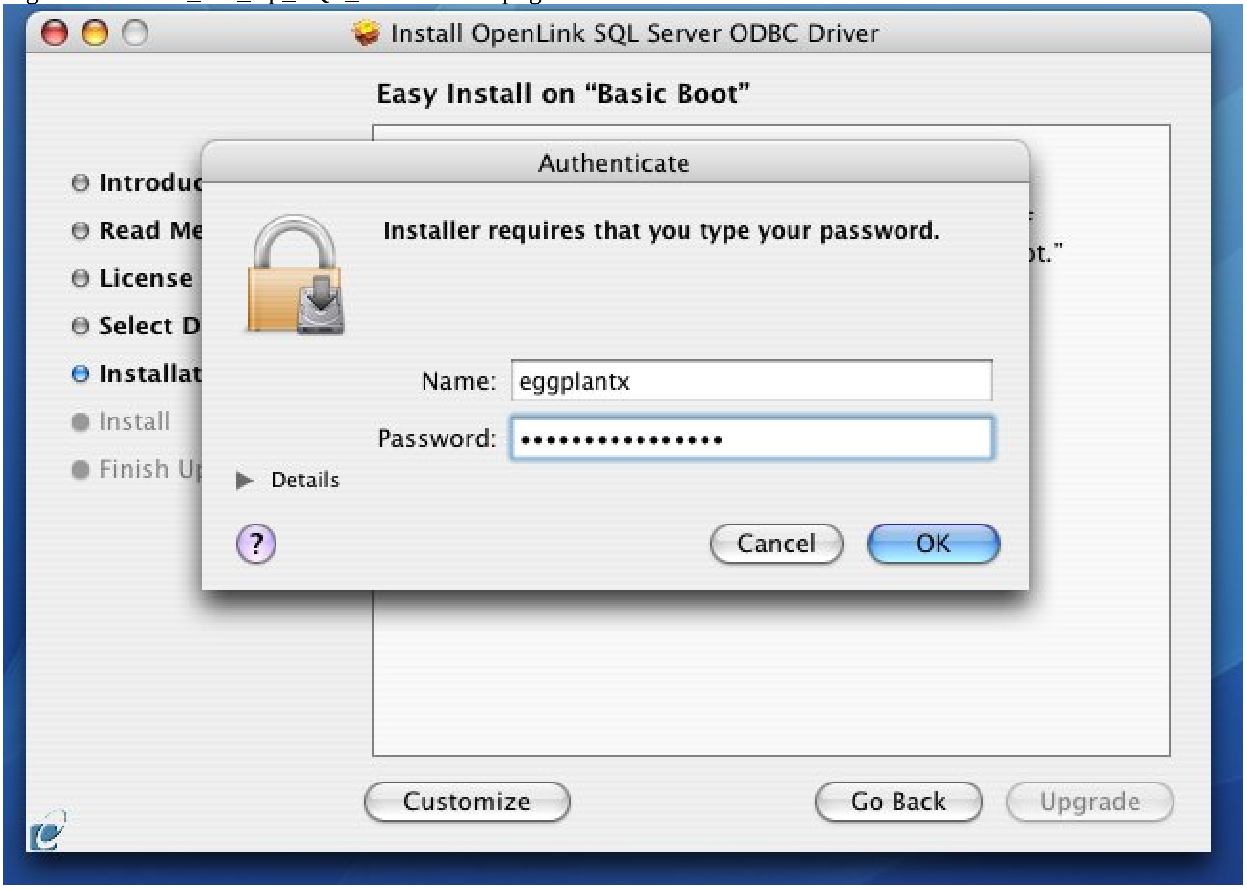
Custom Install on “Basic Boot”

Package Name	Action	Size
✓ iODBC Driver Manager and SDK		0 bytes
✓ License Manager	Upgrade	0 bytes
✓ SQL Server Lite driver	Upgrade	128KB
✓ Online Documentation (Single Tier)	Upgrade	0 bytes

Space Required: 128KB Remaining: 8.9GB

You must have an Administration username and password to install the OpenLink driver. Enter your Mac OS X Username and Password.

Figure 5.154. lite_osx_sql_SQL_Authenticate.png


Install OpenLink SQL Server ODBC Driver
Easy Install on "Basic Boot"
Introduc
Read Me
License
Select D
Installat
Install
Finish U
Authenticate

Installer requires that you type your password.

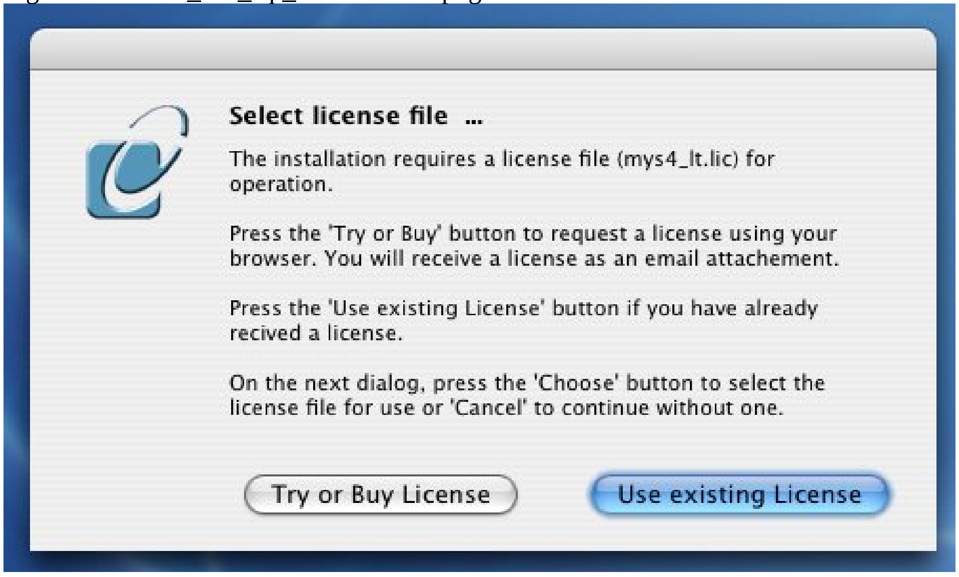
Name: eggplantx

Password: ••••••••••••••••

You will be shown a graphical progress bar as the Installation progresses, followed by System Optimization.

You will need to locate the license file.

Figure 5.155. lite_osx_sql_Selectlicense.png



Select license file ...

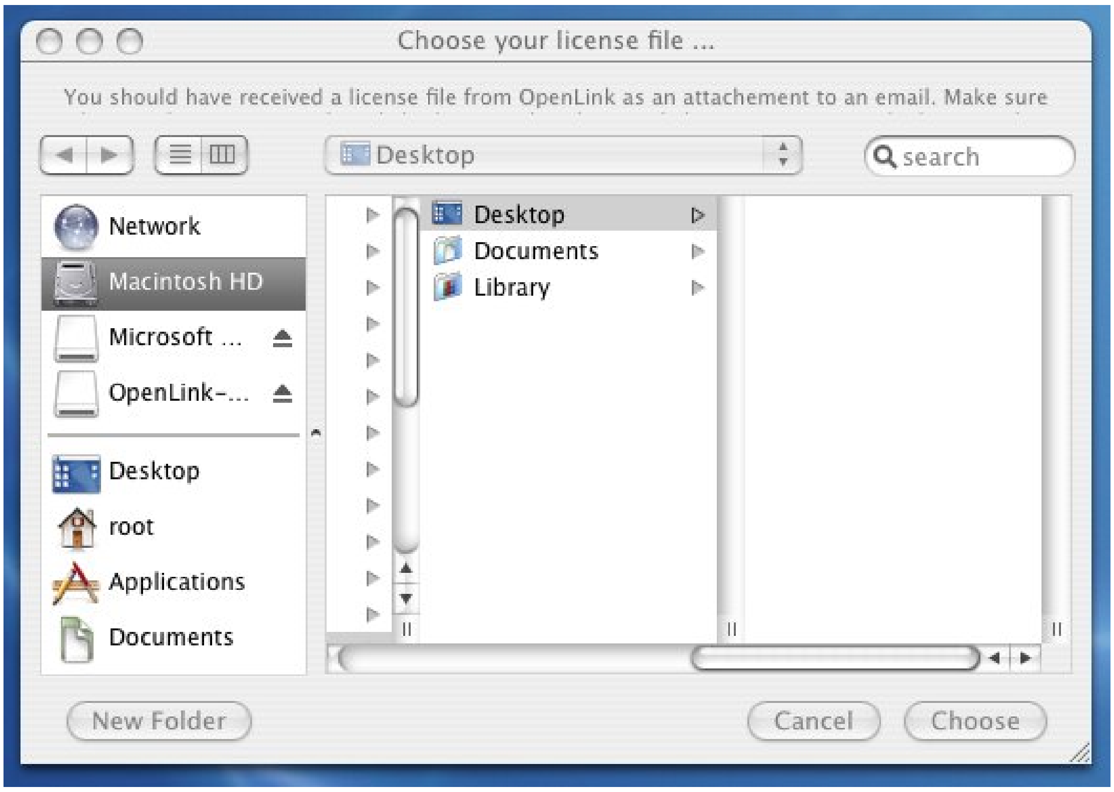
The installation requires a license file (mys4_lt.lic) for operation.

Press the 'Try or Buy' button to request a license using your browser. You will receive a license as an email attachement.

Press the 'Use existing License' button if you have already recived a license.

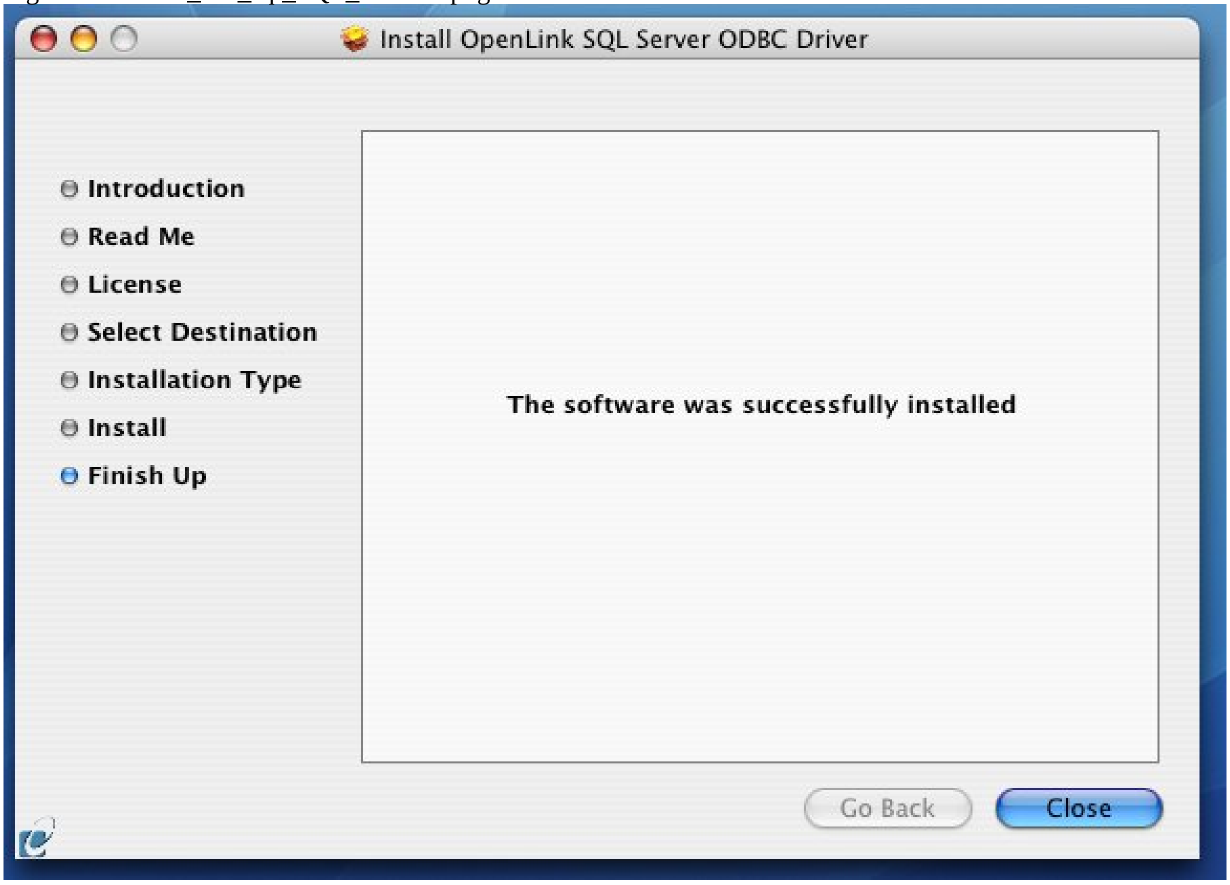
On the next dialog, press the 'Choose' button to select the license file for use or 'Cancel' to continue without one.

Figure 5.156. lite_osx_sql_Browselicense.png



When the process is complete, you will be told that the software was successfully installed. Click "Close" and your new database driver for ODBC is ready for use.

Figure 5.157. lite_osx_sql_SQL_Success.png

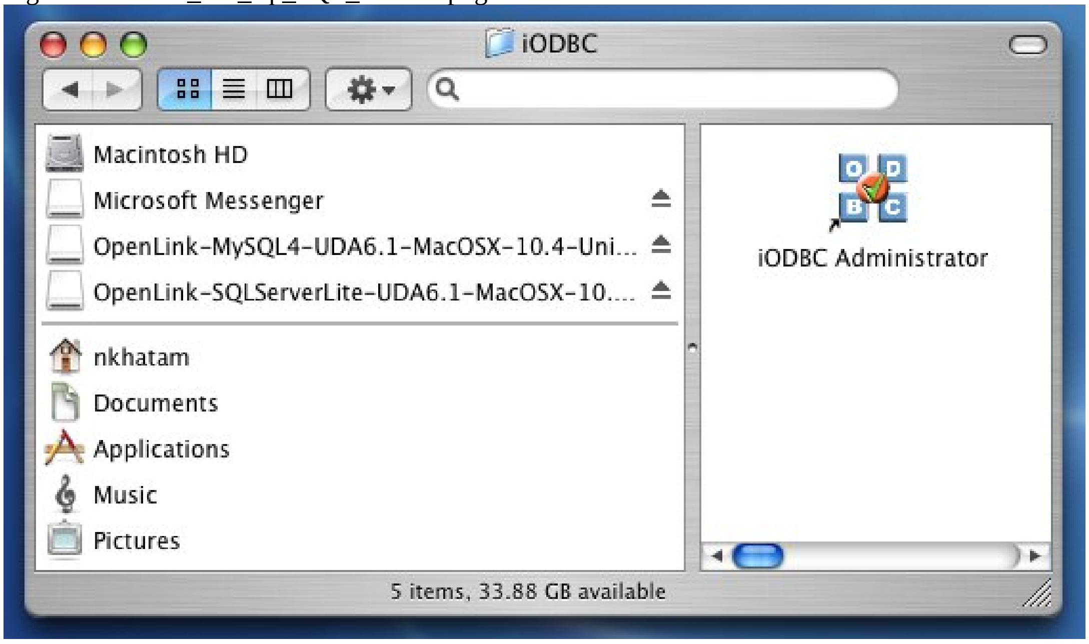


The software was successfully installed

7.3.6.2 Configuration

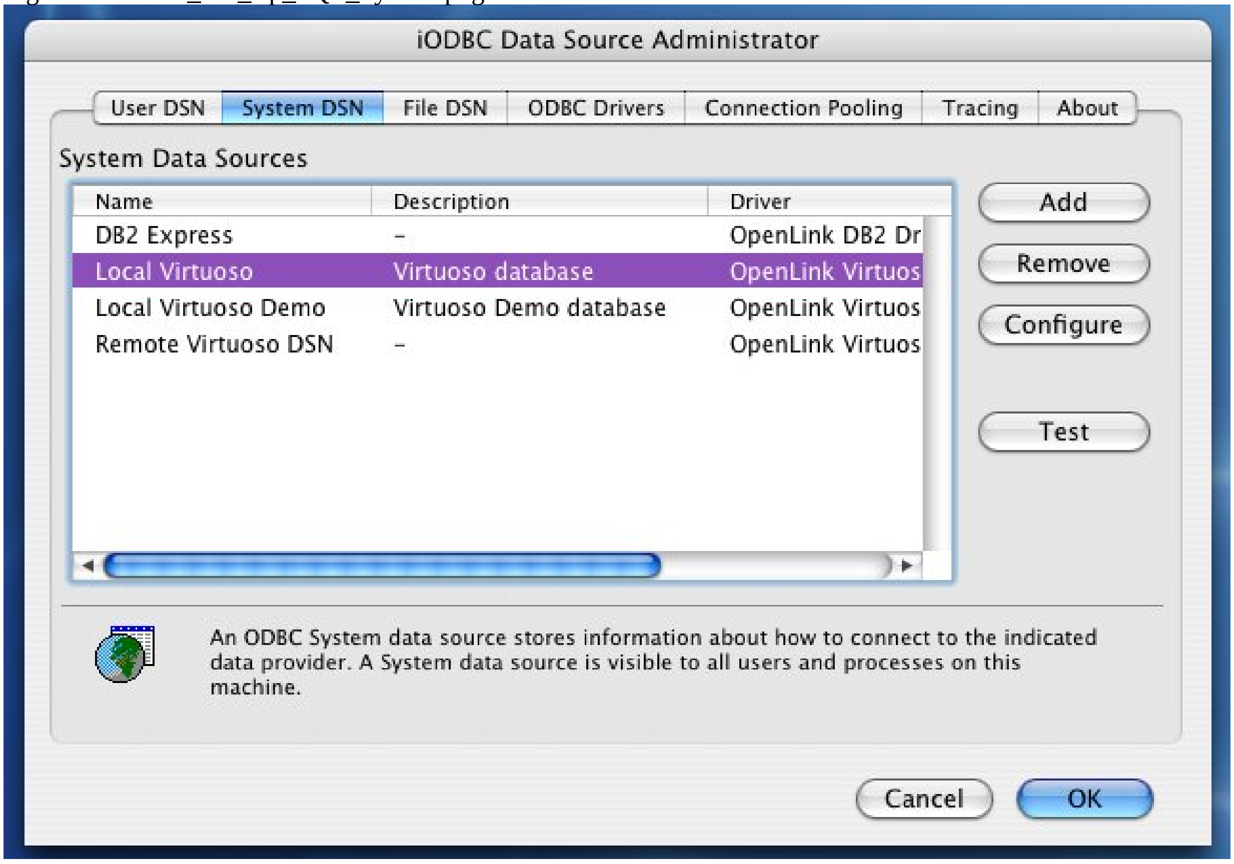
To configure an ODBC DSN, run theOpenLink iODBC Administrator located in the /Applications/iODBC folder:

Figure 5.158. lite_osx_sql_SQL_iODBC.png


iODBC
Macintosh HD
Microsoft Messenger
OpenLink-MySQL4-UDA6.1-MacOSX-10.4-Uni...
OpenLink-SQLServerLite-UDA6.1-MacOSX-10....
nkhatam
Documents
Applications
Music
Pictures
iODBC Administrator
5 items, 33.88 GB available

Click the System DSN tab:

Figure 5.159. lite_osx_sql_SQL_System.png

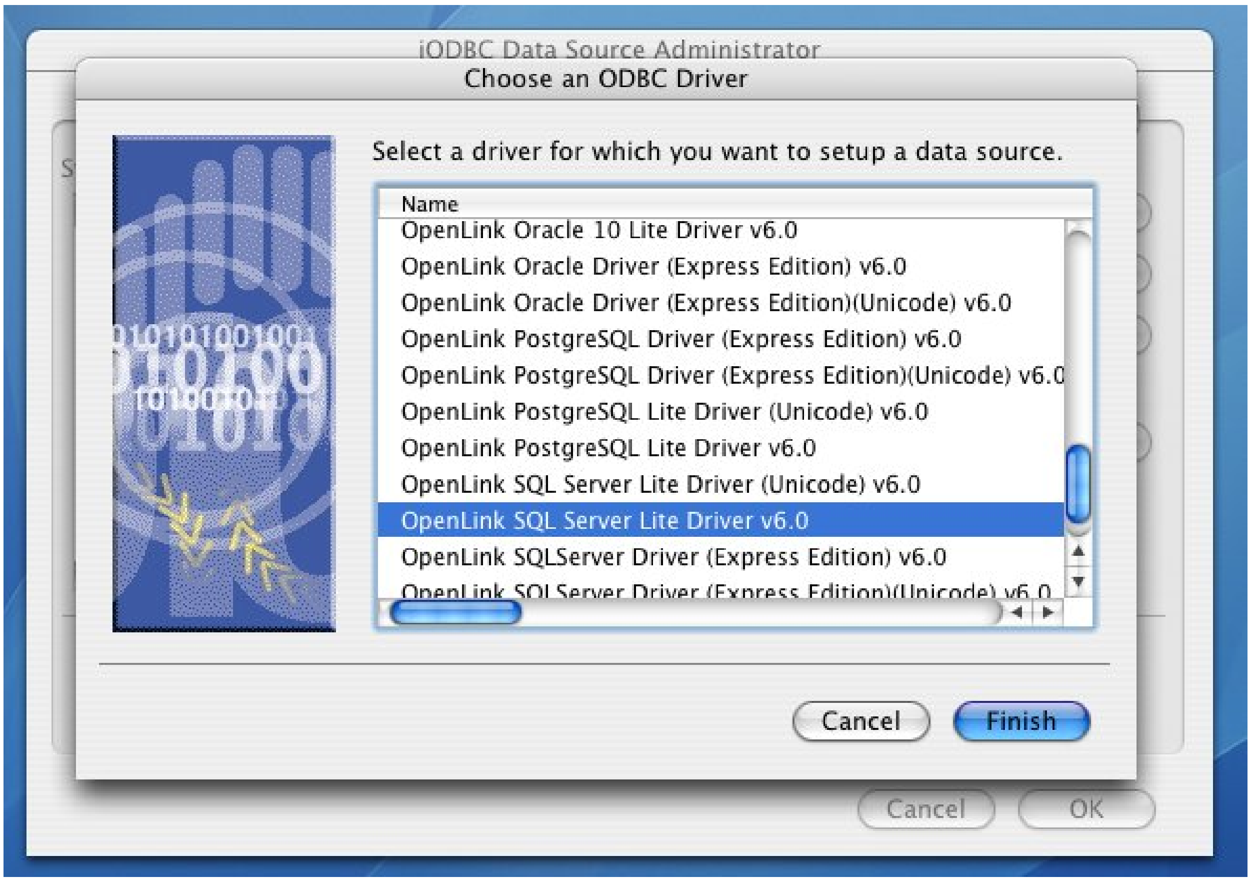


Name	Description	Driver
DB2 Express	-	OpenLink DB2 Dr
Local Virtuoso	Virtuoso database	OpenLink Virtuos
Local Virtuoso Demo	Virtuoso Demo database	OpenLink Virtuos
Remote Virtuoso DSN	-	OpenLink Virtuos

An ODBC System data source stores information about how to connect to the indicated data provider. A System data source is visible to all users and processes on this machine.

Click the Add button. Then, select theOpenLink SQL Server Lite Driver from the list of available drivers:

Figure 5.160. lite_osx_sql_SQL_Available.png



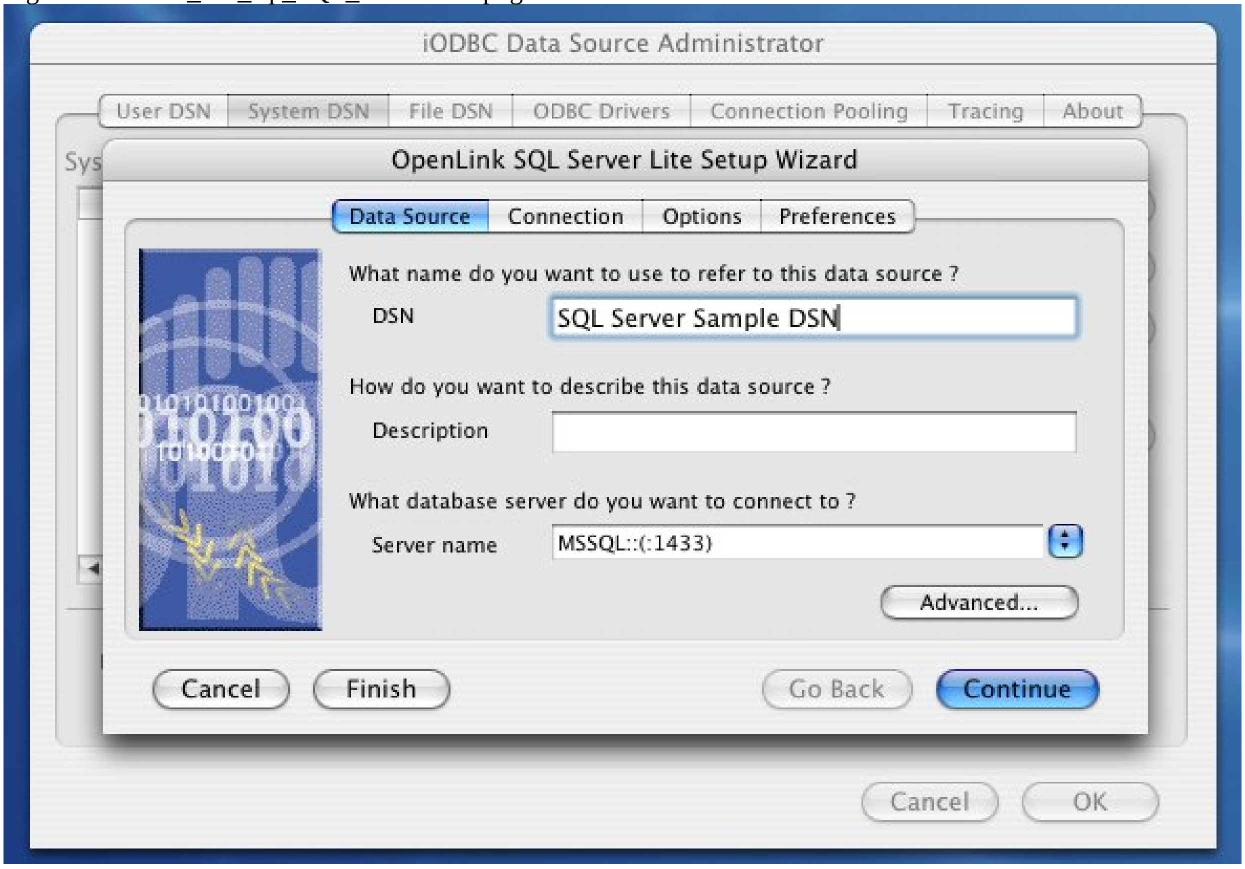
Select a driver for which you want to setup a data source.

Name
OpenLink Oracle 10 Lite Driver v6.0
OpenLink Oracle Driver (Express Edition) v6.0
OpenLink Oracle Driver (Express Edition)(Unicode) v6.0
OpenLink PostgreSQL Driver (Express Edition) v6.0
OpenLink PostgreSQL Driver (Express Edition)(Unicode) v6.0
OpenLink PostgreSQL Lite Driver (Unicode) v6.0
OpenLink PostgreSQL Lite Driver v6.0
OpenLink SQL Server Lite Driver (Unicode) v6.0
OpenLink SQL Server Lite Driver v6.0
OpenLink SQLServer Driver (Express Edition) v6.0
OpenLink SQL Server Driver (Express Edition)(Unicode) v6.0

Click Finish.

The Data Source tab prompts for a DSN name, description, and information that identifies the target SQL Server DBMS.

Figure 5.161. lite_osx_sql_SQL_DSNName.png



What name do you want to use to refer to this data source ?
DSN: SQL Server Sample DSN

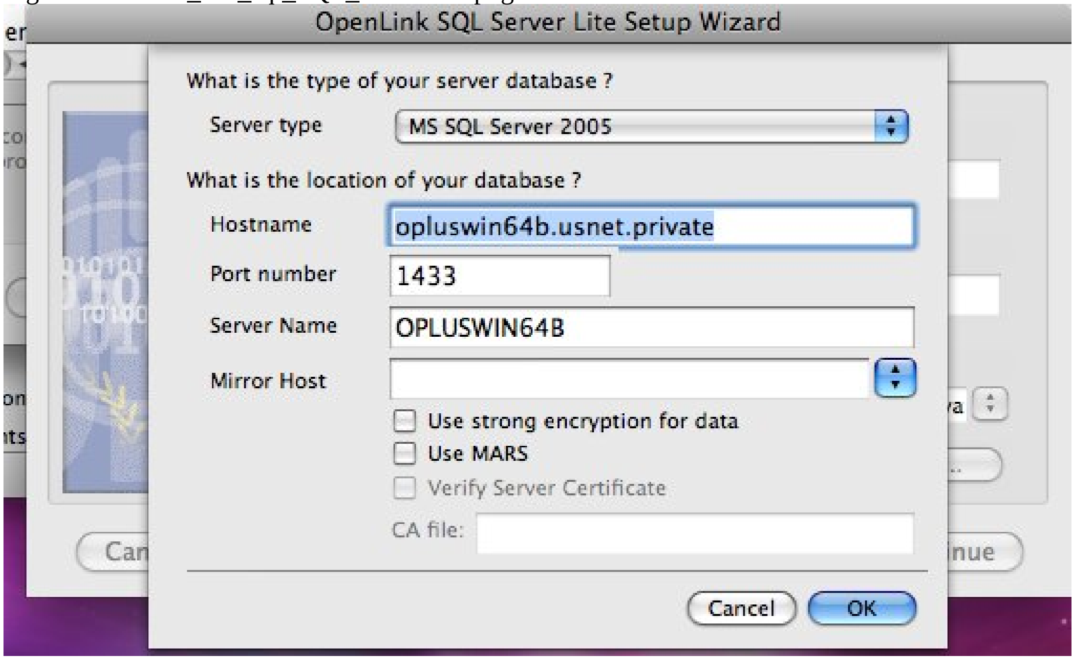
How do you want to describe this data source ?
Description:

What database server do you want to connect to ?
Server name: MSSQL::(:1433)

- *DSN* - A brief and meaningful title for your Data Source Name
- *Description* - An optional description for your Data Source Name
- *Server Name* - Select the drop down list box to invoke the driver's Dynamic discovery of SQL Server instances on the network and choose the desired instance.

Use the "Advanced" button to manually configure a connection if the SQL Server instance could not be dynamically located, as detailed below.

Figure 5.162. lite_osx_sql_SQL_Advanced.png



OpenLink SQL Server Lite Setup Wizard

What is the type of your server database ?

Server type: MS SQL Server 2005

What is the location of your database ?

Hostname: opluswin64b.usnet.private

Port number: 1433

Server Name: OPLUSWIN64B

Mirror Host:

☐ Use strong encryption for data

☐ Use MARS

☐ Verify Server Certificate

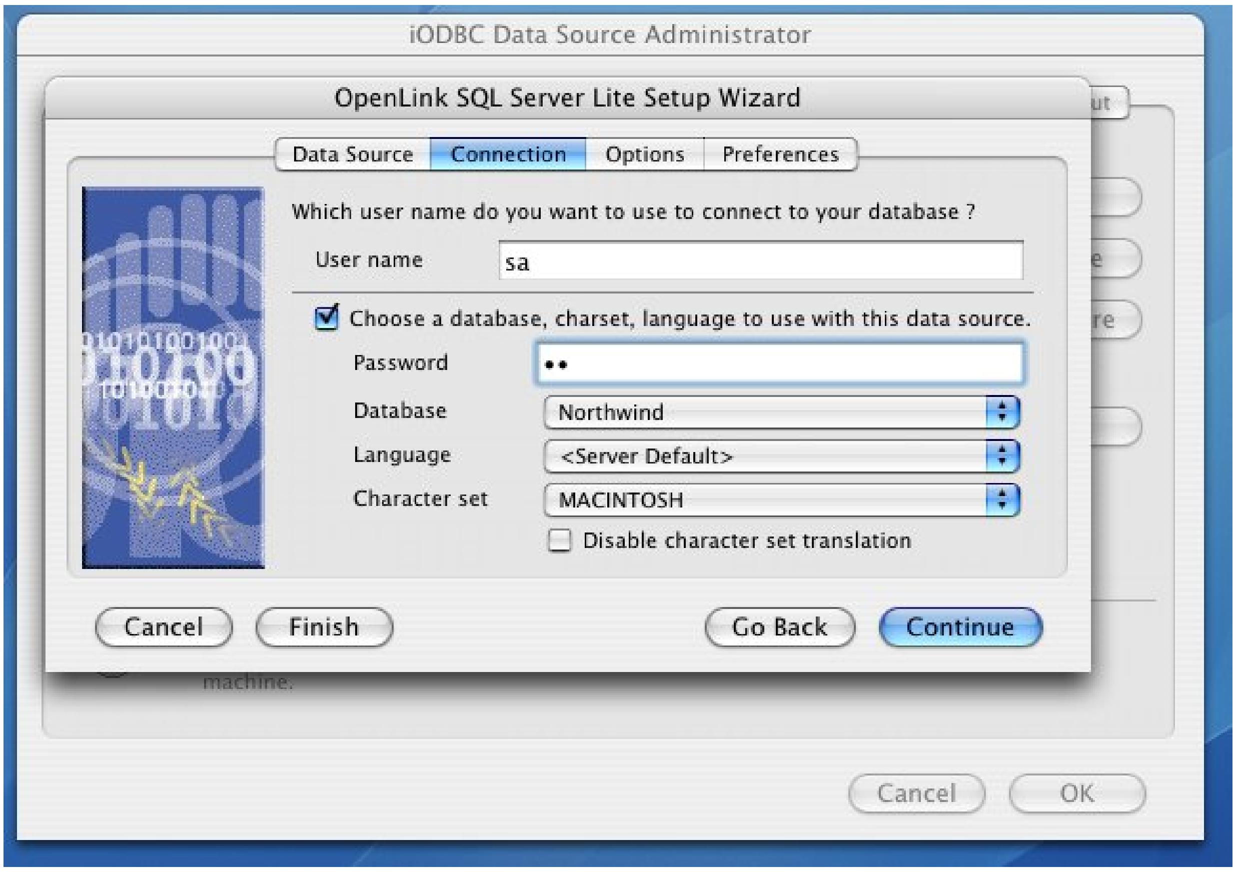
CA file:

- *Server Type* - An OpenLink proprietary parameter that associates the connection with a particular TDS version
- *Hostname* - The hostname or IP address on which SQL Server listens
- *Port number* - The TCP port on which SQL Server lists
- *Server Name* - SQL Server instance name on the specified host. A SQL Server instance can also be specified by appending "\InstanceName" to the ServerName, ie "ServerName\InstanceName".
- *Mirror Host* - The name of the Failover Server hosting the mirrored database if configured
- *Use strong encryption of data* - Enable SSL encryption of data between driver and database
- *Use Mars* - *Multiple Active Result Sets* enables the concurrent processing of multiple statements/queries and/or result sets on a single connection
- *Verify Server Certificate* - Verify the Database Server SSL certificate against the one specified in the "CA file" field
- *CA file* - Specify the location of a Valid SSL Certificate for use during the connection

Click OK to continue.

The Connection Tab takes a combination of required and optional parameters required to make a connection to the target database:

Figure 5.163. lite_osx_sql_SQL_ConnTab.png



Which user name do you want to use to connect to your database ?

User name: sa

☑ Choose a database, charset, language to use with this data source.

Password: ••

Database: Northwind

Language: <Server Default>

Character set: MACINTOSH

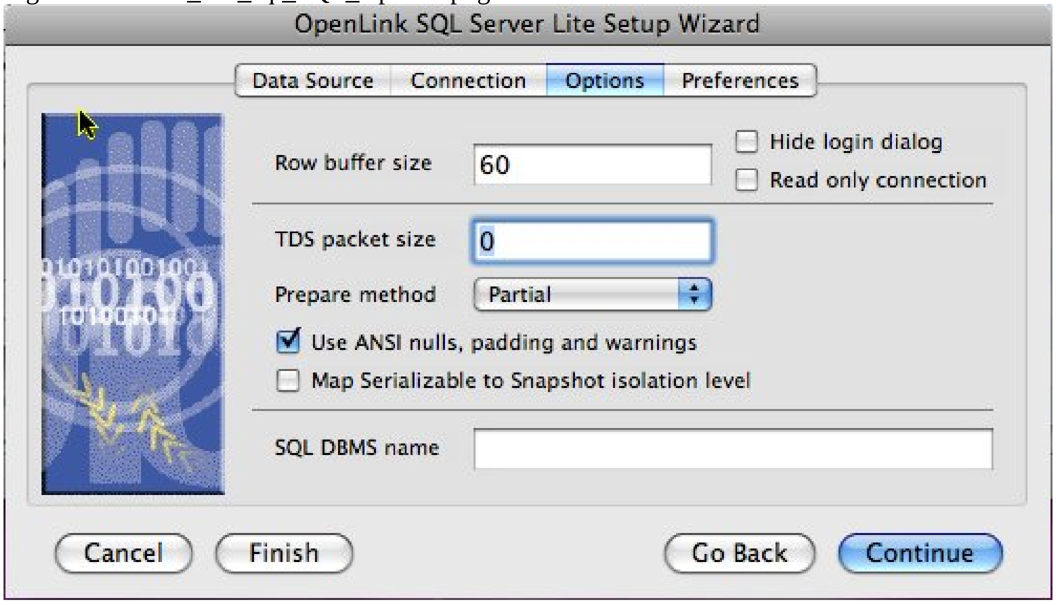
☐ Disable character set translation

- *User name* - A valid SQL Server user name
- *Choose a database, charset, language to use with the data source* -
- *Password* - A valid SQL Server password
- *Database* - The SQL Server database
- *Language* -
- *Character set* -
- *Disable character set translation* -

Click Continue.

The Options tab enables you to set some standard and SQL Server-specific parameters.

Figure 5.164. lite_osx_sql_SQL_Options.png



Row buffer size: 60

☐ Hide login dialog

☐ Read only connection

TDS packet size: 0

Prepare method: Partial

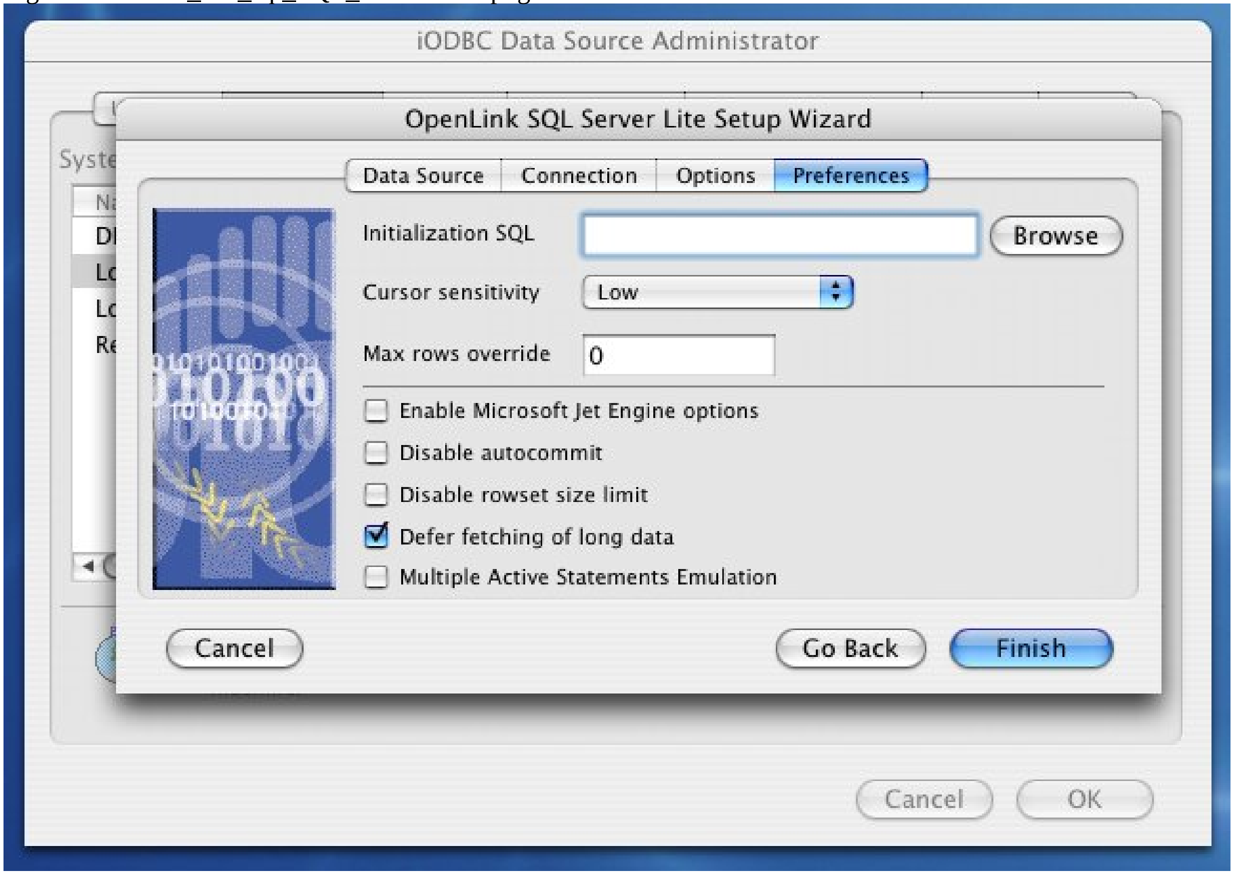
☑ Use ANSI nulls, padding and warnings

☐ Map Serializable to Snapshot isolation level

SQL DBMS name:

- *Row Buffer Size* - This attribute specifies the number of records to be transported over the network in a single network hop. Values can range from 1 to 99.
- *Hide Login Dialog* - Suppresses the ODBC "Username" and "Password" login dialog boxes when interacting with your ODBC DSN from within an ODBC compliant application.
- *Read Only connection* - Specifies whether the connection is "Read-only." Make sure the checkbox is unchecked to request a "Read/Write" connection.
- *TDS packet size* - A value that determines the number of bytes per network packet transferred from the database server to the client. The correct setting of this attribute can improve performance. When set to 0, the initial default, the driver uses the default packet size as specified in the Sybase server configuration. When set to -1, the driver computes the maximum allowable packet size on the first connect to the data source and saves the value in the system information. When set to x, an integer from 1 to 10, which indicates a multiple of 512 bytes (for example, Packet Size of 6 means to set the packet size to 6 * 512 equal 3072 bytes). For you to take advantage of this connection attribute, you must configure the System 10 server for a maximum network packet size greater than or equal to the value you specified for Packet Size.
- *Prepare Method* - This option is specific to the TDS Driver for MS & SQL Server SQLServers. It can take the values None, Partial Full (connectoptions -O [0, 1, 2] respectively). It is used to determine whether stored procedures are created on the server for calls to SQLPrepare.
- *No Quoted Identifiers* - This option indicates that the underlying driver does not support quoted identifiers, which is required for Jet engine based products like MS Access.
- *Use ANSI nulls, padding and warnings* - This option affects TDS agent & Lite Driver connections to MS SQLServer databases. SQL Server connectivity is not affected.
- *Map Serializable to Snapshot isolation level* - Enable Snapshot transaction isolation level in the driver. Snapshot Isolation is a new transaction isolation level available in SQL Server 2005
- *SQL_DBMS Name* - Manually overrides theSQLGetInfo(SQL_DBMS_NAME) response returned by the driver. This is required for products like MicrosoftInfoPath for which the return the value should be "SQL Server".

Click Continue to view additional preferences that can be set for the connection.

Figure 5.165. lite_osx_sql_SQL_Preferences.png


Initialization SQL
Cursor sensitivity: Low
Max rows override: 0
☐ Enable Microsoft Jet Engine options
☐ Disable autocommit
☐ Disable rowset size limit
☑ Defer fetching of long data
☐ Multiple Active Statements Emulation

- *Initialization SQL* - Lets you specify a file containing SQL statements that will be run automatically against the database upon connection.
- *Cursor Sensitivity* - Enables or disables the row version cache used with dynamic cursors. When dynamic cursor sensitivity is set high, the Cursor Library calculates checksums for each row in the current rowset and compares these with the checksums (if any) already stored in the row version cache for the same rows when fetched previously. If the checksums differ for a row, the row has been updated since it was last fetched and the row status flag is set to SQL_ROW_UPDATED. The row version cache is then updated with the latest checksums for the rowset. From the user's point of view, the only visible difference between the two sensitivity settings is that a row status flag can never be set to SQL_ROW_UPDATED when the cursor sensitivity is low. (The row status is instead displayed as SQL_ROW_SUCCESS.) In all other respects, performance aside, the two settings are the same. Deleted rows don't appear in the rowset. Updates to the row since the row was last fetched are reflected in the row data, and inserted rows appear in the rowset, if their keys fall within the span of the rowset. If your application does not need to detect the row status SQL_ROW_UPDATED, you should leave the 'High Cursor Sensitivity' checkbox unchecked, as performance is improved. The calculation and comparison of checksums for each row fetched carries an overhead. If this option is enabled, the table oplrvc must have been created beforehand using the appropriate script for the target database.
- *MaxRows Override* - Allows you to define a limit on the maximum number of rows to be returned from a query. The default value of 0 means no limit
- *Enable Microsoft Jet Engine options* -
- *Disable rowset size limit* - Removes OpenLink's default 100-row rowset restriction
- *Defer fetching of long data* - Defers fetching of LONG (BINARY, BLOB etc.) data unless explicitly requested in a query. This provides significant performance increases when fields in query do not include LONG data fields.
- *Multiple Active Statements Emulation* -

Click the Finish button to save your new Data Source Name.

7.3.7 Virtuoso

7.3.7.1 DSN tab

Figure 5.166. Virtuoso DSN tab

7.3.7.2 Identity tab

Figure 5.167. Virtuoso Identity tab

- Adjust Clock. When selected the ???? will ??? for daylight saving changes. This is so that ???.
- Choose a Database. If selected the pick options for the Database name and Character set are accessed from the datasource.
- Password. This field is enabled if the above field is checked. Password is used to make a connection to the datasource to obtain the choices for subsequent fields.
- Database. The name of the Virtuoso database that is to be accessed by the data source. This is a dynamically generated menu, showing only those databases actually available on the data source when the DSN is configured. If you need to manually specify this information, you may edit the appropriate ODBC.preference text file. Please contact OpenLink Technical Support, for assistance.
- Character Set. The name of an installed character set on the Virtuoso server. The default is the setting active on the Virtuoso Server. This is a dynamically generated menu, showing only those databases actually available on the data source when the DSN is configured. If you need to manually specify this information, you may edit the appropriate ODBC.preference text file. Please contact OpenLink Technical Support, for assistance.

7.3.7.3 Security tab

Figure 5.168. Virtuoso Security tab

- Encrypted. Enable encryption.
- PKCS#12 file. Name of certificate file to be used.

7.3.8 Testing the ODBC Data Source

Once an ODBC Data Source has been configured, you can test it by highlighting the desired DSN and clicking the Test button, on the User DSN or System DSN tabs of the OpenLink ODBC Administrator. This will present you with the following multi-tab dialog box, with the opportunity to override any of the DSN parameters on the fly.

Figure 5.169. OpenLink ODBC Administrator

Figure 5.170. SQL Server Single-Tier DSN Connection Test, Identity tab

Figure 5.171. SQL Server Single-Tier DSN Connection Test, Connection tab

Figure 5.172. SQL Server Single-Tier DSN Connection Test, Preferences tab

Figure 5.173. SQL Server Single-Tier DSN Connection Test, About tab

When all parameters are as desired, click Connect, and a successful test will bring the following message:

Figure 5.174. DSN Connection Test Results

Unsuccessful test connections may present any of a number of error messages. To resolve those errors, please refer to the troubleshooting section of this manual.

For more thorough testing, you can use odbctest, a sample application installed along with the OpenLink Lite Driver. odbctest is a simple command-line, ODBC compliant, Interactive SQL client.

It may be accessed through the Terminal application, by issuing the command

```
        /Library/iodbc/bin/odbctest
```

At the SQL command prompt enter "?" for a list of ODBC DSNs on your machine, or enter a valid ODBC Connect String (e.g., with the DSN created above, named "DEMO", you would enter:

```
        DSN=DEMO;UID=<Username>;PWD=<Password>
```

).

From here, any valid SQL Statement may be executed. Generally, you will need to know a valid table name within the database to be able to retrieve information from it. Within odbctest, the command 'tables' will return a list of all tables accessible through your active connection.

If the query executes successfully you will see a table of the data returned by the query; if unsuccessful, you will see the entire error message returned from the backend DBMS.

7.4 ODBC to Jet Data Type Mapping

7.4.1 Overview

When linking to a remote table, Microsoft Jet calls the ODBC SQLColumns function to gather information on the fields in the table. The information returned by SQLColumns determines how the data type of each field will be mapped to a Microsoft Jet data type.

Jet uses the *fSqlType*, *lPrecision*, and *wScale* values to determine an appropriate local data type, on a field-by-field basis, and uses that data type to represent the remote data in a linked table. Each time Microsoft Jet executes an action or parameter query against the remote data source, the information stored in the linked table is used to ensure that ODBC calls are made with a valid ODBC data type.

The Jet Engine's mapping of the ODBC SQL_DECIMAL and SQL_NUMERIC types is detailed below. The mapping of these column types is problematic when the precision of a column is greater than 15. Under these circumstances Jet maps the column to the Jet Text type. This is done so as not to lose precision, since the maximum precision of the Jet numeric types is 15. An unfortunate consequence of mapping to the Text type is that the data is no longer recognised as being numeric.

To overcome this limitation, the Jetfix switch (+jetfix) changes the ODBC type returned by SQLColumns for native database column types which would normally be reported as SQL_DECIMAL or SQL_NUMERIC. These might, for example, be MONEY, DECIMAL or NUMERIC columns in the remote table. With Jetfix enabled, these columns are typically reported as SQL_DOUBLE; which Jet always maps to Number (Double). As a result, Jet recognises the data as numeric, albeit with a possible loss of precision, depending on the actual data values.

7.4.2 ODBC to Jet Data Type Mapping

Table 5.6. ODBC to Jet Data Type Mapping performed by Jet Engine

ODBC Data Type			**Jet Data Type**	**Notes**
Type	**Precision p**	**Scale s**		
SQL_DECIMAL SQL_NUMERIC	p <= 4	s = 0	Number (Integer)	
	p <= 9	s = 0	Number (Long Integer)	
	p <= 15	0 <= s <=4	Number (Double)	
	p <= 15?	s > 4	Number (Double)	"ODBC to Jet Data Type Mapping" document unclear here.
	p = 19	s = 4	Currency	MS SQL Server only
	p = 10	s = 4	Currency	MS SQL Server only
	p > 15	s irrelevant	Text	Not documented. Based on testing.

The Jet Data Type is a property setting available in the table Design view.

7.4.3 Jet Data Type Ranges

Table 5.7. Jet Data Type Ranges

Jet Data Type	**Range**
Integer	32,768 32,767
Long Integer	2,147,483,648 2,147,483,647
Double	-1.8E+308 -1.8E-308, 1.8E-308 1.8E+308
Currency	922,337,203,685,477.5808 922,337,203,685,477.5807

7.4.4 References

See the following articles from Microsoft:

- Knowledge base article KB214854, "Improved ODBC DataType Mappings with Jet 4.0" on the Microsoft Support Website .
- See Chapter 9 "Developing Client/Server Application" of Microsoft Jet Database Engine Programmer's Guide, Second Edition. Redmond, WA: Microsoft Press, 1997.

7.4.5 Informix Jet Support

7.4.5.1 Informix Jetfix Testing

To verify the effect of the +jetfix switch, two tables were created and then linked to from Access, once with +jetfix enabled, and once with +jetfix disabled. The first table contained five MONEY columns of various precisions and scales. The second table was identical except that it used DECIMAL instead of MONEY columns. The resulting Jet data type mappings as shown in the 'Table Design' view are detailed below:

Table 5.8. Informix ODBC to Jet Data Type Mapping

Informix table definition:	**Jet Type Mappings**

Informix Table definition: Jet Type Mappings

create table CBTEST (<column defs>)	**Jetfix off**	**Jetfix on**
col1 {MONEY| DECIMAL} (14, 4)	Number (Double)	Number (Double)
col2 {MONEY| DECIMAL} (14, 5)	Number (Double)	Number (Double)
col3 {MONEY| DECIMAL} (16, 0)	Text	Number (Double)
col4 {MONEY| DECIMAL} (16, 4)	Text	Number (Double)
col5 {MONEY| DECIMAL} (16, 5)	Text	Number (Double)

7.4.5.2 OpenLink Informix Agent   Numeric Data type Mappings

The following table details how the Informix agent fetches numeric data from Informix. The SQL type reported for a SELECT column varies depending on the native Informix type of the column, and its precision and scale. The OpenLink C type used to fetch the data is also shown, together with the effect of the JetFix command line switch.

Changes to the type mappings required to implement the +jetfix option are shown in

```
italics
```

.

Table 5.9. Informix Agent   Numeric Data type Mappings

Informix Type	**Scale (s)**	Decimal Precision (p) Range (r)	**JetFix**	**SQL Type**	OpenLink Fetch Type CTYPE_xxx
FLOAT [(n)] {1} Synonyms: DOUBLE PRECISION	NA	p <= 16 r = 1.7E 308 (15 digits precision)	NA	SQL_DOUBLE	FLT64
DECIMAL DECIMAL (p) DECIMAL (p,s) Synonyms: NUMERIC	 NA NA	p = 16 p <= 32 p <= 32 r = 1E+124 1E-130 ..	OFF ON	SQL_DECIMAL SQL_DOUBLE	VCHR FLT64 {2}
INTEGER Synonymns: INT	s = 0	p <= 9 r = -2,147,483,648 to +2,147,483,647	NA	SQL_INTEGER	SGN32
MONEY MONEY(p) MONEY (p,s)	 s = 2 s = 2	p = 16 p <= 32 p <=32 r = 1E(p-s) - 1E(-s)	OFF ON	SQL_DECIMAL SQL_DOUBLE	VCHR FLT64 {2}
SMALLFLOAT Synonyms: REAL	NA	r = 3.4E38	NA	SQL_REAL	FLT32
SMALLINT	s = 0	p = 5	NA	SQL_SMALLINT	SGN16

Informix Type	**Scale (s)**	Decimal Precision (p) Range (r)	**JetFix**	**SQL Type**	OpenLink Fetch Type CTYPE_xxx
		r = -32,768 to +32,767			

- {1} Informix SQL ignores the specified float precision.
- {2} Possible loss of precision.

7.4.5.3 Precision of OpenLink C Types

The choice of OpenLink C type used to fetch a numeric value is determined by the maximum precision supported by the type. If a numeric type exists which can represent the data to be fetched, without loss of precision, then this is used as the preferred fetch type. If a numeric type capable of supporting the required precision does not exist, then the data is fetched in character form, unless the JetFix switch is on. In this case, the data is fetched using the CTYPE_FLT64 fetch type. This type has sufficient range to store the maximum numeric values supported by Informix, but its use may result in a loss of precision, if the precision of the data to be fetched exceeds 15 decimal digits.

Table 5.10. Precision of OpenLink C Types

OpenLink C Type CTYPE_xxx	**Equivalent built in C type (32bit processor)**	**Range**	**Can hold all numbers of precision <= p decimal digits**
SGN8	signed char	-128 127	p = 2
SGN16	short	-32768 32767	p = 4
FLT32	float	3.4E38 (6 digits precision)	p = 6
SGN32	long	-2,147,483,648 2,147,483,647	p = 9
FLT64	double	1.7 E 308 (15 digits precision)	p = 15

7.4.6 Oracle Jet Support

7.4.6.1 OpenLink Oracle Agent   Numeric Data type Mappings

The following table details how the Oracle agent fetches numeric data from Oracle. The SQL type reported for a SELECT column varies depending on the native Oracle type of the column, and its precision and scale. The OpenLink C type used to fetch the data is also shown, together with the effect of the JetFix command line switch.

Changes to the type mappings are shown in the table as

```
italics
```

.

Table 5.11. Informix ODBC to Jet Data Type Mapping

Oracle Type	**Scale (s)**	**Decimal Precision (p)**	**JetFix**	**SQL Type**	**OpenLink Fetch Type CTYPE_xxx**
FLOAT (b)	NA	p <= 15 (b <= 50) {1}	NA	SQL_DOUBLE	FLT64
		15 < p < 38 (50 < b < 126)	ON	SQL_DOUBLE	FLT64 {2}
			OFF	SQL_DECIMAL	VCHR16
FLOAT {3} , NUMBER {4}	NA	p = 38	ON	SQL_DOUBLE	FLT64 {2}
			OFF	SQL_DECIMAL	VCHR16
NUMBER (p,s)	s <> 0	p <= 15	ON	SQL_DOUBLE	FLT64
			OFF	SQL_DECIMAL	VCHR16
		p > 15	ON	SQL_DECIMAL	VCHR16

Oracle Type	Scale (s)	Decimal Precision (p)	JetFix	SQL Type	OpenLink Fetch Type CTYPE_xxx
				SQL_DOUBLE	FLT64 {2}?
			OFF	SQL_DECIMAL	VCHR16
Calculated field	s = 0	p = 0 {5}	ON	SQL_DOUBLE	FLT64
			OFF	SQL_DECIMAL	VCHR16
		0 < p <= 2	NA	SQL_TINYINT	SGN8
		2 < p <= 4	NA	SQL_SMALLINT	SGN16
		4 < p <= 9	NA	SQL_INTEGER	SGN32
					VCHR16
NUMBER (p)	s = 0	9 < p <= 15	ON	SQL_DOUBLE	FLT64
				SQL_DOUBLE	
			OFF	SQL_DECIMAL	VCHR16
		15 < p <= 38 {6}	ON	SQL_DOUBLE	FLT64{2}
			OFF	SQL_DECIMAL	VCHR16

{Notes}:

- FLOAT(b) specifies a floating point number with binary precision b. The precision can range from 1 to 126. To convert from binary to decimal precision, multiply b by 0.30103.
- Possible loss of precision
- FLOAT specifies a floating point number with decimal precision 38, or a binary precision of 126.
- NUMBER specifies a floating point number with decimal precision = 38.
- Oracle appears to return s=0, p=0 for a calculated field
- Oracle permits a maximum precision of 38.

7.4.6.2 Precision of OpenLink C Types

The choice of OpenLink C type used to fetch a numeric value is determined by the maximum precision supported by the type. If a numeric type exists which can represent the data to be fetched, without loss of precision, then this is used as the preferred fetch type. If a numeric type capable of supporting the required precision does not exist, then the data is fetched in character form, unless the JetFix switch is on. In this case, the data is fetched using the CTYPE_FLT64 fetch type. This type has sufficient range to store the maximum numeric values supported by Oracle, but its use may result in a loss of precision, if the precision of the data to be fetched exceeds 15 decimal digits.

Table 5.12. Precision of OpenLink Oracle C Types

OpenLink C Type CTYPE_xxx	Equivalent built in C type (32 bit processor)	Range	Can hold all numbers of precision <= p decimal digits
SGN8	signed char	-128 127	p = 2
SGN16	short	-32768 32767	p = 4
SGN32	long	-2,147,483,648 2,147,483,647	p = 9
FLT64	double	1.7 E 308 (15 digits precision)	p = 15

7.5 New Features

- Unicode Driver support. OpenLink Lite Drivers support the latest releases of all supported database engines this includes:

    1. Oracle 8i & 9i
    2. Microsoft SQL Server 2000
    3. DB/2 v7
    4. ODBC Bridge

5. Informix 9
6. Sybase Adaptive Server 12.5
7. Progress 9 (SQL-92)

- Significant SQL Server and SYBASE Driver Enhancements. Our Drivers are now built to communicate directly with Microsoft SQL Server and SYBASE ASE using the TDS protocol (the native wire protocol for both database servers). This also implies that no additional software is required post installation in order for our ODBC Drivers to communicate with these Drivers (this applies to the Single Tier format Drivers only). The use of TDS has also enabled us to double the performance of both our Single Tier and Multi-Tier Drivers for these databases.
- Array Optimizations on Select Queries. All drivers now support the SQLSetStmtAttr(SQL_ARRAY_SIZE) call for batch select statements, providing improved performance when re-execute select statements with bound parameters.
- Deferred Fetching. The Release 4 OpenLink driver family brings marked communications layer improvements. Central to these are improved implementation of the `SQLGetData` and `SQLPutData` ODBC function calls.

  Wholesale vs. Piecemeal Data Transfer. In previous releases of the drivers, parameter data at query execution was assembled in the OpenLink driver's client component and transferred to its server component in a single network hop. (The client and server components apply to both the Single- and Multi-Tier drivers; they refer to different layers within the driver entity.) Similarly, when fetching from a "long", or large binary data column, data was transferred from the driver's server component to the client component in a single network transfer. The only way data could manipulated in a piecemeal fashion, was within the ODBC application from the driver's client component (client side only).

  The Release 4 driver family now allow transferring parameter data in parts over the network between the client and server driver components. Once transferred, the fragmented column data are re-pieced together in their entirety within the client and server portions of the driver.

  Deferred Fetching. When fetching, data from columns with "long" data are only transferred between the server and client components if one of the following applies to that column:

  It has been "bound" by the application via the SQLBindCol API call

  It has been retrieved via the SQLGetData API call

  This mechanism is referred to as deferred fetching. In this method, as "long" column data is not reassembled within the OpenLink ODBC client itself (rather, within the application), driver memory overhead incurred is dramatically reduced. Deferred fetching applies to the following "long" database column types:

  ODBC agent

  SQL_LONGVARCHAR

  SQL_LONGVARBINARY

  DB/2 driver

  SQL_BLOB

  SQL_CLOB

  SQL_DBCLOB

  If the long data compatibility option has been specified in the DB2 database

  SQL_LONGVARCHAR

  SQL_LONGVARBINARY

  SQL_LONGVARGRAPHIC

  Oracle driver

  SQLT_BLOB

  SQLT_CLOB

  Sybase driver

  CS_IMAGE_TYPE

CS_TEXT_TYPE

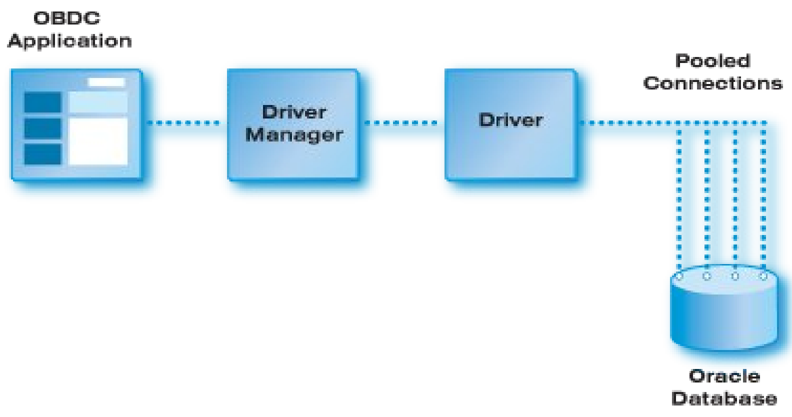
However, if a table contains a column defined as one of these "long" types, but the actual data stored in the column only fills a small proportion of the available space, deferred fetching is of no benefit. In these cases, performance may be improved by switching off the deferred fetching mechanism using the control in the OpenLink Generic Client data source setup dialog.

7.6 Oracle Connection Pooling Support

7.6.1 What it is

Oracle Connection-Pooling gives you the ability to retain a pool of open connections to the database within the ODBC Driver, thereby avoiding costly connection-establishment overhead for every connection from the client. Being implemented in the ODBC Driver means you do not have to rely on the Driver Manager component implementing connection-pooling for you, and have finer control over how it behaves too.

Figure 5.175. orapooling.png



7.6.2 Benefits

OCI separates the concept of database sessions (user logins) from physical connections (server attachments). By pooling connections, it is possible for an application to multiplex several sessions over fewer physical connections. Because the number of physical connections is less than the number of database sessions in use by the application and because the shared pool of physical connections typically has a corresponding back-end server pool containing an identical number of dedicated server processes; the number of back-end server processes is also reduced by connection pooling. Thus many more database sessions can be multiplexed. If the number of back-end server processes may cause scaling problems on the database, OCI connection pooling can be of benefit.

Client-side connection pooling by the driver manager may be done on a per-process basis. For instance, on Unix each application gets its own driver-manager instance in its process. In contrast, in a multi-threaded OpenLink agent with connection re-use enabled, an agent connection pool can span different client processes. Cross-client connection pooling may be preferable to client-side connection pooling in certain application domains and may offer better scalability. For instance, if the agent is used by an application server or web server.

7.6.3 How it Works

If OCI connection pooling is enabled, a separate connection pool is created for each Oracle instance connected to. All connections specifying the same server instance (i.e. the same TNS service name) share the same connection pool. The connection pool is reference counted and only destroyed when the last Lite/agent connection using it is closed down.

Each agent connection holds a reference to an OCI connection pool record or OCPR. The OCPR contains a handle to the OCI connection pool associated with the Oracle instance connected to. The agent maintains a hash table of OCPRs, keyed by instance name. Each OCPR is reference counted. The reference count for an OCPR is incremented each time an agent uses the connection pool to connect to the associated Oracle instance, and decremented when the agent connection is closed. The OCPR is destroyed, and the connection pool closed, when the last agent connection using it is closed.

When an agent is about to establish a connection to an Oracle instance, it searches for an OCPR for the instance. If one exists, a connection pool for that instance already exists. The agent requests an OCI connection from this pool and increments the reference count of the OCPR. If one doesn't exist, the agent creates an OCI connection pool for the instance by registering a new OCPR.

Note: different ODBC DSNs, using this driver and the same server instance, may specify different pool settings (max pool size, min pool size etc.) The settings of the first DSN to connect fixes the characteristics of the pool.

The maximum number of connection pools supported by an Oracle agent or Lite driver is 100. Each connection pool allows up to 500 connections, depending on the value set in the environment variable OCI_CONNPOOL_MAX or the Lite driver setup dialog. The maximum linger time is 300 seconds.

7.6.4 The OpenLink Perspective: what you do to use it

When an OCI connection pool is created, it is characterised by several parameters:

- the minimum number of connections to be opened when the pool is created;
- the maximum number of connections that can be opened in the pool;
    - When the maximum number of connections are open in the pool, and all the connections are busy, if a call needs a connection, it will wait until it gets one if connWait is TRUE, if FALSE an error is returned.
- the incremental number of connections to be opened when all the connections are busy and a call needs a connection.
    - This increment is used only when the total number of open connections is less than the maximum number of connections that can be opened in that pool.
- whether, when all connections in the pool are found to be busy and the number of connections has already reached the maximum, to wait for a connection or report an error.
- how long the last connection in the pool should linger before the pool is destroyed (this option is available for the single-tier WIN32 drivers only)

7.6.5

7.6.5.1 Unix / Linux

OpenLink Single-Tier (Lite) Drivers require the following environment variables to be set in the connecting process (shell or ODBC application):

- OCI_CONNPOOL_MIN - if not set defaults to 0
- OCI_CONNPOOL_INCR - if not set defaults to 1
- OCI_CONNPOOL_MAX - if not set defaults to OCI_CONNPOOL_MIN + OCI_CONNPOOL_INCR
- OCI_CONNPOOL_WAIT - if not set defaults to TRUE
- OCI_CONNPOOL_LINGER - if not set defaults to 0 seconds

OCI connection pooling is disabled by setting a minimum connection pool size of 0.

7.6.5.2 Windows

On Windows, when using the OpenLink Lite Driver for Oracle, the parameters can be configured using the Lite driver's setup dialog:

- OCI_CONNPOOL_MIN - if not set defaults to 0
- OCI_CONNPOOL_INCR - if not set defaults to 1
- OCI_CONNPOOL_MAX - if not set defaults to OCI_CONNPOOL_MIN + OCI_CONNPOOL_INCR

- OCI_CONNPOOL_WAIT - if not set defaults to TRUE
- OCI_CONNPOOL_LINGER - if not set defaults to 0 seconds

7.6.5.3 Linger Time

This option is currently only available for WIN32 single-tier Oracle drivers

Normally, when connection-pooling is enabled for an Oracle instance, the pool is destroyed when the last connection in use is closed. The next connection to the Oracle instance recreates the pool. Depending on the minimum size of the pool, the time taken to create it can be significant. If your application is designed in such a way that the connection usage count could regularly fall to zero (e.g. in a webserver environment), the overhead of the pool creation time could negate the benefits of pooling. The 'linger time' option can help alleviate this problem, at the cost of introducing a disconnection delay for the last pooled connection in use. The linger time should be set no longer than the pool creation time and no longer than the maximum disconnection time acceptable for the application.

8 Chapter 6. OpenLink ADO.NET Data Providers

Abstract
ADO.NET is the new feature-rich, data access Model used within the Microsoft.NET framework. It supports the data access requirements of the loosely coupled, multi-tier Web and Web services based applications of today. ADO.NET relies on the services of .NET Data Providers. These provide access to the underlying data source through four key objects: `Connection`, `Command`, `DataReader`, and `DataAdapter`.

The OpenLink .Net Data Providers are available as a suite of Managed and Unmanaged Data Providers providing a natural extension of our Universal Data Access Driver Suite. Thus providing .Net connectivity to the full range of Databases support in our Universal Data Access Driver suite. Two generic .Net Data Providers are available each exposing a common namespace/interface for accessing remote data sources as explained in the component architecture section below.

Table of Contents

8.1 Architecture

From the outset one of the main design goals of the .Net Data Provider was to implement a generic client layer enabling the re-use of our existing data access components for connecting to remote data sources. This has been achieved with both our Managed and Unmanaged .Net Data Providers, each of which have a common namespace that eliminates the need to recompile applications should the need arise to change the remote data source.

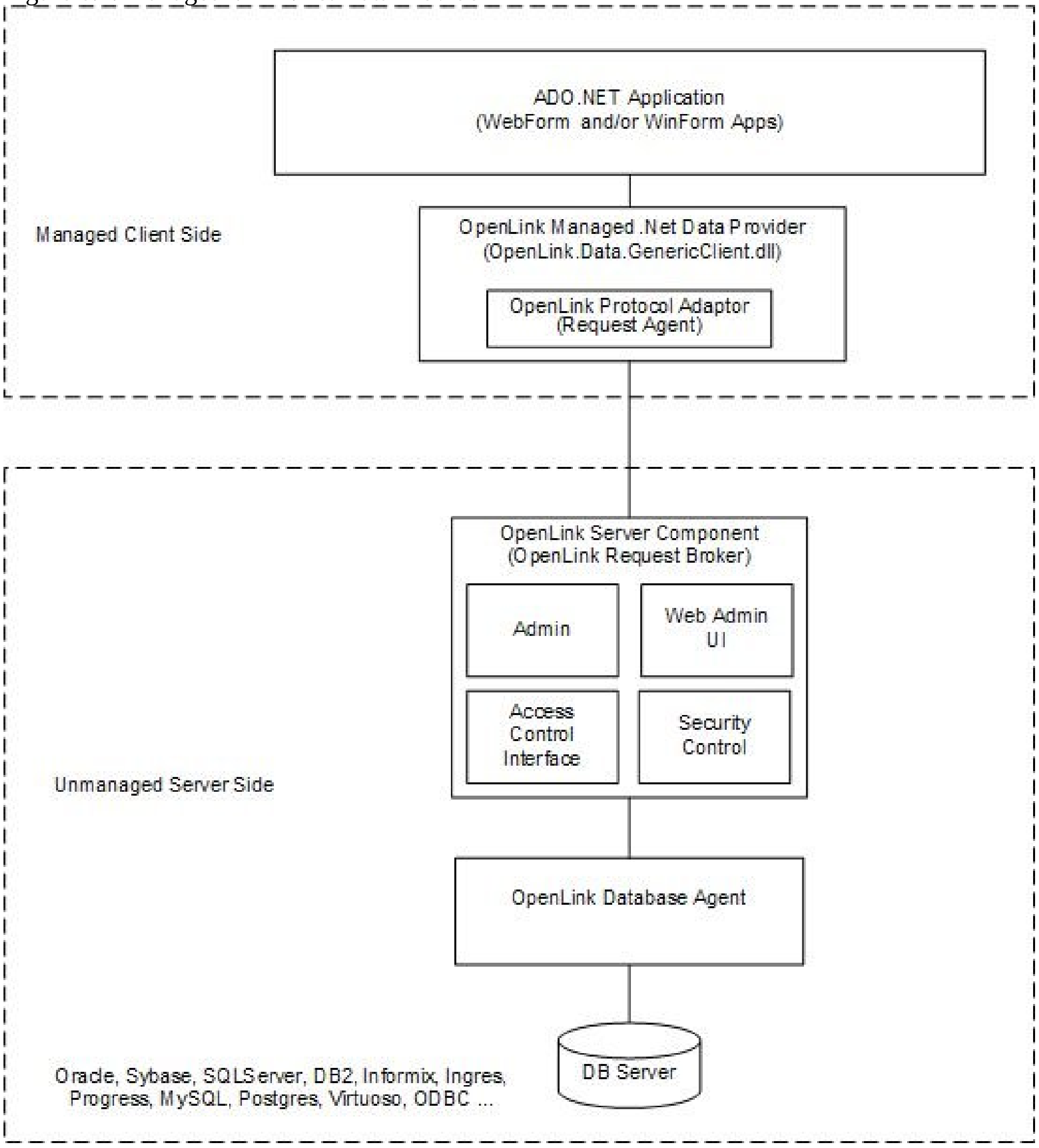
8.1.1 Managed Data Provider

The UDA managed .NET Data Provider delivers robust and secure data connectivity across all Databases support in the Universal Data Access suite, including all major databases - Microsoft SQL Server, Oracle, DB2, Sybase, Ingres II, Informix and Progress. The .NET Data Provider is built with managed code, enabling it to running completely within the

.NET Framework runtime delivering better security and performance. This Generic managed .Net Data Provider connects to the remote data source via one of two forms currently:

- *Multi-Tier Database Agents* - The OpenLink VDB(Virtual Database) layer has been ported to C# and linked into the Provider, enabling it to communicate directly with the OpenLink Multi-Tier Database agents installed on the remote machine (or via 3-Tier connection) as indicated in the diagram below:

  Figure 6.1. Managed VDB .Net Data Provider

  
  ADO.NET Application
  (WebForm and/or WinForm Apps)
  Managed Client Side
  OpenLink Managed .Net Data Provider
  (OpenLink.Data.GenericClient.dll)
  OpenLink Protocol Adaptor
  (Request Agent)
  OpenLink Server Component
  (OpenLink Request Broker)
  Admin
  Web Admin UI
  Access Control Interface
  Security Control
  Unmanaged Server Side
  OpenLink Database Agent
  DB Server
  Oracle, Sybase, SQLServer, DB2, Informix, Ingres, Progress, MySQL, Postgres, Virtuoso, ODBC ...

  The diagram above lists all the databases current supported in our Multi-Tier Data Access suite, but note that ODBC is also included which if chosen would enabled connectivity to any third party ODBC driver also via our ODBC agent(bridge).
- *TDS Protocol* - The TDS protocol has been ported to C# and linked into the Provider, enabling two 100% Managed Providers to be created capable of direct connectivity to Microsoft and Sybase SQLServer Databases without the need for any additional components on the Server, as indicated in the diagram below:

  Figure 6.2. Managed SQLServer .Net Data Provider

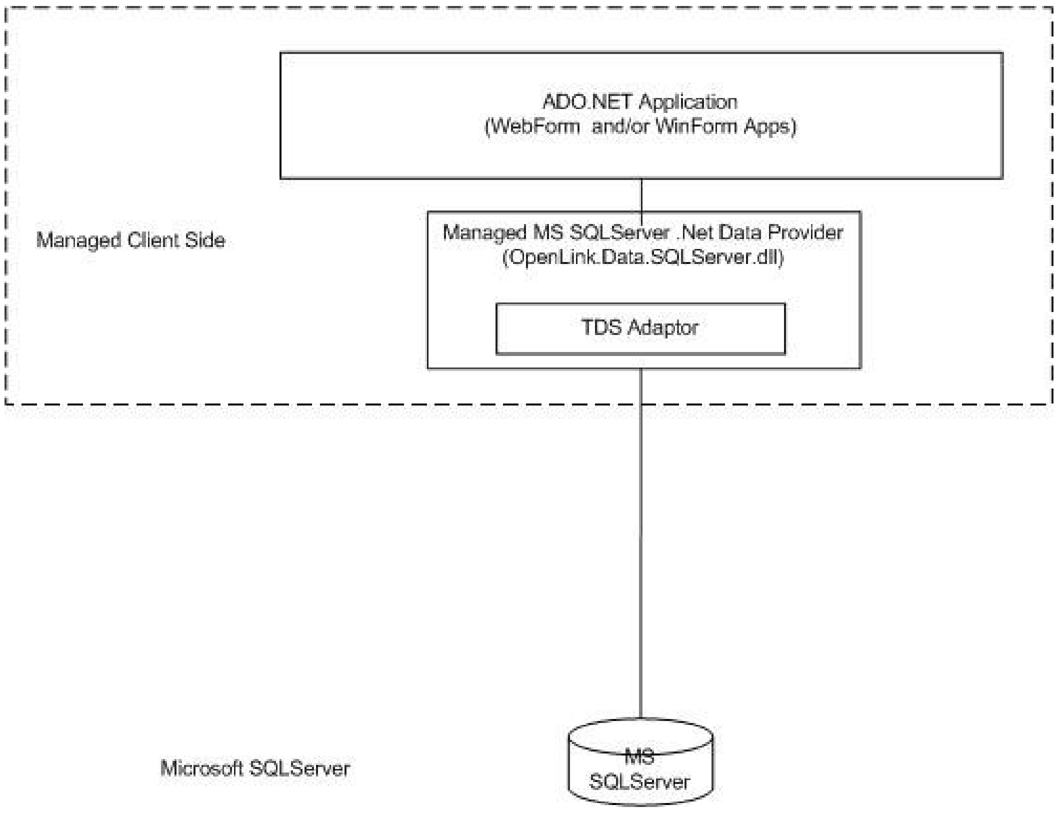
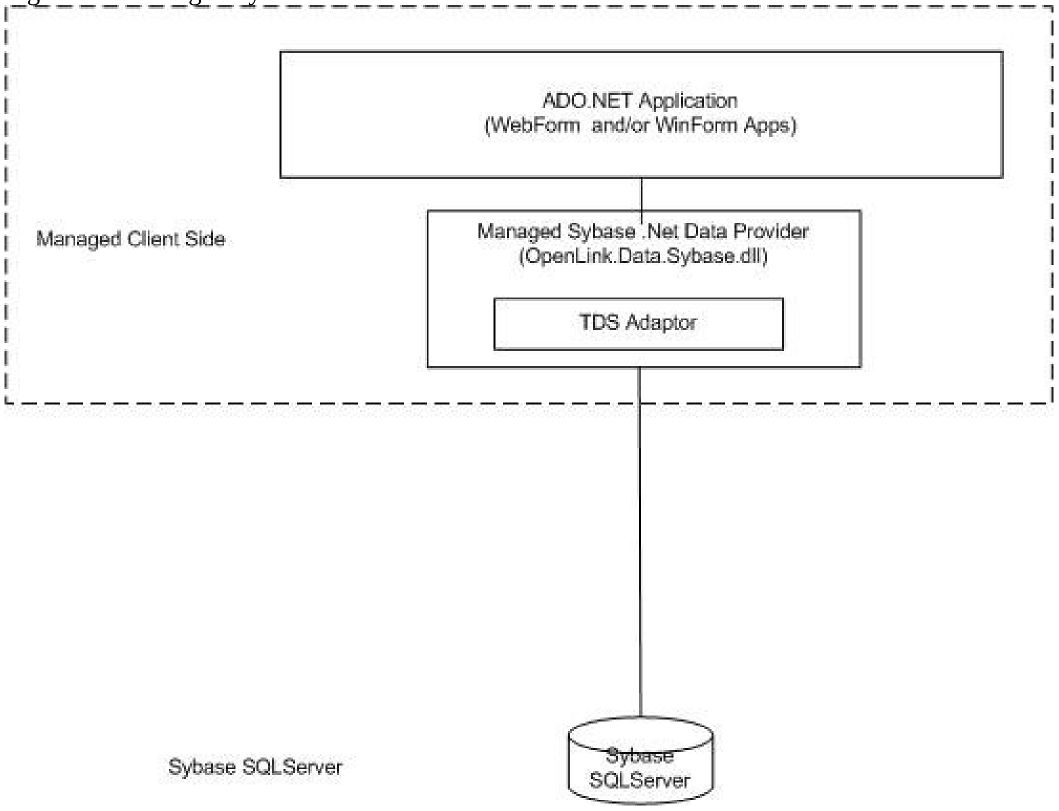

ADO.NET Application
(WebForm and/or WinForm Apps)
Managed Client Side
Managed MS SQLServer .Net Data Provider
(OpenLink.Data.SQLServer.dll)
TDS Adaptor
Microsoft SQLServer
MS SQLServer

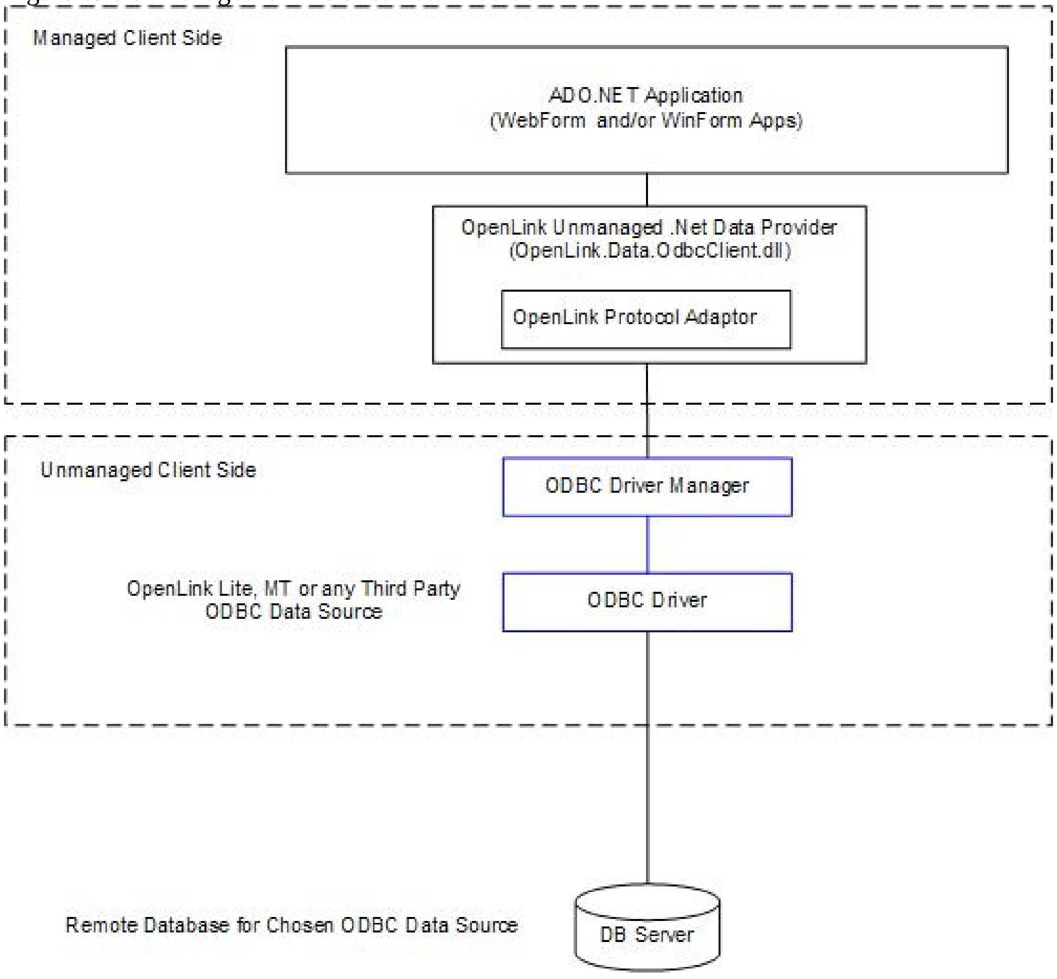
Figure 6.3. Managed Sybase .Net Data Provider


ADO.NET Application
(WebForm and/or WinForm Apps)
Managed Client Side
Managed Sybase .Net Data Provider
(OpenLink.Data.Sybase.dll)
TDS Adaptor
Sybase SQLServer
Sybase SQLServer

8.1.2 Unmanaged Data Provider

The UDA Unmanaged .NET Data Provider enables connectivity to any ODBC Data Source by acting as a Bridge between ADO.Net and ODBC. This Provider is provided as a stop-gap solution enabling connectivity to Data source for which managed .Net Providers are not already available as indicated in the diagram below, and as such does not provide the benefits of security and performance available from its Managed counterpart:

Figure 6.4. Unmanaged ODBC .Net Data Provider


Managed Client Side
ADO.NET Application
(WebForm and/or WinForm Apps)
OpenLink Unmanaged .Net Data Provider
(OpenLink.Data.OdbcClient.dll)
OpenLink Protocol Adaptor
Unmanaged Client Side
ODBC Driver Manager
OpenLink Lite, MT or any Third Party
ODBC Data Source
ODBC Driver
Remote Database for Chosen ODBC Data Source
DB Server

8.2 Developing .NET Data Provider Application

The namespaces for the OpenLink .Net Data Providers are:

```
OpenLink.Data.GenericClient     ; Managed VDB Generic Multi-Tier

OpenLink.Data.SQLServer         ; Managed Microsoft SQLServer

OpenLink.Data.Sybase            ; Managed Sybase SQLServer

OpenLink.Data.OdbcClient        ; Unmanaged ODBC based
```

A .NET data provider provides functionality for connecting to a data source, executing commands, and retrieving results. Those results can be processed directly, or placed in an ADO.NET DataSet for further processing while in a disconnected state. While in the DataSet, data can be exposed to the user, combined with other data from multiple sources, or passed remotely between tiers. Any processing performed on the data while in the DataSet can then be reconciled to the data source.

All .NET data providers are designed to be lightweight. They consist of a minimal layer between the data source and your code. This extends functionality without sacrificing performance.

There are four core objects that make up a .NET data provider. The following table describes those objects and their function.

Table 6.1. Core Classes

Object	Description
Connection	Establishes a connection to a specific data source and can begin a Transaction.
Command	Executes a command at a data source, and exposes Parameters.

Object	Description
DataReader	Exposes and reads a forward-only stream of data from a data source.
DataAdapter	Populates a DataSet and resolves updates with the data source.

Along with the core classes listed in the preceding table, a .NET data provider also contains the classes listed in the following table.

Table 6.2. Additional Classes

Object	Description
ClientPermission	Provided for .NET data provider code access security attributes.
CommandBuilder	A helper object that will automatically generate command properties of a DataAdapter or will derive parameter information from a stored procedure and populate the Parameters collection of a Command object.
Error	Exposes the information from a warning or error returned by a data source.
Exception	Returned when an error is encountered at the data source. For an error encountered at the client, .NET data providers throw a .NET Framework exception.
Parameter	Defines input, output, and return value parameters for commands and stored procedures.
Transaction	Enables you to enlist commands in transactions at the data source.

During the installation process the OpenLink .Net Data Provider is registered in the system GAC(Global Assembly Cache) enabling it for use by .Net applications. To use the OpenLink .NET Data Providers, the application must add an imports or using statement for the .Net Data Provider namespace, as the following code illustrates:

```
[Visual Basic]
Imports OpenLink.Data.GenericClient     // Managed VDB Generic Multi-Tier
or
Imports OpenLink.Data.SQLServer         // Managed Microsoft SQLServer
or
Imports OpenLink.Data.Sybase            // Managed Sybase SQLServer
or
Imports OpenLink.Data.OdbcClient        // Unmanaged ODBC based
[C#]
using OpenLink.Data.GenericClient;      // Managed VDB Generic Multi-Tier
or
using OpenLink.Data.SQLServer;          // Managed Microsoft SQLServer
or
using OpenLink.Data.Sybase;             // Managed Sybase SQLServer
or
using OpenLink.Data.OdbcClient;         // Unmanaged ODBC based
```

You must also include a reference to the .DLL when you compile your code. For example, if you are compiling a Microsoft® Visual C# program, your command line should include:

```
csc /r:OpenLink.Data.GenericClient.dll  ; Managed VDB Generic Multi-Tier
or
csc /r:OpenLink.Data.SQLServer.dll      ; Managed Microsoft SQLServer
or
csc /r:OpenLink.Data.Sybase.dll ; Managed Sybase SQLServer
or
csc /r:OpenLink.Data.OdbcClient.dll     ; Unmanaged ODBC based
```

8.3 OpenLink .NET Data Providers Connect String Attributes

This section details the Connect string attributes an ADO.Net application can pass to the OpenLink .Net Data Providers when attempting a connection to a remote database.

8.3.1 Managed Generic Multi-Tier .NET Data Provider (OpenLink.Data.GenericClient)

The tables below provides a list of the Connect String Attributes for the Data Provider:

Table 6.3. Connection String Keywords for the Generic .Net Provider

Keyword	Default Value
Used ID or UID	[""]
Password or PWD	[""]
Initial Catalog or DATABASE	[""]
Connect Timeout or Connection Timeout	[15]
Persist Security Info	[False]
Connection Lifetime	[0]
Min Pool Size	[0]
Max Pool Size	[100]
Persist Security Info	[False]
Pooling	[True]
Charset	["]
Host	[localhost]
Port	[5000]
Read Only or ReadOnly	[False]
Fetch Buffer Size or FBS or FetchBufferSize	[100]
Server Type or ServerType or SVT	[""]
Defer Long Fetch or DLF or DeferLongFetch	[False]
Encrypted	[False]
Options	[""]
Defer Long Fetch or DLF or DeferLongFetch	[False]
UNICODE	[False]
APPLICATION	["opldotNET"]

Sample connect string :

```
For Oracle 9 :
        "Host=localhost;Port=5000;SVT=Oracle 9.x;DATABASE=ORCL;UID=scott;PWD=tiger;
For SQLServer2000:
        "Host=localhost;Port=5000;SVT=SQLServer 2000;DATABASE=Northwind;UID=sa;PWD=;
```

8.3.2 Managed Microsoft SQLServer .NET Data Provider (OpenLink.Data.SQLServer)

The tables below provides a list of the Connect String Attributes for the Data Provider:

Table 6.4. Connection String Keywords for the Microsoft SQLServer .Net Provider

Keyword	Default Value
Used ID or UID	[""]
Password or PWD	[""]
Initial Catalog or DATABASE	[""]
Connect Timeout or Connection Timeout	[15]
Persist Security Info	[False]
Connection Lifetime	[0]
Min Pool Size	[0]
Max Pool Size	[100]
Persist Security Info	[False]
Pooling	[True]
Charset	["]
Host	[localhost]
Port	[1433]

Keyword	Default Value
Packet Size or PktSize	[8192] for SQLServer7/2000
SrvName or Server or Server Na	[""]
Server Type or ServerType or SVT	["SQLSERVER6"]
WorkstationId or Workstation Id	["localhost]
UNICODE	[False]
APPLICATION	["opldotNET"]
UseBrowseMode	["false"]

The following Keyword default values change for the SQLServer Provider :

```
UseBrowseMode=false - the SQLParser is used for parsing Select queries and getting the acc
for following schema table columns (returned by IDataReader.GetSchemaTable).
UseBrowseMode=true -  the "SET no_browsetable ON" comand is used with Select queries for g
and for accurate information for following schema table columns (returned by IDataReader.G
 Note that the MS SQLServer ADO.NET provider uses the "SET no_browsetable ON" mode.
The property SVT or ServerType supports the following values:
"SQLServer 7" or "SQLServer7" (TDS7 protocol is used)
"SQLServer 2000" or "SQLServer2000" (TDS8 protocol is used)
"SQLServer 6"  or "SQLServer 6.x"  or "SQLServer"  or "SQLServer6"(TDS4.2 protocol is used
Any another values (TDS4.2 protocol is used)
Sample connection string:
        "SVT=SQLServer 2000;DATABASE=Northwind;Host=localhost;Port=1433UID=sa;PWD=;
```

8.3.3 Managed Sybase .NET Data Provider (OpenLink.Data.Sybase)

The tables below provides a list of the Connect String Attributes for the Data Provider:

Table 6.5. Connection String Keywords for the Sybase .Net Provider

Keyword	Default Value
Used ID or UID	[""]
Password or PWD	[""]
Initial Catalog or DATABASE	[""]
Connect Timeout or Connection Timeout	[15]
Persist Security Info	[False]
Connection Lifetime	[0]
Min Pool Size	[0]
Max Pool Size	[100]
Persist Security Info	[False]
Pooling	[True]
Charset	["]
Host	[localhost]
Port	[4100]
Packet Size or PktSize	[512]
SrvName or Server or Server Na	[""]
Server Type or ServerType or SVT	["SYBASE4"]
WorkstationId or Workstation Id	["localhost]
UNICODE	[False]
APPLICATION	["opldotNET"]

The following Keyword default values change for the SQLServer Provider :

```
The property SVT or ServerType supports the following values:
        "Sybase 10"  or "Sybase10" (TDS5 protocol is used)
```

```
                "Sybase 11"  or "Sybase11" (TDS5 protocol is used)
                "Sybase 12"  or "Sybase12"  or "Sybase12.x" (TDS5 protocol is used)
        Any another values (TDS4.2 protocol is used)
        Sample connection string:
                "SVT=Sybase 12;DATABASE=pubs2;Host=localhost;Port=4100;UID=sa;PWD=;
```

8.3.4 Unmanaged .NET Data Provider (OpenLink.Data.OdbcClient)

The tables below provides a list of the Connect String Attributes for the Unmanaged (ODBC based) Data Provider:

Table 6.6. Connection String Keywords

Keyword	Default Value
DSN	[""]
UID	[""]
PWD	[""]

```
   Sample connect string:
        - Oracle ODBC DSN
           "DSN=Oracle;UID=scott;PWD=tiger"
        where 'Oracle' is the name of a valid ODBC DSN for connecting to an Oracle Database
```

8.4 OpenLink .NET Data Providers Class Implementation

This section details the classes exposed by the OpenLink .NET Data Providers, which users must be familiar with in order to make effective use of the providers.

Many of the OpenLink Generic Provider classes implement interfaces or inherit from the .NET Framework namespaces System.Data and System.Data.Common. A summary of the classes exposed by the provider is given below.

The table only shows classes or interfaces inherited from System.Data or System.Data.Common. Some of the OpenLink.Data.GenericClient classes implement additional interfaces or inherit from a class belonging to a namespace other than System.Data or System.Data.Common. These details are not shown. For full details refer to the detailed documentation for the appropriate class in OpenLink.Data.GenericClient Namespace.

Table 6.7. Classes

Classes	Implements / inherits System.Data or System.Data.Common interface / class	Description
OPLCommand	IDbCommand	Represents an SQL statement or stored procedure to execute against a database.
OPLCommandBuilder		Automatically generates single-table commands used to reconcile changes made to a DataSet with the associated data source.
OPLConnection	IDbConnection	Represents an open connection to a data source.
OPLDataAdapter	IDbDataAdapter, DbDataAdapter	Represents a set of data commands and a database connection that are used to fill a DataSet and update a data source.
OPLDataReader	IDataReader, IDataRecord	Provides a way of reading a forward-only stream of data rows from a data source.
OPLError		Holds information about a warning or error returned by a data source.
OPLErrorCollection		Represents a collection of one or more OPLError objects that give detailed information about an OPLException.
OPLErrorException		The exception that is generated when a warning or error is returned by a data source or the Generic Provider.

Classes	Implements / inherits System.Data or System.Data.Common interface / class	Description
OPLParameter	IDbDataParameter, IDataParameter	Represents a parameter to an OPLCommand and optionally, its mapping to a DataSet column.
OPLParameterCollection	IDataParameterCollection	Represents a collection of parameters relevant to an OPLCommand as well as their respective mappings to columns in a DataSet.
O PLPermission		Enables the Generic Provider to ensure that a user has a security level adequate to access a data source.
O PLPermissionAttribute		Associates a security action with a custom security attribute.
OPLTransaction	IDbTransaction	Represents a SQL transaction to be made at a data source.

Table 6.8. Delegates

Delegates	Description
OPLRowUpdatedEventHandler>	Represents a method that will handle the RowUpdated event of an OPLDataAdapter.
OPLRowUpdatingEventHandler	Represents a method that will handle the RowUpdating event of an OPLDataAdapter.

Table 6.9. Enumerations

Enumeration	Description
O PLDbType>	Specifies the data type of a field, property or OPLParameter.

8.5 OpenLink.Data Namespace

All the public classes in the OpenLink.Data namespace are detailed in this section. Note that all of the OpenLink .Net Data Providers use the same common class names, thus the descriptions below are applicable to all enabling maximum re-use of code across Providers.

IMPORTANT: Public class members inherited from a base class defined by the .NET Framework Class Library (FCL), or which implement an FCL defined interface method, are not described. For details of these inherited members, refer to the .NET FCL documentation for the base class or interface. Where an OpenLink class implements an ADO.NET interface and adds additional methods or properties, these extensions are documented.

In the class descriptions which follow, all code extracts showing partial class definitions, method signatures etc. are in C#. Examples for other .NET languages are not shown.

8.5.1 OPLCommand

Represents an SQL statement or stored procedure to execute against a database.

```
public class OPLCommand : Component, IDbCommand, ICloneable
```

8.5.1.1 Constructors

```
public OPLCommand ();
```

Initializes a new instance of the OPLCommand class.

```
public OPLCommand (string cmdText);
```

Initializes a new instance of the OPLCommand class with the text of the query.

```
public OPLCommand (string cmdText, OPLConnection connection);
```

Initializes a new instance of the OPLCommand class with the text of the query and an OPLConnection object.

```
public OPLCommand (string cmdText, OPLConnection connection,OPLTransaction txn);
```

Initializes a new instance of the OPLCommand class with the text of the query, an OPLConnection object and an OPLTransaction object.

8.5.1.2 Properties

8.5.1.2.1 PassThrough

```
public bool PassThrough {get; set;}
```

Allows the command text to be passed to the data source without being parsed by the Generic Provider.

8.5.1.2.2 Remarks

The PassThrough property defaults to false. When pass-through is disabled, the Generic Provider parses command text associated with the OPLCommand and queries the data source for additional metadata on tables referenced in a select statement. The command parser in the Generic Provider is limited to the SQL grammar defined by ODBC. If you wish to pass native SQL to the data source you should enable pass-through; however this will have the following side-effects:

Some of the metadata returned by OPLDataReader.GetSchemaTable may not be accurate, specifically the metadata resultset columns IsKeyColumn, BaseSchemaName, BaseCatalogName, BaseTableName.

The command behavior setting CommandBehavior.KeyInfo will not append missing key columns to the end of a select list.

OPLCommandBuilder may not work, depending on the select statement used.

8.5.2 OPLCommandBuilder

Automatically generates single-table commands used to reconcile changes made to a DataSet with the associated data source.

```
public sealed class OPLCommandBuilder : Component
```

8.5.2.1 Constructors

```
public OPLCommandBuilder ();
```

Initializes a new instance of the OPLCommandBuilder class.

```
public OPLCommandBuilder (OPLDataAdapter adapter);
```

Initializes a new instance of the OPLCommandBuilder class with the associated OPLDataAdapter object.

8.5.2.2 Methods

```
public static void DeriveParameters (OPLCommand command);
```

Retrieves parameter information from the stored procedure specified in the OPLCommand and populates the Parameters collection of the specified OPLCommand object.

```
protected override void Dispose (bool disposing);
```

Releases the resources used by the OPLCommandBuilder.

```
public OPLCommand GetDeleteCommand ();
```

Gets the automatically generated OPLCommand object required to perform deletions at the data source.

```
public OPLCommand GetInsertCommand ();
```

Gets the automatically generated OPLCommand object required to perform insertions at the data source.

```
public OPLCommand GetUpdateCommand ();
```

Gets the automatically generated OPLCommand object required to perform updates at the data source.

```
public void RefreshSchema ();
```

Refreshes the database schema information used to generate INSERT, UPDATE, or DELETE statements.

8.5.2.3 Properties

```
public OPLDataAdapter DataAdapter {get; set;}
```

Gets or sets an OPLDataAdapter object for which this OPLCommandBuilder object will generate SQL statements.

```
public string QuotePrefix {get; set;}
```

Gets or sets the beginning character or characters to use when working with database objects (for example, tables or columns) whose names contain characters such as spaces or reserved tokens.

```
public string QuoteSuffix {get; set;}
```

Gets or sets the ending character or characters to use when working with database objects, (for example, tables or columns), whose names contain characters such as spaces or reserved tokens.

8.5.3 OPLConnect

Represents an open connection to a data source.

```
public sealed class OPLConnection : Component, ICloneable, IDbConnection
```

8.5.3.1 Constructors

```
public OPLConnection();
```

Initializes a new instance of the OPLConnect class.

```
public OPLConnection(string connectionString);
```

Initializes a new instance of the OPLConnection class with the specified connection string.

8.5.3.2 Methods

```
protected override void Dispose (bool disposing);
```

Releases the resources used by the OPLConnection.

8.5.3.3 Events

```
public event StateChangeEventHandler StateChange;
```

Occurs when the state of the connection changes.

8.5.3.3.1 Remarks

The StateChange event is raised immediately after the State changes from Closed to Opened, or from Opened to Closed.

```
public event OPLInfoMessageEventHandler InfoMessage;
```

Returns warning messages from the DBMS.

```
public delegate void OPLInfoMessageEventHandler (object sender, OPLInfoMessageEventArgs e)
```

```
class OPLInfoMessageEventArgs;
```

8.5.4 OPLDataAdapter

Represents a set of data commands and a database connection that are used to fill a DataSet and update a data source.

8.5.4.1 Constructors

```
public OPLDataAdapter();
```

Initializes a new instance of the OPLDataAdapter class.

```
public OPLDataAdapter (OPLCommand selectCommand);
```

Initializes a new instance of the OPLDataAdapter class with the specified SQL SELECT statement.

```
public OPLDataAdapter (string selectCommandText, OPLConnection selectConnection);
```

Initializes a new instance of the OPLDataAdapter class with an SQL SELECT statement and an OPLConnection.

```
public OPLDataAdapter (string selectCommandText, string selectConnectionString);
```

Initializes a new instance of the OPLDataAdapter class with an SQL SELECT statement and a connection string.

8.5.4.2 Methods

```
public event OPLRowUpdatedEventHandler RowUpdated;
```

Occurs during an Update operation after a command is executed against the data source.

```
public event OPLRowUpdatingEventHandler RowUpdating;
```

Occurs during an Update operation before a command is executed against the data source.

8.5.5 OPLDataReader

Provides a way of reading a forward-only stream of data rows from a data source.

```
public sealed class OPLDataReader : MarshalByRefObject, IDataReader, IDataRecord, IDisposable, IEnumerabl
```

8.5.6 OPLError

Holds information about a warning or error returned by a data source.

```
public sealed class OPLError
```

8.5.6.1 Remarks

This class is created whenever an error occurs. Each instance of OPLError created is then managed by the OPLErrorCollection class, which in turn is created by the OPLException class.

8.5.6.2 Properties

```
public string Message {get;}
```

Gets a short description of the error.

```
public string SQLState {get;}
```

Gets the five character ODBC SQL state associated with the error.

```
public int NativeError {get;}
```

Gets the data source-specific error information.

8.5.7 OPLErrorCollection

Represents a collection of one or more OPLError objects that give detailed information about an OPLException.

```
public sealed class OPLErrorCollection : ICollection
```

8.5.7.1 Remarks

This class is created by OPLException to collect instances of the OPLError class. OPLErrorCollection always contains at least one instance of the OPLError class.

8.5.7.2 Methods

```
public IEnumerator GetEnumerator();
```

This member supports the .NET Framework infrastructure and is not intended to be used directly from your code.

8.5.7.3 Properties

```
public OPLError this[int i] {get;}
```

Gets the error at the specified index. In C#, this property is the indexer for the OPLErrorCollection class.

8.5.8 OPLException

The exception that is generated when a warning or error is returned by a data source or the Generic Provider.

```
public sealed class OPLException : SystemException
```

8.5.8.1 Properties

```
public OPLErrorCollection Errors {get;}
```

Gets a collection of one or more OPLError objects that give detailed information about the exception.

```
public override string Message {get;}
```

Gets the text describing the error.

8.5.9 OPLParameter

Represents a parameter to an OPLCommand and optionally, its mapping to a DataSet column.

```
public class OPLParameter : MarshalByRefObject, IDbDataParameter, IDataParameter, ICloneable
```

8.5.9.1 Constructors

```
public OPLParameter();
```

Initializes a new instance of the OPLParameter class.

```
public OPLParameter(string parameterName, object value);
```

Initializes a new instance of the OPLParameter class with the parameter name and a value of the new OPLParameter object.

```
public OPLParameter(string parameterName, OPLDbType type);
```

Initializes a new instance of the OPLParameter class with the parameter name and the data type.

```
public OPLParameter(string parameterName, OPLDbType type, int size);
```

Initializes a new instance of the OPLParameter class with the parameter name, the OPLDbType and the size.

```
public OPLParameter(string parameterName, OPLDbType type, int size, string sourceColumn);
```

Initializes a new instance of the OPLParameter class with the parameter name, the OPLDbType, the size, and the source column name.

```
public OPLParameter(string parameterName, OPLDbType type, int size, ParameterDirection direction, Boolean
```

Initializes a new instance of the OPLParameter class with the parameter name, the type of the parameter, the size of the parameter, a ParameterDirection, whether the parameter is nullable, the precision of the parameter, the scale of the parameter, the source column, a DataRowVersion to use, and the value of the parameter.

8.5.9.2 Methods

```
public override string ToString ();
```

Gets a string containing the ParameterName.

8.5.9.3 Properties

```
public OPLDbType OPLDbType {get; set;}
```

Gets or sets the OPLDbType of the parameter.

8.5.9.3.1 Remarks

The OPLDbType and DbType are linked. Therefore, setting the DbType changes the OPLType to a supporting OPLDbType. For a list of the supported data types, see the appropriate OPLDbType member.

8.5.10 OPLParameterCollection

Represents a collection of parameters relevant to an OPLCommand as well as their respective mappings to columns in a DataSet.

```
public class OPLParameterCollection : MarshalByRefObject, IDataParameterCollection, ICollection, IEnumera
```

8.5.10.1 Methods

```
public int Add (OPLParameter value);
```

Adds the specified OPLParameter to the OPLParameterCollection

```
public int Add (string parameterName, object value);
```

Adds an OPLParameter to the OPLParameterCollection given the parameter name and value.

```
public int Add (string parameterName, OPLDbType dbType);
```

Adds an OPLParameter to the OPLParameterCollection given the parameter name and data type.

```
public int Add (string parameterName, OPLDbType dbType, int size);
```

Adds an OPLParameter to the OPLParameterCollection given the the parameter name, data type, and column length.

```
public int Add (string parameterName, OPLDbType dbType, int size, string sourceColumn);
```

Adds an OPLParameter to the OPLParameterCollection given the parameter name, data type, column length, and source column name.

8.5.10.2 Properties

```
public OPLParameter this[int index] {get; set;}
```

Gets or sets the OPLParameter at the specified index

```
public OPLParameter this[string parameterName] {get; set;}
```

Gets or sets the OPLParameter with the specified name.

8.5.11 OPLRowUpdatedEventArgs

Provides data for the OPLDataAdapter.RowUpdated event.

8.5.11.1 Constructors

```
public OPLRowUpdatedEventArgs(DataRow row, IDbCommand command, StatementType statementType, DataTa
```

Initializes a new instance of the OPLRowUpdatedEventArgs class.

8.5.11.2 properties

```
public new OPLCommand Command {get;}
```

Gets the OPLCommand executed when Update is called.

8.5.12 OPLRowUpdatedEventHandler

Represents a method that will handle the RowUpdated event of an OPLDataAdapter.

```
public delegate void OPLRowUpdatedEventHandler(object sender, OPLRowUpdatedEventArgs e);
```

8.5.13 OPLRowUpdatingEventArgs

Provides data for the OPLDataAdapter.RowUpdating event.

8.5.13.1 Constructors

```
public OPLRowUpdatingEventArgs(DataRow row, IDbCommand command, StatementType statementType, DataT
```

Initializes a new instance of the OPLRowUpdatingEventArgs class.

8.5.13.2 properties

```
public new OPLCommand Command {get; set;}
```

Gets or sets the OPLCommand to execute when Update is called.

8.5.14 OPLRowUpdatingEventHandler

Represents a method that will handle the RowUpdating event of an OPLDataAdapter.

```
public delegate void OPLRowUpdatingEventHandler(object sender, OPLRowUpdatingEventArgs e);
```

8.5.15 OPLTransaction

Represents an SQL transaction to be made at a data source.

```
public sealed class OPLTransaction : MarshalByRefObject, IDbTransaction, IDisposable
```

8.6 Known Issues

8.6.1 Unsigned Type Handling

8.6.1.1 Unmanaged ODBC Provider

The provider assumes that all integer data returned by an ODBC driver is signed. The provider only examines the ODBC SQL type of the data to ascertain its type. But, the ODBC SQL type gives no indication of whether the data is signed or unsigned. The ODBC to .NET type mappings used internally for fetched data assume that all data is signed. There is the potential for overflow errors when fetching unsigned integer data, because the .NET types to which integer data is mapped are all signed. However, across the range of databases currently supported by OpenLink, this problem only manifests itself in one instance   with the SQL Server TinyInt type. This is the only native unsigned type supported across the databases covered by OpenLink. However, if the ODBC provider is to support third party ODBC drivers, more databases could expose this fault.

The SQL Server TinyInt type has a range of 0 .. 255. It is returned by the provider as a .NET System.SByte type which has a range of 127 .. 128. At present, TinyInt values over 128 will not be returned correctly by the provider.

8.6.1.2 Managed Providers

The same general problem exists in the GenericClient managed provider. However, the provider handles SQL_TINYINT data as a special case, so the problem with the SQL Server TinyInt type does not arise. If the provider detects data fetched using the OpenLink CTYPE_UNS8 transport type, it changes the mapping for SQL_TINYINT from System.SByte to System.Byte. Any other type of unsigned integer data will not be handled correctly, but at present this does not arise as TinyInt is the only unsigned native DBMS type the provider encounters across our currently supported agents.

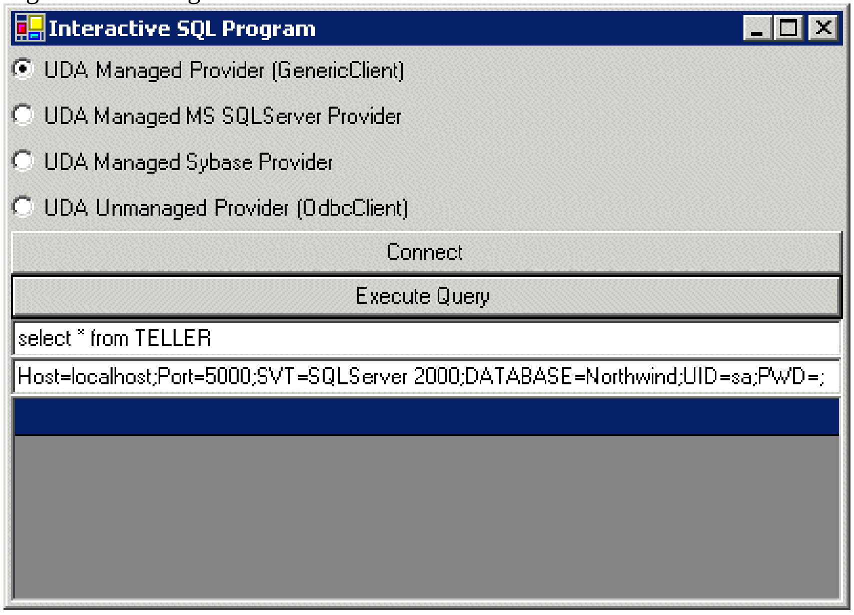
8.6.2 Timestamp Precision

Both the managed and unmanaged providers map the ODBC SQL_TYPE_TIMESTAMP type to the .NET DateTime type. The .NET DateTime type stores times with millisecond precision, whereas an ODBC SQL_C_TIMESTAMP struct can hold seconds accurate to nanoseconds. A loss of precision will result when fetching timestamp data from databases which hold fractional second data to greater than millisecond precision. The corresponding DateTime values returned to an application will be rounded to the nearest millisecond.

8.7 .Net Provider Test Program

A simple .Net interactive SQL program is provided for enabling a test connection to be made with the UDA Managed and/or Unmanaged .Net Data Providers, as indicated in the screen shots below:

Figure 6.5. Managed .Net Data Provider test connection


Interactive SQL Program

[✓ UDA Managed Provider (GenericClient)]

UDA Managed MS SQLServer Provider

UDA Managed Sybase Provider

UDA Unmanaged Provider (OdbcClient)

Connect

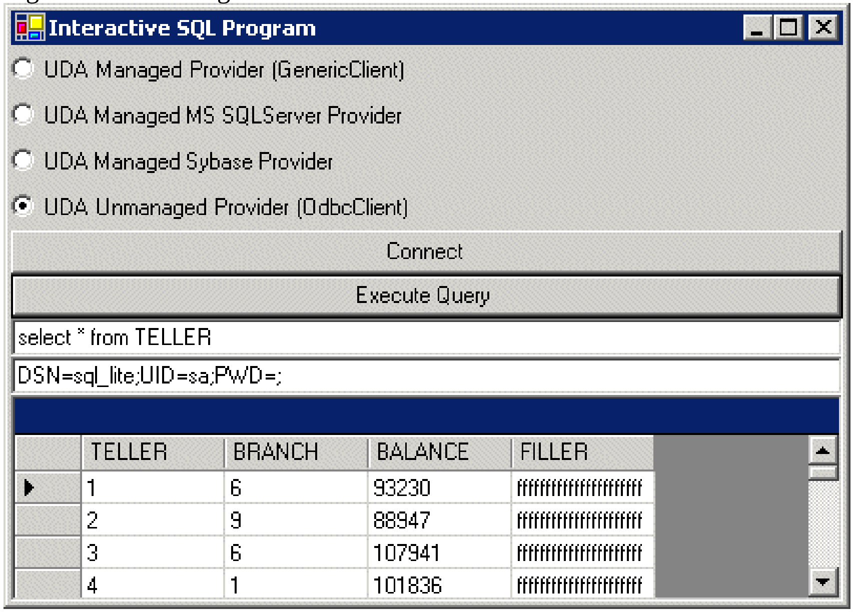
Execute Query

select * from TELLER

Host=localhost;Port=5000;SVT=SQLServer 2000;DATABASE=Northwind;UID=sa;PWD=;

The connect strings for the Managed .Net Providers (GenericClient, MS SQLServer and Sybase) are similar with the 'Port' attribute designating the location of the Service to which is connection will band made. The Unmanaged OdbcClient provider differs as indicated below:

Figure 6.6. Unmanaged .Net Data Provider test connection


Interactive SQL Program
UDA Managed Provider (GenericClient)
UDA Managed MS SQLServer Provider
UDA Managed Sybase Provider
UDA Unmanaged Provider (OdbcClient)
Connect
Execute Query

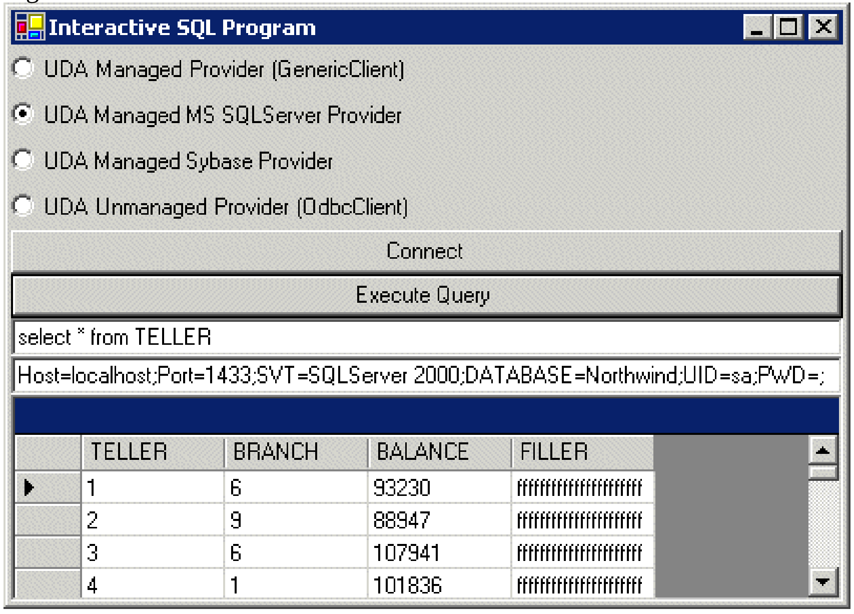
Selected: UDA Unmanaged Provider (OdbcClient)

```
select * from TELLER
DSN=sql_lite;UID=sa;PWD=;
```

TELLER	BRANCH	BALANCE	FILLER
1	6	93230	ffffffffffffffffffff
2	9	88947	ffffffffffffffffffff
3	6	107941	ffffffffffffffffffff
4	1	101836	ffffffffffffffffffff

1. Select the *radio* button of the .Net Provider you want to test.
2. Enter the *connect string attributes* of the Database Server to which the connection is to be made.
3. Click the *connect* button to make the Database connection.
4. Enter the *SQL query* you wish to run in the text window provided and click the *Execute Query* button to execute.
5. Once executed the result set will be displayed in the result set pane as indicated in screen shot below:

Figure 6.7.


Interactive SQL Program
UDA Managed Provider (GenericClient)
UDA Managed MS SQLServer Provider
UDA Managed Sybase Provider
UDA Unmanaged Provider (OdbcClient)
Connect
Execute Query

Selected: UDA Managed MS SQLServer Provider

```
select * from TELLER
Host=localhost;Port=1433;SVT=SQLServer 2000;DATABASE=Northwind;UID=sa;PWD=;
```

TELLER	BRANCH	BALANCE	FILLER
1	6	93230	ffffffffffffffffffff
2	9	88947	ffffffffffffffffffff
3	6	107941	ffffffffffffffffffff
4	1	101836	ffffffffffffffffffff

8.8 New Features

- .Net Data Providers. A suite of Managed .Net Data Providers built with a thin generic .Net client classes for communicating with any of our supported Database drivers, as well as a 100% Managed TDS based .Net Provider for connectivity to Microsoft and Sybase SQLServer Database eliminating the need for any software installation on the Database Server machine. An Umanaged .Net ODBC Provider is also available, which makes use of the OpenLink built in Cursor Library to provide a greater level of .Net support when connecting via an ODBC Datasource.

- Unicode Driver support. OpenLink Lite Drivers support the latest releases of all supported database engines this includes:

    1. Oracle 8i & 9i
    2. Microsoft SQL Server 2000
    3. DB/2 v7
    4. ODBC Bridge
    5. Informix 9
    6. Sybase Adaptive Server 12.5
    7. Progress 9 (SQL-92)
- Significant SQL Server and SYBASE Driver Enhancements. Our Drivers are now built to communicate directly with Microsoft SQL Server and SYBASE ASE using the TDS protocol (the native wire protocol for both database servers). This also implies that no additional software is required post installation in order for our ODBC Drivers to communicate with these Drivers (this applies to the Single Tier format Drivers only). The use of TDS has also enabled us to double the performance of both our Single Tier and Multi-Tier Drivers for these databases.
- Array Optimizations on Select Queries. All drivers now support the SQLSetStmtAttr(SQL_ARRAY_SIZE) call for batch select statements, providing improved performance when re-execute select statements with bound parameters.
- Deferred Fetching. The Release 4 OpenLink driver family brings marked communications layer improvements. Central to these are improved implementation of the `SQLGetData` and `SQLPutData` ODBC function calls.

    Wholesale vs. Piecemeal Data Transfer. In previous releases of the drivers, parameter data at query execution was assembled in the OpenLink driver's client component and transferred to its server component in a single network hop. (The client and server components apply to both the Single- and Multi-Tier drivers; they refer to different layers within the driver entity.) Similarly, when fetching from a "long", or large binary data column, data was transferred from the driver's server component to the client component in a single network transfer. The only way data could manipulated in a piecemeal fashion, was within the ODBC application from the driver's client component (client side only).

    The Release 4 driver family now allow transferring parameter data in parts over the network between the client and server driver components. Once transferred, the fragmented column data are re-pieced together in their entirety within the client and server portions of the driver.

    Deferred Fetching. When fetching, data from columns with "long" data are only transferred between the server and client components if one of the following applies to that column:

    It has been "bound" by the application via the SQLBindCol API call

    It has been retrieved via the SQLGetData API call

    This mechanism is referred to as deferred fetching. In this method, as "long" column data is not reassembled within the OpenLink ODBC client itself (rather, within the application), driver memory overhead incurred is dramatically reduced. Deferred fetching applies to the following "long" database column types:

    ODBC agent

        SQL_LONGVARCHAR

        SQL_LONGVARBINARY

    DB/2 driver

        SQL_BLOB

        SQL_CLOB

        SQL_DBCLOB

        If the long data compatibility option has been specified in the DB2 database

        SQL_LONGVARCHAR

SQL_LONGVARBINARY

SQL_LONGVARGRAPHIC

Oracle driver

SQLT_BLOB

SQLT_CLOB

Sybase driver

CS_IMAGE_TYPE

CS_TEXT_TYPE

However, if a table contains a column defined as one of these "long" types, but the actual data stored in the column only fills a small proportion of the available space, deferred fetching is of no benefit. In these cases, performance may be improved by switching off the deferred fetching mechanism using the control in the OpenLink Generic Client data source setup dialog.

9 Chapter 7. OpenLink OLE-DB Provider

Abstract
The OpenLink ODBC Provider for OLEDB is delivered as an OLEDB - ODBC bridge. It utilizes ODBC data sources to connect to databases, much like the Microsoft ODBC Provider; so you will require a working ODBC installation first.

The OpenLink Provider also requires that the Microsoft Data Access Components have been installed. To gain any functionality with .Net you will require MDAC 2.7 RTM (2.70.7713.4) or later. This particular version of the MDAC is included with Visual Studio .Net and with the .Net Framework SDK. Alternatively it can be downloaded from www.microsoft.com/data. Releases prior to 2.70.7713.4, specifically MDAC 2.7 included in the .Net SDK Beta 2, will not allow non-Microsoft OLE DB providers to work with the .Net Data Provider for OLE DB.

Although not completely necessary if you are using a newer OpenLink installer, before installing this provider, any previous release of the driver should be deinstalled fully. If a full deinstall using Install Shield is not performed, the old driver should be unregistered using the regsvr32 utility as follows:

```
regsvr32 /u
        oploleod.dll
```

Table of Contents

9.1 Testing an OLEDB Connection

The connection can be tested using the sample application, "Rowset Viewer" as follows:

1. Select *Full Connect* from the File menu
2. Select *OpenLink ODBC Provider* for the connection provider
3. Choose an ODBC *Datasource* either by typing the name directly or using the *"..."* button and selecting *Enumerator* from the submenu that appears in place of the button. In the new dialog that appears choose " *OpenLink ODBC Data Source Enumerator* " as the data source enumerator and click *Connect* . A list of ODBC data sources will appear, from which you can choose the one you want and click *OK* to confirm.
4. Enter the *UserID* and *Password* and click on *OK* to connect.
5. Once connected an "Command" subwindow will appears, into which you can submit SQL for test querying on the data source.

9.2 Call Tracing

To turn on call tracing and enable logging to a file, use the Registry Editor (regedit or regedt32) to enter a fully qualified file name in the registry entry:

```
HKEY_LOCAL_MACHINE\SOFTWARE\OpenLink Software\OpenLink OLE DB Provider\DebugFile
```

To turn off call tracing simply leave this entry blank. A separate log file is opened for each process which uses the provider. Each file opened is named using the file base name specified in the DebugFile entry above with a three digit process ID suffix.

9.3 Provider Specific Connection Information

OLE DB predefines a number of property sets and the properties in them. The *Extended Properties* property in the Initialization property group provides a means of supplying provider-specific extended connection information. The OpenLink provider supports extended properties to control:

ODBC Cursor Library usage
whether bookmarks are enabled by default on rowsets
There are three ways to enter extended properties:

Through a prompting interface supplied by the consumer application.
Initialise a Data Source object through a connection string.
Explicitly set the DBPROP_INIT_PROVIDERSTRING property in the consumer application code.

9.3.1 Using a Consumer Supplied Prompting Interface

The OpenLink provider does not display a prompting interface of its own for entering OLE DB specific connection information. It relies instead upon the application supplying it.

OLE DB provides several core components, one of which is the Data Link component. The Data Link component provides a default prompting interface and is used by numerous Microsoft applications. It typically includes a page displayed by the All tab, which allows users to set values for all the Initialization properties supported by an OLE DB provider. The Extended Properties property can be set on this page. For the OpenLink provider, you should enter key-value pairs for any supported extended properties you wish to set, such as:

```
Cursors=Driver
```

9.3.2 Using a Connection String

The connection string is used to contain connection specific details as semi-colon delimited key=value pairs so that the Broker/Agent facilitating the connection can chose the correct database and method. The details provided on various setup panels form the connect string automatically upon use. Applications can use hand made connection strings to avoid DSN configurations or prompting during exection. The parameters that can be used are as follows:

The connection string should contain a key-value pair for the Extended Properties keyword, such as:

PROVIDER=OpenLinkODBC
DRIVER={OpenLink Generic 32 Bit driver v4.0}
HOST=BrokerHostNameOrIP
PORT=BrokerListenPort
SVT=DBMSType/Provider
DATABASE=myDatabaseName
UID=myUsername
PWD=myPassword
PROTOCOL=TCP/IP
FBS=FetchBufferSize (Rows 1-99)

DLF=DeferLongFetch [y|n]

OPTIONS=opts

READONLY=[y|n]

DSN=myDSNname

```
        ;Extended Properties= Cursors=ODBC ;
```

Which is used for setting the cursor mode and/or bookmarking.

9.3.3 Using The DBPROP_INIT_PROVIDERSTRING Property

Applications can set this initialization property directly.

9.4 Controlling ODBC Cursor Library Usage

The OpenLink ODBC Provider requires that the underlying ODBC driver supports some form of scrollable cursor. In order to support OLE DB rowsets, the minimum scrolling functionality requirements include:

- bookmark support
- absolute cursor positioning
- backwards scrolling

Keyset driven and static cursors both support this functionality. All OpenLink ODBC drivers support these cursor models. However, if the OpenLink ODBC provider is to be used with a third party driver, either the driver must support one of these cursor types natively, or the Microsoft ODBC Cursor Library must be used. The latter only supports static scrollable cursors, but provides sufficient functionality to allow third party drivers to be used with the OpenLink provider. When using an OpenLink ODBC driver, it is preferable not to use the Microsoft Cursor Library.

To control how the OpenLink Provider uses the ODBC Cursor Library, the provider supports the provider specific keyword Cursors in the Extended Properties property string. The keyword can be set to one of three values:

- ODBC
- Driver
- IfNeeded

The meaning of each of these values is analogous to their ODBC counterpart SQL_CUR_USE_xxx. The default setting is Cursors=IfNeeded.

The table below lists the required Cursors setting for various ODBC drivers when used with the OpenLink ODBC Provider.

Table 7.1. Features Comparison

ODBC Driver	Cursor	Comments
All OpenLink ODBC drivers	Driver or IfNeeded (default)	The native scrollable cursor support in the OpenLink drivers provides the necessary functionality
Native Microsoft SQL Server driver	ODBC	The native scrollable cursor support is inadequate.

9.5 Controlling the Default Bookmark Setting for Rowsets

The extended property keyword BookmarkDefault controls whether rowsets are created with or without a bookmark column by default. OLE DB does not specify what the default behaviour should be. The OpenLink provider includes a bookmark column by default. Normally it should not be necessary to change this setting. To explicitly turn bookmarks on or off, use an entry of the form: BookmarkDefault=On|Off.

9.6 Known Issues

These are the known issues that apply to the OpenLink OLEDB provider as of September 2005:

9.6.1 General Issues

- The OpenLink ODBC Provider does not allow a consumer to specify the type of server-side cursors used internally. ADO consumers, for instance Visual Basic 6 and Visual Interdev 6, should use client-side cursors.
- Batched commands are not supported.

9.6.2 .Net

- Automatic generation of the DeleteCommand, InsertCommand and UpdateCommand properties of a DataAdapter by a CommandBuilder is not supported.
- Parameters must be bound in the order they occur in a command.

9.6.3 Visual Interdev 6

Visual Interdev uses the username you specify at connect time as the owner qualifier when referring to schema objects. If the target database uses case-sensitive qualifiers, the case of the username you specify when connecting must match the case of the owner qualifier of schema objects belonging to that user. For instance, if using the Oracle sample user SCOTT , connect as SCOTT not scott . If the incorrect case is used, Visual Interdev may fail to retrieve schema information. One manifestation of this problem is that the Query Builder may not list the columns belonging to a table.

9.6.4 Visual Basic 6 and ADO

When specifying the SQL for the Recordsource property in an ADO Data Control (ADO DC), you must quote the table name. If you do not, VB converts the SQL to lowercase and then quotes the table name when attempting an update. e.g. If you enter select * from emp , when attempting an update, this becomes update emp . Databases which support case-sensitive schema object names, e.g. Oracle, will then either reject this SQL, complaining that the table doesn t exist, or reference the wrong table. To avoid this problem, enter the query as select * from EMP .

9.6.5 SQL Server Data Transformation Services

The provider implements interface IRowsetFastLoad. This is an interface specific to the SQL Server OLE DB Provider and is required by SQL Server DTS, even on third party OLE DB providers. Export of tables from SQL Server to Oracle using DTS is possible.

The OpenLink OLE DB provider uses a scrollable cursor to support scrolling over rowsets. OpenLink scrollable cursors require a unique row identifer (primary key, rowid etc.) to act as a key column. If the table(s) used to populate the OLE DB rowset do not have a primary key or similar then the OpenLink OLEDB provider can still provide a rowset however it will be created as read only. With Oracle, the pseudo column rowid acts as a key - the table does not have to have a primary key to make the rowset writeable. With DB2, the table(s) must have a primary key otherwise the rowset will be read only.

If you choose to export all primary and foreign keys in the table, the DTS appears to assume it is talking to SQL Server when creating the target table. It uses a fixed SQL syntax in the CREATE TABLE command to express the primary key as a table constraint. Oracle accepts this syntax, however DB2 rejects it.

As a consequence of the above currently the only way to export a table to DB2 is to manually create the target table before launching DTS. If the target table already exists, DTS does not attempt to create it; it just copies the data from the source table. The manually created table must have a primary key.

The DTS does not handle quoting of the target table name correctly. The user must specify the target table name using the appropriate case which does not require quoting. e.g. When exporting to Oracle, give the table name in uppercase.

9.6.5.1 Provider Options in the SQL Server Enterprise manager

When setting up a linked server using the Enterprise Manager you can configure the way SQL Server uses your OLE DB provider by clicking on the Provider Options button just under the box where the provider is selected. The options in the Provider Options dialogue box apply to the provider rather than the specific server so any changes made here will effect all linked servers using that provider. A list of all the servers using the provider is given in the bottom half of the box.

Note that once a server has been created it is not possible to change these options in the property page for that server. To change them after the linked server has been created you have to create a new server and alter the options there. Making changes to these options when creating a new linked server affects all existing linked servers. Once you have set up a linked server the options you have chosen effectivley become the defaults for the provider you are using.

A document describing the Provider Options, called 'Configuring OLE DB Providers for distributed Queries', can be found in the SQL Server Books Online documentation or on the web at http://msdn.microsoft.com/library/default.asp?url=/library/en-us/adminsql/ad_1_server_8ib7.asp

By default none of the options is enabled for our driver. These options are specifically for SQLServer distributed queries using linked servers rather than being general OLE DB options.

9.6.5.2 Provider Options

Dynamic Parameters - you can set this if the provider supports the ICommandWithParameters interface. This in supported in the OpenLink provider.

NestedQueries - can be set if provider allows SELECT in a FROM clause. May cause concerns with the underlying Cursor libraries. This option should not be enabled if the underlying DSN or DBMS does not allow nested queries.

LevelZeroOnly - Should not be enabled.

Allow InProcess - This option should be checked. Checking this option stops errors like: `Error 7311: Could not obtain the schema rowset for OLE DB provider 'UNKNOWN'. The provider supports the interface, but returns a failure code when it is used. OLE DB error trace [OLE/DB Provider 'UNKNOWN' IDBSchemaRowset::GetRowset returned 0x800706c6:].`

Error 0x800706c6 is RPC_S_INVALID_BOUND. The error message identifies the OLE DB provider that the error comes from as UNKNOWN and our log files show no sign of the error. SQL Server uses a proxy/stub dll, msdaps.dll, to marshal oledb interfaces between processes/apartments. These errors from the 'UNKNOWN' provider come from msdaps.dll. If the OLE DB provider is invoked out of process or is marked as apartment model then this stub gets used. By default if the OLE DB provider is a Microsoft provider then SQL Server invokes it in process and this proxy is not used. Checking the Allow InProcess box when using our provider ensures that this stub dll is not used and so avoids this error.

NonTransactedUpdates - this is entirely up to the user to choose.

IndexAsAccessPath - should be left disabled.

DisallowAdhocAccess - Disables use of OPENROWSET and OPENDATASOURCE with the provider. Up to the user to choose

9.6.5.3 Connection Errors. Error 0x80004005

If the linked server has problems connecting then the following error is generated:

```
Error 7399: OLE DB provider 'OpenLinkODBC' reported and error. The provider
did not give any information about the error. OLE DB error trace [OLE/DB
Provider'OpenLinkODBC' IDBInitialize::Initialize returned 0x80004005: The
provider did not give any information about the error.].
```

Reasons for this error could be:

The ODBC DSN does not exist

The linked database is not started

Username or password not set up correctly on the security property page.

The first thing to check when getting this error is that the underlying ODBC DSN is connecting correctly and after that if the DSN name has been spelt correctly in the linked server definition. This error may also occur when using the OPENQUERY, OPENROWSET, and OPENDATASOURCE syntax. In addition to the connection errors listed above other causes of this error may be an incorrect table, column or owner name in the statement.

9.6.5.4 Using SQLServer Authentication

When using OPENROWSET or OPENDATASOURCE options on logging into SQL Server using SQL Server authentication, the following error might be seen:

```
Could not perform Windows NT authentication because delegation is not
available.
```

This error is avoided if the connection to the SQL Server is made using Windows NT authentication.

This problem only occurred when using OPENROWSET and OPENDATASOURCE not with OPENQUERY, i.e. only when the connection information was given in the query not when a linked server had been set up in the Enterprise Manager.

9.6.5.5 Linking Progress Servers.

Linking to Progress using a SQL-89 datasource works if the linked server is set up in the Enterprise Manager and the OPENQUERY syntax is used. Connections made using the OPENDATASOURCE or OPENROWSET syntax fail. The Progress SQL-89 engine does not handle the SQL generated by SQL Server when executing the OPENROWSET or OPENDATASOURCE query.

Linking to Progress using a SQL-92 datasource works using OPENQUERY, OPENDATASOURCE and OPENROWSET.

9.6.5.6 Inconsistent Metadata

Queries that fail with errors about inconsistent metadata usually indicate that there is a discrepancy between the information returned from SQLColumns and from SQLDescribeCol by the underlying ODBC driver.

9.7 Objects and Interfaces Implemented by the OpenLink Provider

The OpenLink provider implements four OLE DB objects.

- The data source object, which enables consumers to connect and initialize the interaction with the database.
- The session, which enables consumers to create a rowset for the data set in the database.
- The rowset, which exposes a data set to the consumer.
- The command, which enables consumers to create a SQL string for the data in the database.

These objects, along with the interfaces implemented in the OpenLink provider, are described below.

Table 7.2. OLE-DB Interfaces Implemented

Interface name	Method name
IDBInitialize	Initialize Uninitialize
IDBCreateSession	CreateSession
IDBProperties	GetProperties GetPropertyInfo SetProperties
IPersist	GetClassID
IGetDataSource	GetDataSource
ICommand	Cancel Execute GetDBSession
ICommandText	GetCommandText SetCommandText
ICommandProperties	GetProperties SetProperties
ICommandPrepare	Prepare

Interface name	Method name
	Unprepare
IOpenRowset	OpenRowset
IColumnsInfo	GetColumnInfo
	MapColumnIDs
IConvertType	CanConvert
IAccessor	AddRefAccessor
	CreateAccessor
	GetBindings
	ReleaseAccessor
IRowset	AddRefRows
	GetData
	GetNextRows
	ReleaseRows
	RestartPosition
IRowsetInfo	GetProperties
	GetReferencedRowset
	GetSpecification
IRowsetChange	DeleteRows
	InsertRow
	SetData
IRowsetLocate	Compare
	GetRowsAt
	GetRowsByBookmark
	Hash
ISessionProperties	GetProperties
	SetProperties
ISupportErrorInfo	InterfaceSupportsErrorInfo
IErrorInfo	GetDescription
	GetGUID
	GetHelpContext
	GetHelpFile
	GetSource
IErrorLookup	GetErrorDescription
	GetHelpInfo
	ReleaseErrors

Interface name	Method name
ISQLErrorInfo	GetSQLInfo

9.7.1 Invoking the OpenLink Provider

The OpenLink ODBC Provider (oploleod.dll) can be loaded using a variety of methods, depending on your programming environment.

9.7.1.1 Using CoCreateInstance

If you are writing an application which calls the OLE DB API directly, a consumer typically creates a provider's Data Source object by passing the provider's class identifier (CLSID) to the COM CoCreateInstance function and requesting the IDBInitialize interface. Every OLE DB provider declares a unique CLSID for itself. The CLSIDs for the OpenLink ODBC Provider, the OpenLink Error Lookup Service and the OpenLink ODBC Data Source Enumerator are given in the example below, which declares macros for each of the class identifiers.

```
#ifdef DBINITCONSTANTS
// Provider CLSID
EXTERN_C const CLSID CLSID_OPLOLEDB =
  {0X2D93A18D, 0XAC86, 0X11D1, {0X9C, 0XEA, 0XE5, 0X2A, 0X53, 0XBE, 0XA0, 0X7D}};
// OpenLink Error Lookup Service CLSID
EXTERN_C const CLSID CLSID_OPLOLEDB_ERROR =
  {0X2D93A18E, 0XAC86, 0X11D1, {0X9C, 0XEA, 0XE5, 0X2A, 0X53, 0XBE, 0XA0, 0X7D}};
// OpenLink ODBC Data Source Enumerator CLSID
EXTERN_C const CLSID CLSID_OPLOLEDB_ENUM =
  {0X2D93A190, 0XAC86, 0X11D1, {0X9C, 0XEA, 0XE5, 0X2A, 0X53, 0XBE, 0XA0, 0X7D}};
#else //DBINITCONSTANTS
EXTERN_C const CLSID CLSID_OPLOLEDB;
EXTERN_C const CLSID CLSID_OPLOLEDB_ERROR;
EXTERN_C const CLSID CLSID_OPLOLEDB_ENUM;
#endif //DBINITCONSTANTS
IDBInitialize * pIDBInitialize;
HRESULT hr;
hr = CoCreateInstance(CLSID_OPLOLEDB, NULL, CLSCTX_INPROC_SERVER,
      IID_IDBInitialize, (void**) &amp;pIDBInitialize);
if (FAILED(hr))
{
   // Display error
...
}
```

9.7.2 Connecting from ADO or .Net

The provider's name is "OpenLinkODBC". The OpenLink OLE DB Provider is invoked from ADO or .Net using a connection string which typically takes the following form:

Provider=OpenLinkODBC; Data Source=*w2ks2*;User ID=*SCOTT*;Password=*tiger*;Extended Properties="Cursors=Driver;BookmarkDefault=On";

9.7.3 Initialization Properties

When the consumer calls IDBInitialize::Initialize, the OpenLink Provider calls the UDBC/ODBC functions SQLSetConnectOption, to set various connection options, and SQLDriverConnect, to connect to an ODBC data source. The values passed to SQLSetConnectOption and SQLDriverConnect come from the initialization properties set by the consumer.

When the data source object is first created, the value of each initialization property is set to a default value.

9.7.3.1 Initialization Properties Used

The following lists the initialization properties currently used by the OpenLink Provider. Any properties not listed are not used by the OpenLink Provider.

Table 7.3. OLE-DB Initialization Properties

Property	Description
DBPROP_AUTH_PASSWORD	Passed as the value of the PWD keyword in SQLDriverConnect.
DBPROP_AUTH_USERID	Passed as the value of the UID keyword in SQLDriverConnect.
DBPROP_INIT_CATALOG	Sets the initial catalog for data sources which recognise catalogs.
DBPROP_INIT_DATASOURCE	Passed as the value of the DSN keyword in SQLDriverConnect.
DBPROP_INIT_HWND	Passed as the value of the hwnd argument in SQLDriverConnect.
DBPROP_INIT_MODE	Mapped to the ODBC connect option SQL_ACCESS_MODE.
DBPROP_INIT_PROMPT	Passed as the value of the fDriverCompletion parameter in SQLDriverConnect.
DBPROP_INIT_PROVIDERSTRING	Specifies extended properties for controlling ODBC Cursor Library usage (through the 'Cursors' keyword) and the whether bookmarks are exposed by default on rowsets (through the 'BookmarkDefault' keyword).
DBPROP_INIT_TIMEOUT	Mapped to the ODBC connect option SQL_LOGIN_TIMEOUT.

9.7.3.2 Setting and Getting Provider Properties

The data source object is the first object created when a consumer instantiates the provider by calling *CoCreateInstance*.

The data source object provides the starting point for communications between the provider and consumer. For example, a consumer can call *CoCreateInstance* and request an *IDBInitialize* interface pointer to instantiate a data source object. The provider has a CLSID (class ID) that is stored in the Windows Registry. The consumer can use this CLSID with *CoCreateInstance* to instantiate the data source object. The OpenLink provider setup program registers the OpenLink provider in the Windows Registry.

The data source object is responsible for setting and returning information about the properties supported by the provider and exposing the list of supported keywords and literals. This functionality is supported through the mandatory *IDBProperties* interface and the optional *IDBInfo* interface. The *IDBProperties* interface contains three methods:

- *GetProperties* returns the list of properties currently set on the data source object.
- *GetPropertyInfo* returns information about supported rowset and data source properties.
- *SetProperties* sets the properties on the data source object.

The *IDBInfo* interface contains two methods:

- *GetKeywords* returns a list of supported keywords.
- *GetLiteralInfo* returns information about literals used in text commands.

9.7.4 Initializing and Uninitializing the Data Source Object

The *IDBInitialize* interface contains two methods: *Initialize* and *Uninitialize*.

Initialize enables consumers to explicitly initialize a data source object. Consumers must set properties on the data source object before attempting to initialize it; and consumers must supply a valid datasource name to the database in IDBProperties::SetProperties. If the datasource is invalid, the OpenLink provider returns an E_FAIL error on initialization.

Uninitialize enables consumers to return the data source object to an uninitialized state. It is an error to call *IDBInitialize::Uninitialize* when there are open sessions or rowsets on the data source object.

9.7.5 Creating a Session

After you initialize the data source object, you must create a session object to manage the session and provide the framework needed to create a rowset with *IOpenRowset::OpenRowset*. The *IDBCreateSession::CreateSession* interface on the data source object enables you to create a new session object and returns an interface pointer to the session.

Once the session has been created, the provider must expose the interface pointer to the data source object that created the session. This interface pointer is exposed through the mandatory interface IGetDataSource.

9.7.6 Creating a Rowset

The session contains the interface that enables consumers to open a database and create a rowset object containing all rows in the database. The OpenLink provider implements both the *IOpenRowset*, and the *ICommand* (and associated *ICommandText, ICommandProperties)* interfaces on the session to create a rowset..

9.7.6.1 Instantiating and Exposing a Rowset

The *IOpenRowset* interface contains a single method: *OpenRowset*. *IOpenRowset* is a required interface on the session. *IOpenRowset::OpenRowset* can be used by consumers that do not support command objects to generate a rowset of all rows in a table or index.

The *ICommand* interface contains the method: *Execute*. *ICommand::Execute* generates a rowset from the SQL query set by *ICommandText::SetCommandText*.

9.7.6.2 Consumer and Provider Interactions with the Rowset

After receiving the rowset interface pointer, the consumer can request rowset metadata from the provider through *IColumnsInfo*. The consumer then creates bindings by requesting *IAccessor* from the provider and specifying the bindings through *IAccessor::CreateAccessor*. The provider returns a handle to the accessor to the consumer.

The consumer then requests a number of rows from the provider using *IRowset::GetNextRows*. The provider retrieves the data for these rows and stores it in the data cache. The provider then returns an array of row handles to the consumer. Each row handle returned by the provider has an initial reference count of one. The consumer is then free to get the data for any rows from the provider using *GetData*. The consumer supplies *GetData* with the row handle, the handle of an accessor, and the buffer location into which to return the data; the provider copies the data to the location specified by the consumer.

To update rows, consumers call *IRowsetChange::SetData*, which sets the data in the data cache to the values specified by the consumer. To delete rows from the rowset, the consumer calls *IRowsetChange::DeleteRows*. To insert rows into the rowset, the consumer calls *IRowsetChange::InsertRow*. Note that the OpenLink Provider is not able to fetch back a newly inserted row if the underlying datasource does not provide this functionality.

When the consumer makes any change to data in the data cache, the effects of the change are written to the data source immediately. OLE DB specifies a change-buffering model, which enables the consumer to make changes that are not realized until the consumer calls *IRowsetUpdate::Update*; this model is not supported by the OpenLink provider.

When the consumer has finished working with a row, it can release the row by calling *IRowset::ReleaseRows*. *ReleaseRows* simply decrements the reference count on the row in the data cache. If the reference count for that row reaches zero, the row data is released from the data cache.

9.7.7 Exposing Metadata

the OpenLink Provider expose information about the columns of a rowset through *IColumnsInfo*. The information for each column is returned in a DBCOLUMNINFO structure. OLE DB also has an optional metadata interface, *IColumnsRowset*; the OpenLink provider does not implement this interface.

The *GetColumnInfo* method returns metadata that is most commonly used by consumers: column ID, column name, the ordinal number of the column in the rowset, the column's data type, and so on.

The provider returns the information in an array of DBCOLUMNINFO structures, one DBCOLUMNINFO structure per column in the rowset. The order of the structures returned in the array is the order in which the columns appear in the rowset.

9.7.7.1 IColumnsInfo

Columns that have an ODBC SQL type of SQL_LONGVARCHAR or SQL_LONGVARBINARY are returned as type DBTYPE_BYTES or DBTYPE_STR, and the DBCOLUMNFLAG_ISLONG is set in the dwFlags element of the DBCOLUMNINFO structure.

9.7.7.2 Returning Column Ordinals

Columns in a rowset are identified by a column ID, which is a value of type DBID in the DBCOLUMNINFO structure.

The *MapColumnIDs* method returns column ordinals for all column IDs provided in the *rgColumnIDs* array. Column ordinals do not change during the life of the rowset, but may change between different instances of the rowset.

9.7.8 Supported Conversions

Before the consumer creates an accessor, it can call *IConvertType::CanConvert* to determine if the provider supports a particular conversion.

9.7.8.1 Default Data Type Mapping

The OpenLink Provider binds to the ODBC/UDBC data source using the types in the table below. The SQL type is queried using SQLDescribeCol. The sign of the data type (signed/unsigned) is determined using SQLColAttributes. It is used in deciding which C type to use in internal buffers and which type indicator to return through *IColumnsInfo::GetColumnInfo*.

Table 7.4. OLE-DB Data Type Mappings

SQL Type Indicator	Indicator of C Type Used For Internal Buffers	OLE DB Type Indicator
SQL_CHAR, SQL_VARCHAR, SQL_LONGVARCHAR, SQL_DECIMAL, SQL_NUMERIC	SQL_C_CHAR	DBTYPE_STR
SQL_BIT	SQL_C_BIT	DBTYPE_BOOL
SQL_TINYINT, SQL_SMALLINT	SQL_C_USHORT, SQL_C_SSHORT	DBTYPE_I2
SQL_INTEGER	SQL_C_ULONG, SQL_C_SLONG	DBTYPE_I4
SQL_BIGINT	SQL_C_STR	DBTYPE_STR
SQL_REAL	SQL_C_FLOAT	DBTYPE_R4
SQL_FLOAT, SQL_DOUBLE	SQL_C_DOUBLE	DBTYPE_R8
SQL_BINARY, SQL_VARBINARY, SQL_LONGVARBINARY	SQL_C_BINARY	DBTYPE_BYTES
SQL_DATE	SQL_C_DATE	DBTYPE_DATE
SQL_TIME	SQL_C_TIME	DBTYPE_DATE
SQL_TIMESTAMP	SQL_C_TIMESTAMP	DBTYPE_DATE

9.7.8.2 Length Binding

For types DBTYPE_UI1, DBTYPE_I2, DBTYPE_I4, DBTYPE_I8, DBTYPE_R4, DBTYPE_R8, DBTYPE_CY, DBTYPE_NUMERIC, the length binding is always set to the fixed size of the destination binding type, rather than the internal source type.

9.7.8.3 Supported Data Conversions

The follwoing table outlines the supported type conversion implemented in the OpenLink provider. An 'X' means supported, and '-' means not supported.

Table 7.5. OLE-DB Data Type Conversions

	I1	**I2**	**I4**	**I8**	**UI1**	**UI2**	**UI4**	**UI8**	**R4**	**R8**	**CY**	**DEC**	**NUM**	**BOOL**	**DATE**	**DBDATE**	**DBTIMESTAMP**	**DBTIME**	**BY**
I1	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	X
I2	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	X
I4	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	X
I8	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	X
UI1	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	X
UI2	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	X
UI4	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	X
UI8	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	X
R4	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	X
R8	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	X
CY	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	X
DEC	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	X
NUM	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	X
BOOL	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	X
DATE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X
DBDATE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	X	X
DBTIME	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	X	X	X
DBTIMESTAMP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X
BYTES	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X
BSTR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WSTR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
DISP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X
UNK	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X
GUID	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X

9.7.9 Creating and Using Accessors

Consumers describe the memory structure for their buffers through a process called binding. An accessor is a group of bindings. The OpenLink provider does not currently support reference accessors, which allow the consumer direct access to the rowset's data cache.

Accessors are implemented through *IAccessor*. Accessors are created with *IAccessor::CreateAccessor* and released with *IAccessor::ReleaseAccessor*. *IAccessor::GetBindings* can be used to determine the bindings in an existing accessor. IAccessor::AddRefAccessor enables the consumer to add a reference count to an existing accessor.

Accessors may not always be validated immediately at the time of creation. Instead, they may be validated at the time the first row is fetched. Errors will be returned at the first attempt to use such an accessor.

Creating an Accessor

CreateAccessor associates a set of bindings with an accessor handle that is used to send data to or fetch data from the rowset's data cache. The OpenLink provider supports only the DBACCESSOR_ROWDATA accessor flag, which specifies that the accessor is to be used for rowset data.

Returning Accessor Bindings

GetBindings returns the bindings in an existing accessor.

Adding a Reference Count to an Existing Accessor

AddRefAccessor adds a reference count to an existing accessor.

Releasing an Accessor

ReleaseAccessor decrements the reference count on an accessor; when the reference count reaches zero, the accessor is released.

9.7.10 Rowset MetaData

IRowsetInfo enables consumers to query the properties of a rowset through *IRowsetInfo::GetProperties*. Consumers can get an interface pointer to the object that created the rowset by calling *IRowsetInfo::GetSpecification*.

IRowset provides methods for fetching rows sequentially, exposing data from those rows to consumers, and managing the rows in the rowset. *IRowset* contains five methods: *AddRefRows*, *GetData*, *GetNextRows*, *ReleaseRows*, and *RestartPosition*.

9.7.10.1 Incrementing the Reference Count on Row Handles

AddRefRows increments the reference count on the row handles supplied by the caller. *AddRefRows* enables consumers to make multiple references to a row in the data cache.

9.7.10.2 Populating the Data Cache

IRowset::GetNextRows gets the next sequence of rows from the datasource and places them in the rowset's data cache. When *GetNextRows* is first called, it starts at the beginning of the rowset. After that, *GetNextRows* maintains information about its current position so it can proceed forward from that position. The OpenLink provider also provides support for *IRowset::RestartPosition*, which repositions the next fetch position to the beginning of the rowset.

9.7.10.3 Retrieving Data from the Data Cache

IRowset::GetData enables consumers to retrieve data from the data cache. *GetData* uses the bindings in the accessor to determine how the data should be returned and what data should be returned to the consumer's buffer. Then, *GetData* converts the data in the cache to the type specified in the binding and transfers the converted data to the consumer.

9.7.10.4 Decrementing the Reference Count on Row Handles

IRowset::ReleaseRows decrements the reference count on the rows specified. A consumer must call *ReleaseRows* once for each time a row was fetched or each time the row had its reference count incremented by *AddRefRow*. When the reference count reaches zero, the row is released if the rowset is in immediate update mode.

In providers that implement *IRowsetUpdate*, rows are released unless there are pending changes on the row. The OpenLink provider does not implement this interface; the OpenLink provider always performs rowset updates in immediate mode, which means that changes are immediately applied to the underlying data source. Therefore, the OpenLink provider does not recognize any changes as pending.

9.7.10.5 Returning to the First Row of the Rowset

IRowset::RestartPosition moves the next fetch position used by *GetNextRows* to the first row of the rowset.

9.7.10.6 Updating Rows

IRowsetChange enables consumers to change the values of columns in a row of data. If the consumer wants to change the data, it must first construct an accessor for the columns to be changed. *IRowsetChange* contains three methods: DeleteRows, InsertRow, and *SetData*.

9.7.10.7 Deleting Rows

IRowsetChange also enables consumers to delete rows from the rowset. *IRowsetChange*::*DeleteRows* deletes rows from the rowset and are applied to the data source immediately.

9.7.10.8 IRowsetChange

IRowsetChange is implemented using the UDBC/ODBC function SQLSetPos. It therefore can be exposed only when the underlying datasource supports SQLSetPos. Newly inserted rows cannot be updated.

10 Chapter 8. OpenLink JDBC Driver (Single-Tier Edition)

Introduction
The OpenLink Drivers for JDBC enable the development, deployment, and utilization of database independent Java Applications, Applets, Servlets, and Bean Components (collectively called JDBC Clients) that conform to the JDBC 1.0.2, JDBC 1.1.x, or JDBC 2.0.x specifications from JavaSoft.

JDBC clients are built by importing the "java.sql.*" collection of classes known as the JDBC Driver Manager interface. The JDBC Driver Manager uses JDBC URLs to link JDBC clients with JDBC Drivers. It is important to note that JDBC URLs are JDBC Driver specific. Detailed information regarding JDBC is available from:

http://java.sun.com/products/jdbc/index.html

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10.1 OpenLink JDBC Driver (Single-Tier Edition) for Java Database Connectivity (JDBC)

10.1.1 New JDBC Driver Packages

OpenLink now has a broader range of JDBC Driver types which also transcend JDBC versions.

The drivers are now categorized as follows:

- Generic Drivers for JDBC 1.1.x (compatible with Java Virtual Machine version 1.1.x)
- Generic Drivers for JDBC 2.0 (compatible with Java Virtual Machine version 1.2 & 1.3)
- Generic Drivers for JDBC 3.0 (compatible with Java Virtual Machine version 1.4)
- Megathin Drivers for JDBC 1.1.x (compatible with Java Virtual Machine version 1.1.x)
- Megathin Drivers for JDBC 2.0 (compatible with Java Virtual Machine version 1.2 & 1.3)
- Megathin Drivers for JDBC 3.0 (compatible with Java Virtual Machine version 1.4)

The following table depicts how each of these drivers is packaged, what JDBC Driver formats are supported, and whether they are certified 100% Pure Java or Not:

Table 8.1.

Product Name	Java Package	JDBC Driver Name	JDBC Driver Formats	100% Pure Java ?
Generic Drivers for JDBC 1.1.x	opljdbc.jar	openlink.jdbc.Driver	1,2,3	N
Generic Drivers for JDBC 2.0	opljdbc2.jar	openlink.jdbc2.Driver	1,2,3	N
Generic Drivers for JDBC 3.0	opljdbc3.jar	openlink.jdbc3.Driver	1,2,3	N
Megathin Drivers for JDBC 1.1.x	megathin.jar	openlink.jdbc.Driver	3	Y
Megathin Drivers for JDBC 2.0	megathin2.jar	openlink.jdbc2.Driver	3	Y
Megathin Drivers for JDBC 3.0	megathin3.jar	openlink.jdbc3.Driver	3	Y

10.1.2 New Features & Enhancements

1. Enhanced Communications Layer. Prior to Release 4.1, the JDBC driver sent preformed database metadata calls in a manner considered to be redundant prior to SELECT statements. With this new release, each SELECT statement only sends and receives TCP packets associated with these metadata calls one time prior to execution.
2. Connection Pooling Support. The JDBC driver now supports connection pooling according to the JDBC 2.0 specification.
3.

   #### 10.1.2.1 Scrollable Cursors

   A new OpenLink RowSet class enables JDBC applications to take advantage of ODBC-style scrollable cursors functionality, with the ability to: retrieve rowsets, go to any row in the resultset or rowset, add new rows to the database, refresh and update any row with a single method invocation, lock and unlock any row, retrieve the current row number, as well as use ODBC-style bookmarks. This is an OpenLink extension to JDBC.

   The Drivers for JDBC 2.0 implement the Scrollable Cursor Interfaces introduced in JDBC 2.0. They also retain support for the OpenLink Scrollable Cursor extension so as to provide access to those Scrollable Cursor features that exist in ODBC but are missing from the JDBC 2.0 specification.
4.

   #### 10.1.2.2 Array Binding

   As part of the new RowSet class. It is now possible to bind data arrays to the columns of the OpenLink RowSet object, and retrieve the data directly into the arrays with a single invocation of the RowSet.next() method. Please see the accompanying demonstration application for an example of its usage.

   This approach enables you to retrieve multiple records with a reduced number of calls to the RowSet.next() method. It basically improves JDBC Application performance.
5.

   #### 10.1.2.3 openlink.sql.Statement

   This is a new OpenLink interface that extends java.sql.Statement to provide additional methods for configuring the ODBC-Style Scrollable Cursors functionality.

   You only need this functionality when working with the OpenLink Scrollable Cursor extensions. The Drivers for JDBC 2.0 implement similar features for the JDBC 2.0 Scrollable Cursor specification.
6. Security. The OpenLink client and server components for JDBC encrypt the data sent across the network between the client and server. This provides for enhanced security, particularly over a WAN. This is transparent to the application, and there are no driver specific properties for the application to set.
7. Version self-checking. The OpenLink client component for JDBC now cross checks version numbers with the server at connect time, thus ensuring that compatible components are always in use. An exception will be thrown when incompatibilities are encountered, this exception will also contain information about the component versions relating to the exception.
8.

   #### 10.1.2.4 Easier Client Version checking

   There is now an easier way of checking the OpenLink client for JDBC version. Make sure that the driver is in the classpath and then at your command prompt enter the command:

   ```
   java openlink.jdbc.Driver
   ```

   (for JDK 1.x Drivers)

or

```
        java openlink.jdbc2.Driver
```

(for JDK 1.2 or 1.3/2.0 Drivers)

or

```
        java openlink.jdbc3.Driver
```

(for JDK 1.4/3.0 Drivers)

or

```
        java openlink.jdbc.Driver
```

(for 100% Pure Java Drivers for JDK 1.x)

or

```
        java openlink.jdbc2.Driver
```

(for 100% Pure Java Drivers for JDK 1.2 or 1.3/2.0)

or

```
        java openlink.jdbc3.Driver
```

(for 100% Pure Java Drivers for JDK 1.4/3.0)

The driver will respond with appropriate version and release number information.

9. OpenLink Native (UDBC) Bridge for JDBC. UDBC is OpenLink's Universal Database Connectivity solution for cross platform data access. The new OpenLink Client UDBC Bridge for JDBC enables JDBC binding to Native Database Interfaces without going through an ODBC Driver Manager.

10.2 Downloading Driver Software

The OpenLink Drivers for JDBC are packaged either as a bundle alongside the other OpenLink data access drivers (ODBC, UDBC, and OLE-DB) that make up the OpenLink Universal Data Access Driver Suite or as a separate release archive which contains only the OpenLink Megathin Drivers for JDBC, a 100% pure Java Driver for JDBC.

When you download the drivers as part of the data access driver suite bundle three driver types for JDBC are available to you:

- OpenLink Driver for JDBC Type 1 (JDBC-ODBC Bridge)
- OpenLink Driver for JDBC Type 2 (JDBC-Native Bridge)
- OpenLink Driver for JDBC Type 3 (Network enabled all Java Driver)

When you download the OpenLink Megathin Drivers for JDBC you only get a very thin 100% Pure Java Type 3 Driver for JDBC known as the OpenLink Megathin Driver for JDBC.

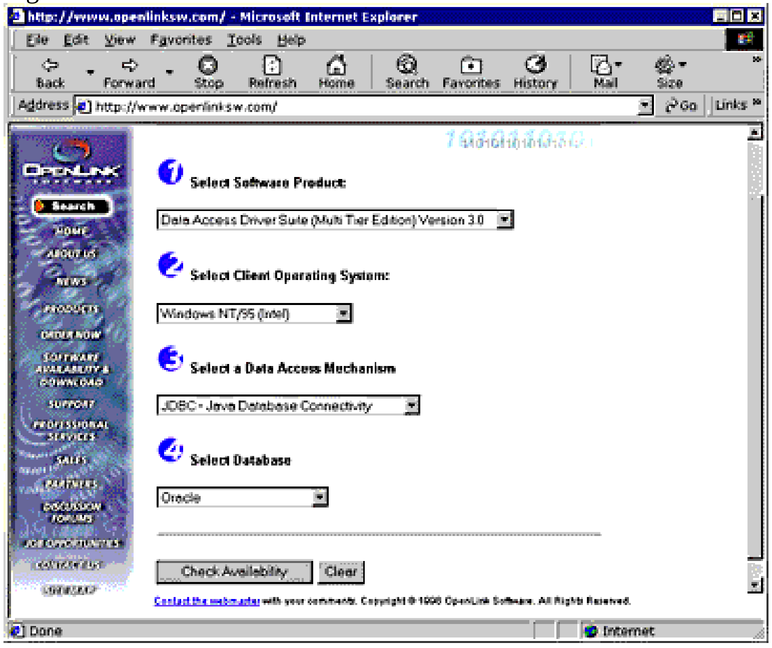
If you are not installing these Drivers from a CD you would have to visit the OpenLink Web Site's download page, http://www.openlinksw.com, to obtain these Drivers.

The screen shots that follow depict the OpenLink download wizard interaction that is required in order to download either the JDBC Driver bundle or the standalone Megathin Drivers.

10.2.1 OpenLink Web Download Wizard Interaction for obtaining OpenLink Drivers for JDBC Bundle

1. Select a Client Operating System from the "Select Client Operating System" listbox and then select a database engine that you will be connecting to via your Driver for JDBC using the "Select Database" listbox.

   Figure 8.1. Client OS

   Select Software Product: Data Access Driver Suite (Multi Tier Edition) Version 3.0

   Select Client Operating System: Windows NT/95 (Intel)

   Select a Data Access Mechanism: JDBC - Java Database Connectivity

   Select Database: Oracle

   http://www.openlinksw.com/ - Microsoft Internet Explorer
Check Availability
Clear
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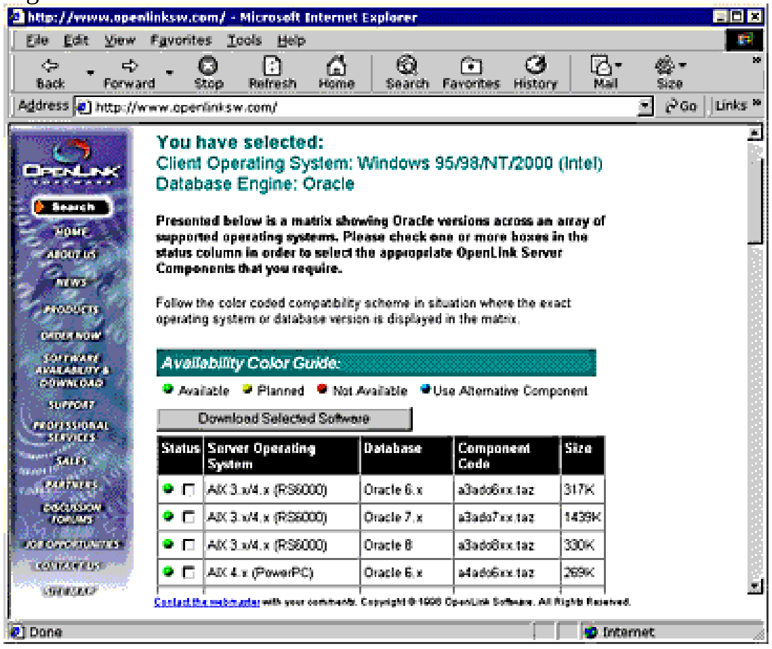
2. Pick one or more server components matching the server operating system that will host the OpenLink Server components required by the Drivers for JDBC. Then click on the "Download Selected Software" button.

   Figure 8.2. Client OS

   You have selected:
   Client Operating System: Windows 95/98/NT/2000 (Intel)
   Database Engine: Oracle

   Presented below is a matrix showing Oracle versions across an array of supported operating systems. Please check one or more boxes in the status column in order to select the appropriate OpenLink Server Components that you require.

   Follow the color coded compatibility scheme in situation where the exact operating system or database version is displayed in the matrix.

   Availability Color Guide: ● Available ● Planned ● Not Available ● Use Alternative Component

Status	Server Operating System	Database	Component Code	Size
● ☐	AIX 3.x/4.x (RS6000)	Oracle 6.x	a3ado6xx.taz	317K
● ☐	AIX 3.x/4.x (RS6000)	Oracle 7.x	a3ado7xx.taz	1439K
● ☐	AIX 3.x/4.x (RS6000)	Oracle 8	a3ado8xx.taz	330K
● ☐	AIX 4.x (PowerPC)	Oracle 6.x	a4ado6xx.taz	269K

   http://www.openlinksw.com/ - Microsoft Internet Explorer
Download Selected Software
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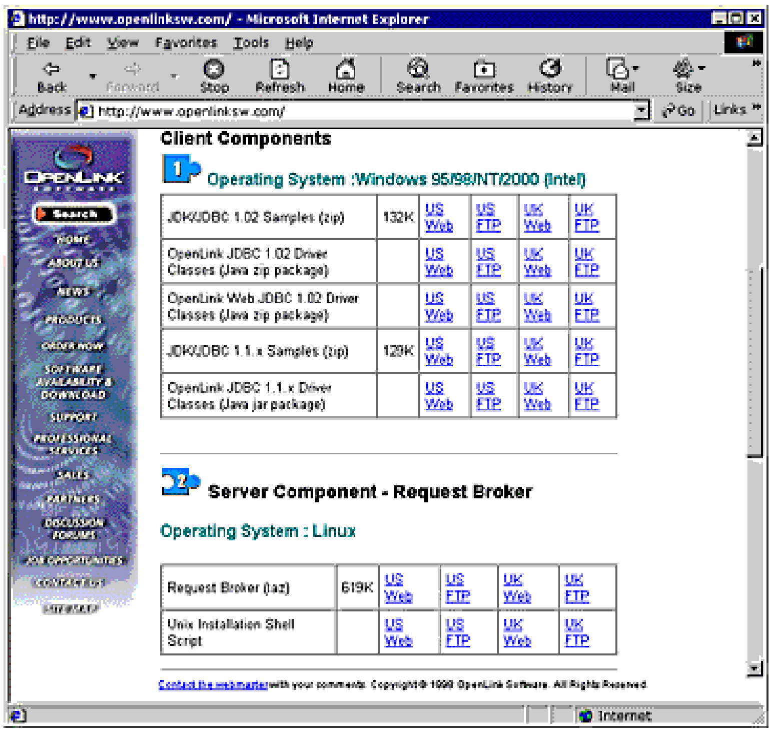
3. Download all the software components presented in the "Software Download" page.

   Figure 8.3. Software Download


http://www.openlinksw.com/ - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites History Mail Size
Address http://www.openlinksw.com/
Go Links
Search HOME ABOUT US NEWS PRODUCTS ORDER NOW SOFTWARE AVAILABILITY & DOWNLOAD SUPPORT PROFESSIONAL SERVICES SALES PARTNERS DISCUSSION FORUMS JOB OPPORTUNITIES CONTACT US SITEMAP
Internet

Client Components

1 Operating System :Windows 95/98/NT/2000 (Intel)

JDK/JDBC 1.02 Samples (zip)	132K	US Web	US FTP	UK Web	UK FTP
OpenLink JDBC 1.02 Driver Classes (Java zip package)		US Web	US FTP	UK Web	UK FTP
OpenLink Web JDBC 1.02 Driver Classes (Java zip package)		US Web	US FTP	UK Web	UK FTP
JDK/JDBC 1.1.x Samples (zip)	129K	US Web	US FTP	UK Web	UK FTP
OpenLink JDBC 1.1.x Driver Classes (Java jar package)		US Web	US FTP	UK Web	UK FTP

2 Server Component - Request Broker

Operating System : Linux

Request Broker (taz)	619K	US Web	US FTP	UK Web	UK FTP
Unix Installation Shell Script		US Web	US FTP	UK Web	UK FTP

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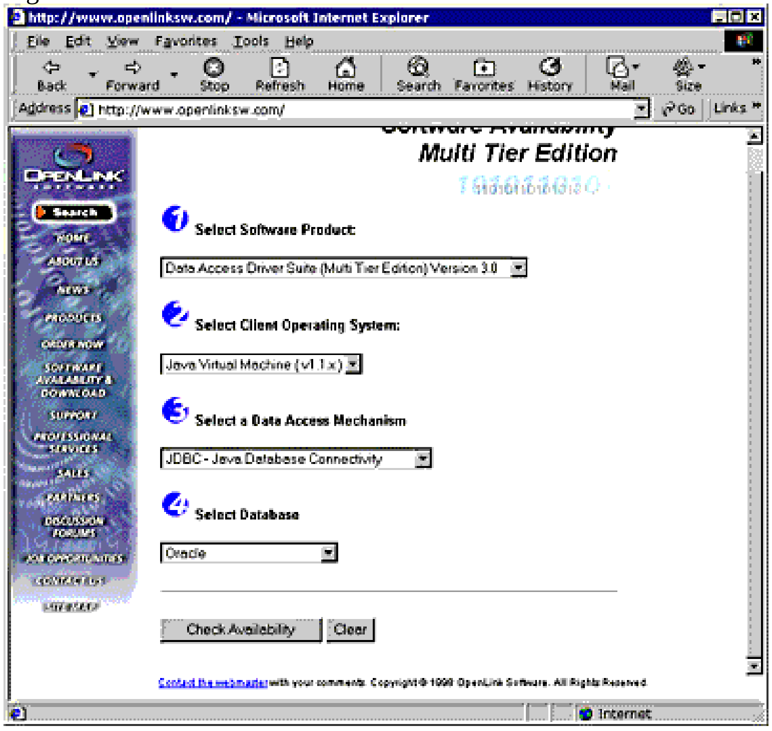
10.2.2 Download Wizard Interaction for obtaining OpenLink Megathin Drivers for JDBC

1. Select a Java Virtual Machine version from the "Select Client Operating System" listbox and then select a database engine that you will be connecting to via your Driver for JDBC using the "Select Database" listbox.

   Figure 8.4. Software Download


http://www.openlinksw.com/ - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites History Mail Size
Address http://www.openlinksw.com/
Go Links
Search HOME ABOUT US NEWS PRODUCTS ORDER NOW SOFTWARE AVAILABILITY & DOWNLOAD SUPPORT PROFESSIONAL SERVICES SALES PARTNERS DISCUSSION FORUMS JOB OPPORTUNITIES CONTACT US SITEMAP
Check Availability
Clear
Internet

Software Availability
Multi Tier Edition

1 Select Software Product
Data Access Driver Suite (Multi Tier Edition) Version 3.0

2 Select Client Operating System:
Java Virtual Machine (v1.1.x)

3 Select a Data Access Mechanism
JDBC - Java Database Connectivity

4 Select Database
Oracle

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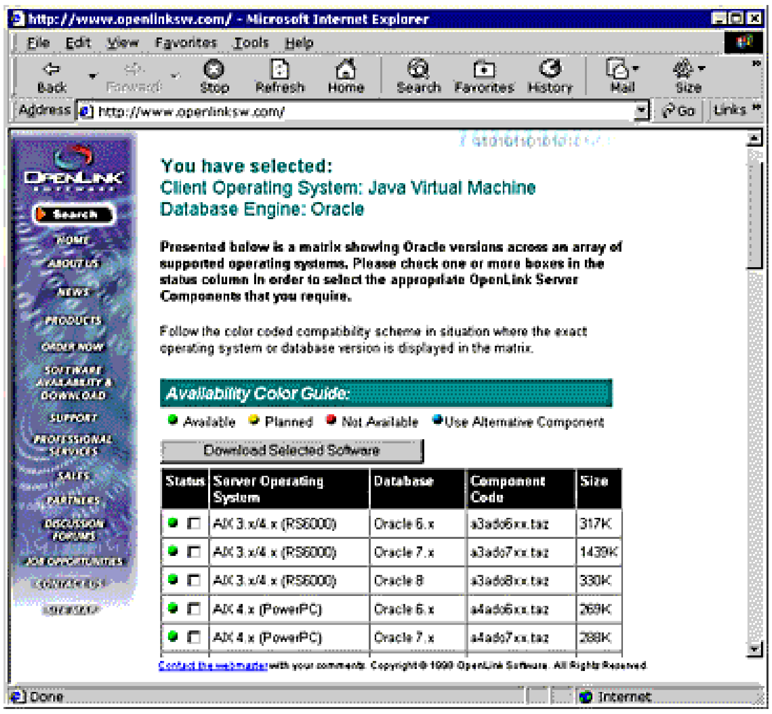
2. Pick one or more server components matching the server operating system that will host the OpenLink Server components required by the Drivers for JDBC. Then click on the "Download Selected Software" button.

   Figure 8.5. Software Download


http://www.openlinksw.com/ - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites History Mail Size
Address http://www.openlinksw.com/
Go Links
OPENLINK
Search
HOME
ABOUT US
NEWS
PRODUCTS
ORDER NOW
SOFTWARE AVAILABILITY & DOWNLOAD
SUPPORT
PROFESSIONAL SERVICES
SALES
PARTNERS
DISCUSSION FORUMS
JOB OPPORTUNITIES
CONTACT US
SITE MAP
Done
Internet

You have selected:
Client Operating System: Java Virtual Machine
Database Engine: Oracle

Presented below is a matrix showing Oracle versions across an array of supported operating systems. Please check one or more boxes in the status column in order to select the appropriate OpenLink Server Components that you require.

Follow the color coded compatibility scheme in situation where the exact operating system or database version is displayed in the matrix.

Availability Color Guide:

● Available ● Planned ● Not Available ● Use Alternative Component

Download Selected Software

Status	Server Operating System	Database	Component Code	Size
● ☐	AIX 3.x/4.x (RS6000)	Oracle 6.x	a3ado6xx.taz	317K
● ☐	AIX 3.x/4.x (RS6000)	Oracle 7.x	a3ado7xx.taz	1439K
● ☐	AIX 3.x/4.x (RS6000)	Oracle 8	a3ado8xx.taz	330K
● ☐	AIX 4.x (PowerPC)	Oracle 6.x	a4ado6xx.taz	269K
● ☐	AIX 4.x (PowerPC)	Oracle 7.x	a4ado7xx.taz	288K

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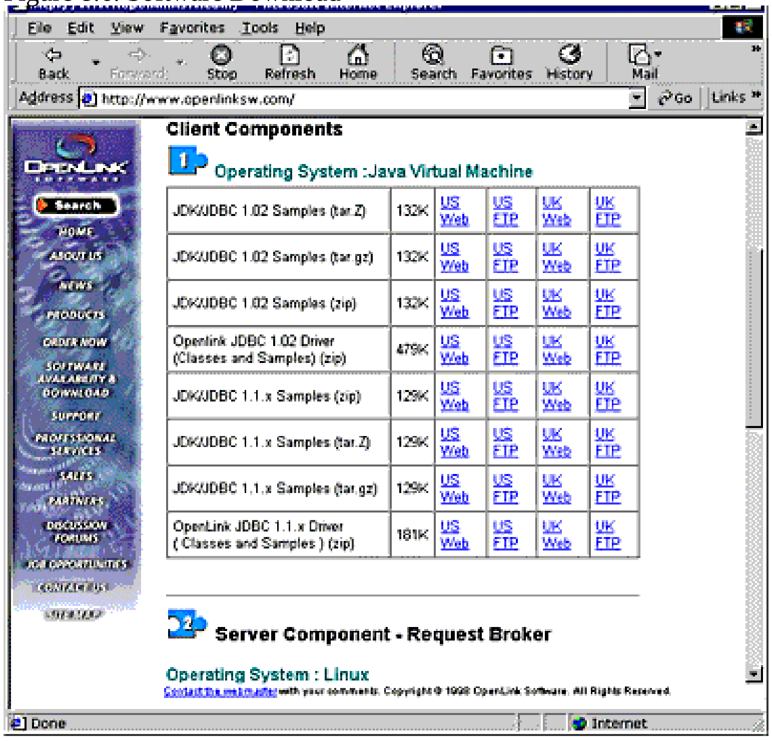
3. Download all the software components presented in the "Software Download" page.

Figure 8.6. Software Download


File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites History Mail
Address http://www.openlinksw.com/
Go Links
OPENLINK
Search
HOME
ABOUT US
NEWS
PRODUCTS
ORDER NOW
SOFTWARE AVAILABILITY & DOWNLOAD
SUPPORT
PROFESSIONAL SERVICES
SALES
PARTNERS
DISCUSSION FORUMS
JOB OPPORTUNITIES
CONTACT US
SITE MAP
Done
Internet

Client Components

1 Operating System :Java Virtual Machine

JDK/JDBC 1.02 Samples (tar.Z)	132K	US Web	US FTP	UK Web	UK FTP
JDK/JDBC 1.02 Samples (tar.gz)	132K	US Web	US FTP	UK Web	UK FTP
JDK/JDBC 1.02 Samples (zip)	132K	US Web	US FTP	UK Web	UK FTP
Openlink JDBC 1.02 Driver (Classes and Samples) (zip)	479K	US Web	US FTP	UK Web	UK FTP
JDK/JDBC 1.1.x Samples (zip)	129K	US Web	US FTP	UK Web	UK FTP
JDK/JDBC 1.1.x Samples (tar.Z)	129K	US Web	US FTP	UK Web	UK FTP
JDK/JDBC 1.1.x Samples (tar.gz)	129K	US Web	US FTP	UK Web	UK FTP
OpenLink JDBC 1.1.x Driver (Classes and Samples) (zip)	181K	US Web	US FTP	UK Web	UK FTP

2 **Server Component - Request Broker**

Operating System : Linux

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10.3 OpenLink JDBC Driver (Single-Tier Lite Edition) Configuration

The JDBC Client Classes can be downloaded as part of the OpenLink Lite Data Access bundle or separately by choosing JDBC as the client platform on the web.

Before any connections can be made using JDBC for Lite you must ensure that a Lite data source is configured correctly. Refer to the previous chapters to correctly install and configure the Database vendors communications layer and the corresponding OpenLink Lite driver.

Once the underlying OpenLink Lite Data Access Driver has been configured correctly the following section should be followed to construct suitable JDBC Connect Strings to connect to the database successfully.

10.4 OpenLink JDBC Driver (Single-Tier Edition) for JDBC Utilization

OpenLink Drivers for JDBC are available in three different JDBC Driver formats.

- JDBC Type 1. Driver for JDBC is implemented as a bridge to ODBC Drivers, thereby implementing the JDBC Driver classes through native methods, this is due to the fact that ODBC is a 'C' language based data access application programming interface. Thus, this driver format is inherently part Java and part Native, implying that it is inherently platform specific rather than independent.
- JDBC Type 2. Driver for JDBC is implemented as a bridge to Native Database Call Level Interfaces, thereby implementing the JDBC Driver classes through native methods, this is due to the fact that Native Database Call Interfaces are either C/C++ language based data access application programming interfaces. Thus, this driver format is inherently part Java and part Native, implying that it is inherently platform specific rather than independent

10.4.1 Note:

JDBC Lite can be JDBC Types 1 or 2 only because you have to address platform specific database vender software beneath.

JDBC Applets, Applications, Bean Components, and Servlets communicate with JDBC drivers through JDBC Uniform Resource Locators (URLs). Theses URLs are service request and binding formats implemented slightly differently for each OpenLink Driver for JDBC format. The general JDBC URL format is:

jdbc:<jdbc-subprotocol>:[jdbc implementation specific URL attributes]

The "sub-protocol" component of the URL above identifies each JDBC implementation and typically identifies the JDBC driver vendor, the actual URL attributes are vendor specific. Each OpenLink Driver for JDBC type has a different JDBC URL format, the sections that follow depict and provides examples of these formats.

10.4.2 OpenLink Driver for JDBC Type 1

URL Format variation 1

This driver format connects you to ODBC Data Source Names (DSNs) via JDBC. The URL format is as follows:

```
jdbc:openlink://ODBC[/DSN][/UID][/PWD][/READONLY]
```

URL Attributes

/DSN - ODBC Data Source Name

/UID - Username

/PWD - Password

/READONLY - Determines session mode, read-write or read-only.

Example:

If you were attempting to connect to an ODBC DSN on your machine named "Customers Database" in read-only mode then you would enter the following JDBC URL:

jdbc:openlink://ODBC/DSN=CustomerDatabase/UID=test/PWD=test/READONLY=Y

10.4.3 Note:

In the case of OpenLink ODBC DSNs you do not have to provide values for the /UID and /PWD attributes since these can be controlled and configured on the database or application server using the OpenLink Session Rules Book.

URL Format variation 2

This is an alternative connect string format, that is compatable with the Sun JDBC to ODBC Type 1 bridge:

```
jdbc:odbc:<dsn>;UID=<uid>;PWD=<pwd>
```

URL Attributes

<dsn> - ODBC Data Source Name

<uid> - Username

<pwd> - Password

10.4.4 OpenLink Driver for JDBC Type 2

URL Format

This driver format connects you to UDBC Data Source Names (DSNs) via JDBC. The URL format is as follows:

```
jdbc:openlink://UDBC[/DSN][/UID][/PWD][/READONLY]
```

URL Attributes

/DSN - ODBC Data Source Name

/UID - Username

/PWD - Password

/READONLY - Determines session mode, read-write or read-only.

Example:

If you were attempting to connect to an UDBC DSN on your machine named "Customers Database" in read-only mode then you would enter the following JDBC URL:

jdbc:openlink://UDBC/DSN=CustomerDatabase/UID=test/PWD=test/READONLY=Y

10.4.5 Note:

In the case of OpenLink ODBC DSNs you do not have to provide values for the /UID and /PWD attributes since these can be controlled and configured on the database or application server using the OpenLink Session Rules Book.

10.4.6 OpenLink Driver for JDBC Type 3

URL Format

This driver format connects you to remote database directly via the OpenLink Database drivers. The URL format is as follows:

```
jdbc:openlink://<Hostname>:[portnumber] [/DSN] [/UID] [/PWD] [/READONLY] [/FBS]
                [/JDBCAGENT] [/SVT] [/DATABASE] [/OPTIONS] [/DRIVER]
```

URL Attributes

Hostname - Network Alias or IP address of server machine running an OpenLink Request Broker instance

Port Number - Port number that identifies location of OpenLink JDBC Agent Service, the default value is 5000

/DSN - ODBC Data Source Name

/UID - Username

/PWD - Password

/READONLY - Determines session mode, read-write or read-only

/FBS - Sets number of JDBC resultset rows that get packed into a single network packet

/JDBCAGENT - Determines JDBC Agent type used rather than default (JDBC Agents exist for ODBC and UDBC)

/SVT - Determines OpenLink Database Agent type (Oracle, Informix, Sybase, Progress, Ingres, SQL Sever, Sybase etc.)

/DATABASE - Actual database name within a particular database environment

/OPTIONS - Values used to connect to OpenLink Database Agents to remote database servers using database vendors networking

/DRIVER - Used when making a DSN-Less connection to a remote ODBC Driver

10.4.7 Examples

10.4.7.1 Connecting To Remote Database

If you were attempting to connect to a remote Database Server Type "SQLServer 2000", hosted on a database server machine with the network alias "pluto", with an OpenLink JDBC server listening at port 5001 (rather than default of 5000), and you wanted this session to be in read-only mode then you would enter the following JDBC URL:

```
jdbc:openlink://pluto:5001/SVT=SQLServer 2000/UID=test/PWD=test/
                READONLY=YES/FBS=55
```

10.4.8 Note:

1. In the case of OpenLink ODBC DSNs you do not have to provide values for the /UID and /PWD attributes since these can be controlled and configured on the database or application server using the OpenLink Session Rules Book
2. "/FBS" ensures that each iteration of a JDBC Resultset fetch loop returns 55 records or less until all records have been retrieved from a remote database server

10.4.8.1 Connecting To Remote UDBC DSN

If you were attempting to connect to a remote UDBC DSN named "Customers Database", hosted on a database server machine with the network alias "pluto", with an OpenLink JDBC server listening at port 5001 (rather than default of 5000), and you wanted this session to be in read-only mode then you would enter the following JDBC URL:

```
jdbc:openlink://pluto:5001/DSN=CustomerDatabase/UID=test/PWD=test/
                READONLY=Y/JDBCAGENT=judbc/FBS=55
```

10.4.9 Note:

1. In the case of OpenLink ODBC DSNs you do not have to provide values for the /UID and /PWD attributes since these can be controlled and configured on the database or application server using the OpenLink Session Rules Book
2. If "pluto" is a Linux or UNIX machine then the "/JDBCAGENT" attribute defaults to "judbc" when left out of the JDBC URL. Likewise if "pluto" is a Windows 95/98/NT/2000 machine the "/JDBCAGENT" attribute defaults to "jodbc"

3. "/FBS" ensures that each iteration of a JDBC Resultset fetch loop returns 55 records or less until all records have been retrieved from a remote database server

10.4.9.1 Connecting To Databases Using DSN-Less Connections

You do not have to create ODBC or UDBC DSNs in order to use your OpenLink Drivers for JDBC when using the type 3 format. Instead you can specify the OpenLink Database Type and Database Name attributes as part of your JDBC URL.

To connect to a remote Microsoft SQL Server database without going via an ODBC DSN you would construct the following URL:

```
jdbc:openlink://saturn:5001/SVT=SQLServer6/DATABASE=pubs/UID=sa/
                PWD=/FBS=55/READONLY=Y
```

10.4.10 Notes:

1. In the case of OpenLink ODBC DSNs you do not have to provide values for the /UID and /PWD attributes since these can be controlled and configured on the database or application server using the OpenLink Session Rules Book
2. As "saturn" is a Windows 95/98/NT/2000 machine the "/JDBCAGENT" attribute defaults to "jodbc"
3. This feature applies to both OpenLink JDBC Agent types: JODBC Agent and JUDBC Agent

10.4.10.1 Connecting To Database via ODBC Driver Without A DSN (DSN-Less Connection)

This JDBC URL format is currently only supported by the OpenLink JDBC Agent for ODBC DSNs (JODBC Agent). DSN-Less connections require you to determine the ODBC connect string attributes for the ODBC Driver that you are using. For OpenLink ODBC Drivers these values are:

Table 8.2. Connect String Attributes

Attribute	Description
ServerType	Database Type
Host	Machine hosting the Database Agent serving an OpenLink ODBC Driver
Username	Valid Database Username
Password	Valid Password for Username
FetchBufferSize	Number of resultset records fetched during each ODBC fetch loop
Database	Actual database name within database server environment
NoLoginBox	Disables OpenLink ODBC Drivers attempt to present dialog when ODBC Driver determines an incomplete ODBC connect string (collection of ODBC attributes passed at connect time) good examples being missing or blank "Username" and "Password" attributes.

If you were connecting a remote Oracle database on a machine called "pluto" and you wanted this session to be read-only, your URL formal would be as follows:

```
jdbc:openlink://pluto/DRIVER={OpenLink Generic 32 Bit Driver}/Database=ORCL/Username=test/
                          PWD=test/ReadOnly=Yes/FBS=55/ServerType=Oracle 8/Host=pluto
```

10.4.10.2 Connecting To Remote Databases On Separate Server Machine (OpenLink 3-Tier Architecture)

You may choose to install your OpenLink Drivers for JDBC on an Application Server and then install your OpenLink Data Access Server components (Request Broker and Database Agents) on your dedicated database server machine. In such a scenario you will be connecting to your remote database engine using OpenLink Database Independent as opposed to your Database vendor's database specific networking middleware.

If you were connecting from your Application Server called "pluto" to a dedicated Database Server machine named "ora_server", hosting an Oracle database identified as "ORCL" you would construct the following JDBC URL:

jdbc:openlink://pluto/SVT=Oracle 6/UID=test/PWD=test/HOST=ora_server

10.4.11 Notes:

1. This feature applies to both OpenLink JDBC Agent types: JODBC Agent and JUDBC Agent
2. You could also have used the "/DSN" attribute to point to an ODBC or UDBC DSN which has been configured to connect to the Database Server machine, this simply reduces the size of your JDBC URL, but imposes the use of DSNs upon you.

10.4.11.1 Connecting To Remote Databases On Separate Server Machine Using Database Vendors Networking (Mixed 3-Tier Architecture)

Organizational standards or individual preference may present you with a scenario in which you have two server machines in use, one acting as an Application Server hosting your OpenLink Drivers for JDBC and OpenLink Data Access Server components (Request Broker & Database Agents), and the other acting as a dedicated Database Server. You may not have the necessary authority to install the OpenLink Data Access Server components on the Database Server, or you simply prefer to use your database vendors networking software which is already configured on your Application Server. This scenario can be described as a "Mixed 3-Tier" architecture, this is because you are going to use your OpenLink Database Agents atop database vendor provided networking rather than connecting to an OpenLink Database Agent using OpenLink Database independent networking.

If you were connecting to a remote Oracle database somewhere on your network from our application server called "pluto" using an ODBC DSN called "Customers" you would construct the following JDBC URL assuming a Net8 or SQL*Net "tnsname" or server alias called "ora_pluto":

```
jdbc:openlink://pluto/SVT=Oracle 8/UID=test/PWD=test/OPTIONS=ora_pluto
```

10.4.12 Notes:

1. The "/OPTIONS" JDBC URL attribute provides the entry or bind point for connecting OpenLink Database agents to Database vendors networking products. This applies to all supported OpenLink databases, see the OpenLink Database Agents configuration guide for additional information relating to the database specific formats of values passed to the "/OPTIONS" JDBC URL attribute
2. This feature applies to both OpenLink JDBC Agent types: JODBC Agent and JUDBC Agent
3. You could also have used the "/DSN" attribute to point to an ODBC or UDBC DSN which has been configured to connect to the Database Server machine, this simply reduces the size of your JDBC URL, but imposes the use of DSNs upon you.

10.5 OpenLink JDBC Driver (Single-Tier Edition) Demonstration Programs

To assist you further during your utilization or evaluation of OpenLink's Drivers for JDBC a number of demonstration JDBC compliant Applets and Applications are bundled with your OpenLink Driver for JDBC installation, these programs are provided in both binary and source code format for your free use. The sections that follow guide you through the process of using these programs

10.5.1 JDBC Compliant Applet Demos

Three JDBC applet samples are bundled with your OpenLink Driver for JDBC installation, each one of these demonstrating practical use of JDBC applets and highlighting OpenLink specific functionality. Each of these demos reside in the "samples\jdbc\jdk[10 or 11 or 12]" sub-directory below the directory into which you installed your OpenLink software. Each applet is accessible from the OpenLink Admin Assistant (an OpenLink agent that provides HTTP services like any Web Server does). The programs are:

1. JDBCDemo. demonstrates basic JDBC functionality via an Applet
2. ScrollDemo. demonstrates JDBC functionality via an Applet. It also demonstrates the additional Resultset navigation functionality provided by OpenLink's Scrollable Resultset & RowSet Extensions for JDBC on a Record by Record Basis.
3. ScrollDemo2. demonstrates JDBC functionality via an Applet. It also demonstrates the additional Resultset navigation functionality provided by JDBC 2.0
4. RowSetDemo. demonstrates JDBC functionality via an Applet. It also demonstrates the additional Resultset navigation functionality provided by OpenLink's Scrollable Resultset & RowSet Extensions for JDBC on a

RowSet by RowSet Basis.

10.5.2 JDBCDemo

This applet demonstrates basic JDBC functionality via an Applet.

Utilization Steps:

1. Start the OpenLink Request Broker
2. Start up your Web Browser
3. Enter one of the following URLs into your browser depending on the location of your OpenLink Request Broker:

   Local To you:

   ```
   http://localhost:8000
   ```

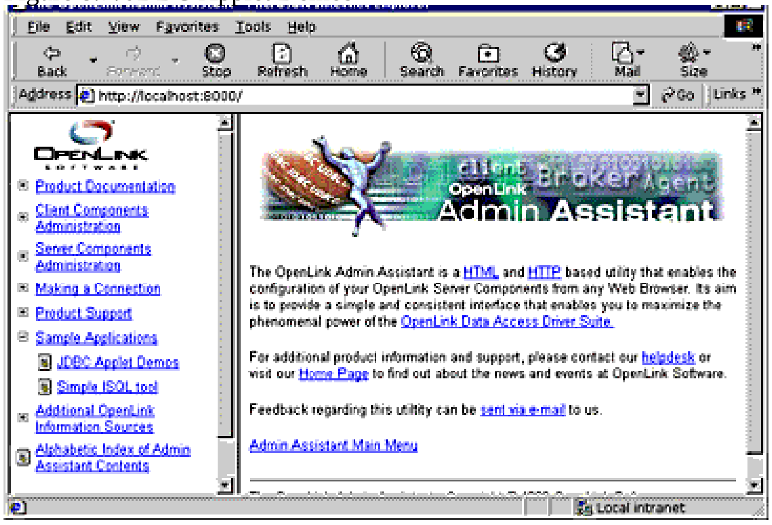
   Remote Server:

   ```
   http://<hostname or IP address of remote server>:8000
   ```

   #### 10.5.3 Note:

   Port "8000" presumes that you provide this value when prompted during your OpenLink Sever components installation.
4. Follow the Admin Assistant's Menu tree to the location of the "Sample Applications->JDBC Applet Demos" menu item. The graphic below depicts this process.

   Figure 8.7. JDBC Applet Demos


File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites History Mail Size
Address http://localhost:8000/
Go Links
OpenLink Software
Product Documentation
Client Components Administration
Server Components Administration
Making a Connection
Product Support
Sample Applications
JDBC Applet Demos
Simple ISQL tool
Additional OpenLink Information Sources
Alphabetic Index of Admin Assistant Contents
Client Broker Agent OpenLink Admin Assistant
Admin Assistant Main Menu
Local intranet

The OpenLink Admin Assistant is a HTML and HTTP based utility that enables the configuration of your OpenLink Server Components from any Web Browser. Its aim is to provide a simple and consistent interface that enables you to maximize the phenomenal power of the OpenLink Data Access Driver Suite.

For additional product information and support, please contact our helpdesk or visit our Home Page to find out about the news and events at OpenLink Software.

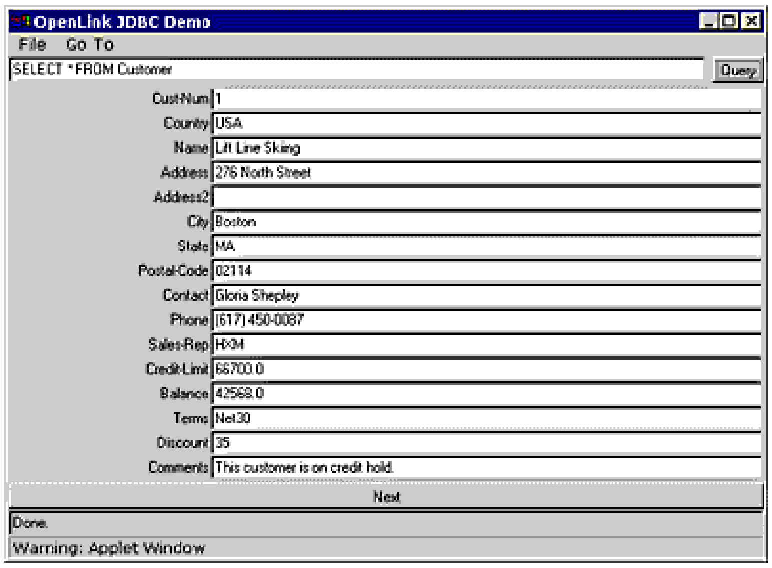
Feedback regarding this utility can be sent via e-mail to us.

5. Click on the hyperlink that reads "Applet demonstration with OpenLink Software JDBC Driver"
6. Use the Applet's File->Set Connection URL menu item set a URL pointing to an ODBC or UDBC DSN. If uncertain follows the instructions laid out in the section covering OpenLink JDBC URL formats which shows you how to construct Type 1, 2, and 3 URL formats for your OpenLink Drivers for JDBC. This applet will run with non OpenLink Drivers for JDBC but you will need to obtain URL construction information from the relevant driver vendor.

   The line below depicts the URL construction dialog presented:

   ```
               jdbc:openlink://localhost/DSN=WebJDBCDemo
   ```
7. Enter a valid SQL statement for the back end database that you are connecting to via JDBC and then click on the "Query" button. The screen shot below depicts this process.

   Figure 8.8. WebJDBC Applet Demo



SELECT * FROM Customer

Cust-Num	1
Country	USA
Name	Lift Line Skiing
Address	276 North Street
Address2	
City	Boston
State	MA
Postal-Code	02114
Contact	Gloria Shepley
Phone	(617) 450-0087
Sales-Rep	HXM
Credit-Limit	66700.0
Balance	42568.0
Terms	Net30
Discount	35
Comments	This customer is on credit hold.

Done.

Warning: Applet Window

8. Basic JDBC 1.1 functionality provides Forward-Only as opposed to Bi-Directional record Scrolling, this is why the basic JDBC applet on has a "Next" button. When you click on the "Next" button you are moved to the next record in your JDBC resultset, unfortunately you have to hit the "Query" button again and re-start the Forward-Only resultset navigation if you need to see the First or Prior resultset records from your current position. The examples that follow show how OpenLink and the new release of JDBC (version 2.0) address the Bi-Directional Scrolling Limitation demonstrated by this Applet.

10.5.4 ScrollDemo

This program demonstrates JDBC functionality via an Applet. It also demonstrates the additional Resultset navigation functionality provided by OpenLink's Scrollable Resultset & RowSet Extensions for JDBC on a Record by Record Basis.

Utilization Steps:

1. Start the OpenLink Request Broker.
2. Start up your Web Browser
3. Enter one of the following URLs into your browser depending on the location of your OpenLink Request Broker:

   Local To you:

   http://localhost:8000

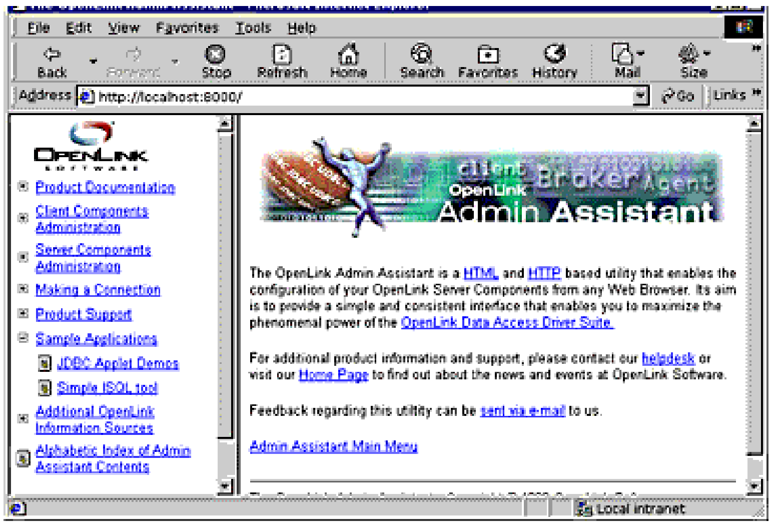
   Remote Server:

   http://<hostname or IP address of remote server>:8000

   ### 10.5.5 Note:

   Port "8000" presumes that you provide this value when prompted during your OpenLink Sever components installation.
4. Follow the Admin Assistant's Menu tree to the location of the "JDBC Applet Demos" menu item. The graphic below depicts this process.

   Figure 8.9. WebJDBC Applet Demo


File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites History Mail Size
Address http://localhost:8000/
Go Links
OpenLink Client Broker Agent Admin Assistant
Local intranet

OPENLINK SOFTWARE

- Product Documentation
- Client Components Administration
- Server Components Administration
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The OpenLink Admin Assistant is a HTML and HTTP based utility that enables the configuration of your OpenLink Server Components from any Web Browser. Its aim is to provide a simple and consistent interface that enables you to maximize the phenomenal power of the OpenLink Data Access Driver Suite.

For additional product information and support, please contact our helpdesk or visit our Home Page to find out about the news and events at OpenLink Software.

Feedback regarding this utility can be sent via e-mail to us.

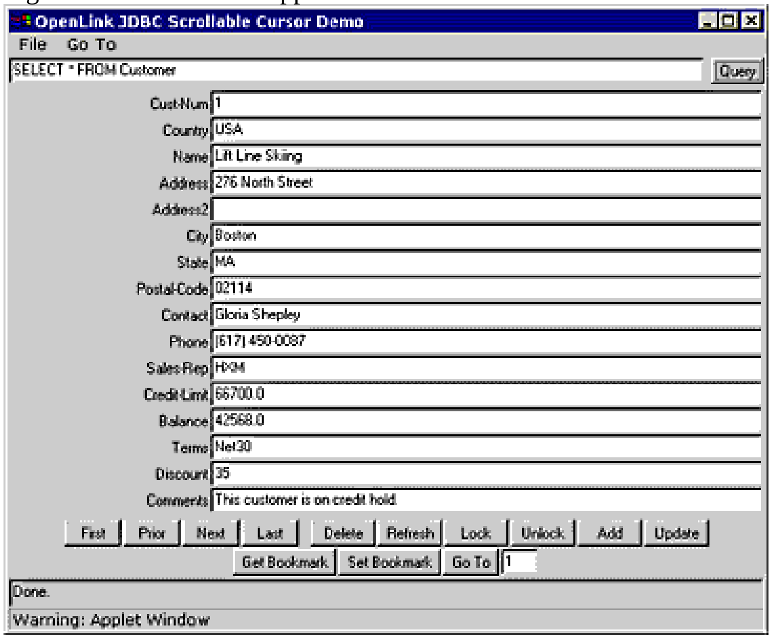
Admin Assistant Main Menu

5. Click on the hyperlink that reads "Applet demonstration with OpenLink Software JDBC Scrollable Cursor extensions"
6. Use the Applet's File->Set Connection URL menu item set a URL pointing to an ODBC or UDBC DSN. If uncertain follows the instructions laid out in the section covering OpenLink JDBC URL formats which shows you how to construct Type 1, 2, and 3 URL formats for your OpenLink Drivers for JDBC.

   The line below depicts the URL construction dialog presented:

   ```
           jdbc:openlink://localhost/DSN=WebScrollDemo
   ```
7. Enter a valid SQL statement for the back end database that you are connecting to via JDBC and then click on the "Query" button. The screen shot below depicts this process:

   Figure 8.10. WebScroll Applet Demo


OpenLink JDBC Scrollable Cursor Demo
File Go To
Query
First Prior Next Last Delete Refresh Lock Unlock Add Update
Get Bookmark Set Bookmark Go To

SELECT * FROM Customer

Cust-Num	1
Country	USA
Name	Lift Line Skiing
Address	276 North Street
Address2	
City	Boston
State	MA
Postal-Code	02114
Contact	Gloria Shepley
Phone	(617) 450-0087
Sales-Rep	HXM
Credit-Limit	66700.0
Balance	42568.0
Terms	Net30
Discount	35
Comments	This customer is on credit hold.

Go To: 1

Done.

Warning: Applet Window

8. JDBC 1.1 functionality provides Forward-Only as opposed to Bi-Directional Resultset Scrolling, OpenLink's Scrollable Resultset Extensions for JDBC enable Bi-Directional Resultset Scrolling. This is why this applet has an additional set of Resultset Navigation buttons: "First","Next", "Prior","Last", "Lock", "Unlock", "Add", "Update", "Get Bookmark", "Set Bookmark", "and Go To". The existence of Bi-directional Scrollable Result sets (or Cursors) is often presumed by end-users and developers alike, its importance rarely understood prior to embarking upon JDBC application development or product selection, the unfortunate consequence being complex application re-writes or implementation of sub par JDBC solutions. Each of the button in the applet demo is explained below so as to understand the magnitude of this issue:

   Table 8.3. Scroll Demo Keys Explained

Button	Explanation
First	takes you to first record in the Resultset
Next	takes you to the next record in the Resultset from your current position
Prior	takes you to the previous record in the Resultset from your current position
Last	takes you to the last record in the Resultset
Lock	locks the current record
Unlock	unlocks the current record
Add	add a new record to database
Update	change current record
Delete	remove current record from database
Get Bookmark	mark current record position for future revisit
Set Bookmark	revisit previous marked position in current ResultSet
Go To	go directly to a specific record number within the current ResultSet
Refresh	Reopen current resultset

10.5.6 ScrollDemo2

This applet demonstrates JDBC functionality via an Applet. It also demonstrates the additional Resultset navigation functionality provided by JDBC 2.0

This Applet require a browser that is Java Virtual Machine version 1.2.x or 2.x compliant. If you do not have such a Browser, you can simply run the JDBC Application version of this program.

Utilization Steps:

1. Start the OpenLink Request Broker
2. Start up your Web Browser
3. Enter one of the following URLs into your browser depending on the location of your OpenLink Request Broker:

   Local To you:

   http://localhost:8000/

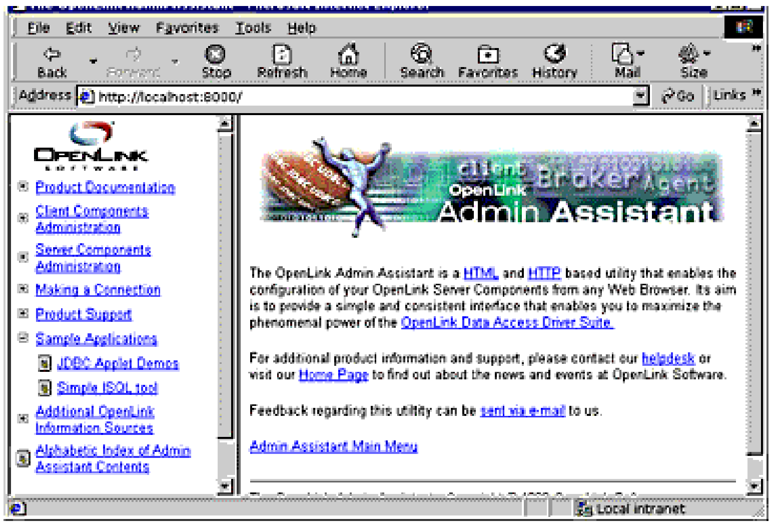
   Remote Server:

   http://<hostname or IP address of remote server>:8000

   ## 10.5.7 Note:

   Port "8000" presumes that you provide this value when prompted during your OpenLink Sever components installation.
4. Follow the Admin Assistant's Menu tree to the location of the "Sample Applications->JDBC Applet Demos" menu item. The graphic below depicts this process.

   Figure 8.11. Scroll2 Applet Demo


File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites History Mail Size
Address
Go
Links
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http://localhost:8000/

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OpenLink Client Broker Agent Admin Assistant

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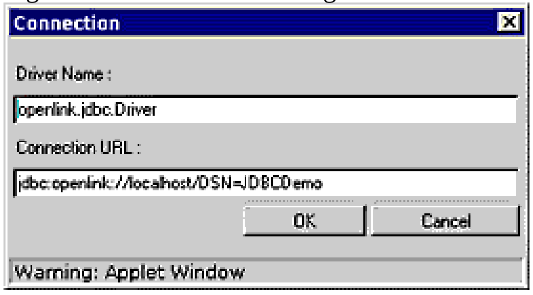
Admin Assistant Main Menu

5. Click on the hyperlink that reads "Applet demonstration with OpenLink Software JDBC 2.0 Scrollable Cursors"
6. Use the Applet's File->Set Connection URL menu item set register your Driver for JDBC 2.0 and then enter a URL pointing to an ODBC or UDBC DSN. If uncertain follow the instructions laid out in the section covering OpenLink JDBC URL formats which shows you how to construct Type 1, 2, and 3 URL formats for your OpenLink Drivers for JDBC. This applet will run with non OpenLink Drivers for JDBC but you will need to obtain Driver registration and JDBC URL construction information from the relevant Driver vendor.

   The screen shot below depicts the URL construction dialog presented:

   Figure 8.12. Connection dialog



Driver Name :
openlink.jdbc.Driver
Connection URL :
jdbc:openlink://localhost/DSN=JDBCDemo

7. Enter a valid SQL statement for the back end database that you are connecting to via JDBC and then click on the "Query" button.
8. JDBC 1.1 functionality provides Forward-Only as opposed to Bi-Directional Resultset Scrolling, JDBC 2.0 on the other hand supports Bi-Directional Resultset Scrolling. As a result this applet has an additional set of Resultset Navigation buttons: "First","Next", "Previous","Last", "Insert", "Update", "Absolute", "Relative". Unfortunately JDBC 2.0 does not provide Bookmarking or Row Level concurrency control hence the exclusion of the "Lock", "UnLock", "Go To", "Set Bookmark", "Get Bookmark" navigation buttons provided in the "ScrollDemo" applet. To use this functionality in a JDBC 2.0 environment you simply make use of the OpenLink Scrollable ResultSet & RowSet Extensions.

   Each navigation button is described below so as to shed more light on the Scrollable ResultSet functionality provided by JDBC 2.0.

   Table 8.4. Scroll Demo Keys Explained

Button	Explanation
First	takes you to first record in the Resultset
Next	takes you to the next record in the Resultset from your current position
Previous	takes you to the previous record in the Resultset from your current position
Last	takes you to the last record in the Resultset
Add	add a new record to database
Update	change current record
Delete	remove current record from database

Button	Explanation
Relative	moves N number of records forward from the current record where N represents a value entered into the field beside the "Relative" button. IF the field contains a negative number then it indicates a backwards move.
Absolute	go directly to record number N within the current ResultSet where N represents a value entered into the field beside the "Relative" button, the actual direction of Resultset navigation depends on the actual location of the record in question
Refresh	Reopen current resultset

10.5.8 RowSetDemo

This applet demonstrates JDBC functionality via an Applet. It also demonstrates the additional Resultset navigation functionality provided by OpenLink's Scrollable Resultset & RowSet Extensions for JDBC on a RowSet by RowSet Basis.

Utilization Steps:

1. Start the OpenLink Request Broker
2. Start up your Web Browser
3. Enter one of the following URLs into your browser depending on the location of your OpenLink Request Broker:

   Local To you:

   ```
   http://localhost:8000
   ```

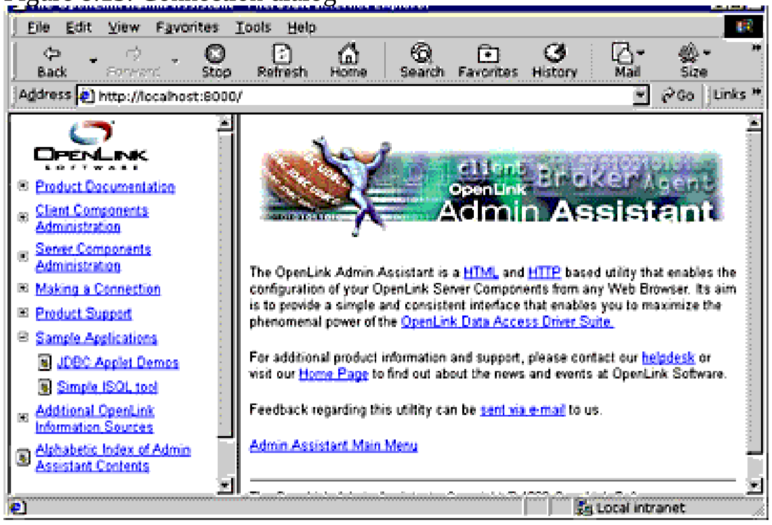
   Remote Server:

   ```
   http://<hostname or IP address of remote server>:8000
   ```

   #### 10.5.9 Note:

   Port "8000" presumes that you provide this value when prompted during your OpenLink Sever components installation.
4. Follow the Admin Assistant's Menu tree to the location of the "Sample Applications->JDBC Applet Demos" menu item. The graphic below depicts this process.

   Figure 8.13. Connection dialog


File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites History Mail Size
Address http://localhost:8000/
Go Links
OpenLink Software
Product Documentation
Client Components Administration
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Feedback regarding this utility can be sent via e-mail to us.

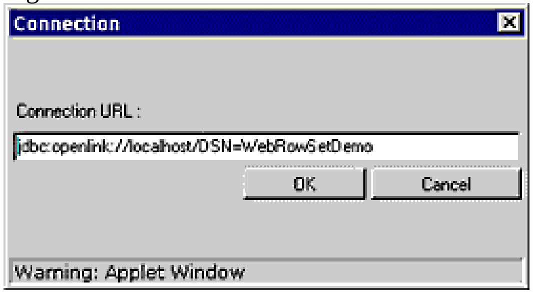
Admin Assistant Main Menu

5. Click on the hyperlink that reads "Applet demonstration with OpenLink Software JDBC Scrollable Cursor RowSet Extensions"
6. Use the Applet's File->Set Connection URL menu item set a URL pointing to an ODBC or UDBC DSN. If uncertain follows the instructions laid out in the section covering OpenLink JDBC URL formats which shows

you how to construct Type 1, 2, and 3 URL formats for your OpenLink Drivers for JDBC. This applet will run with non OpenLink Drivers for JDBC but you will need to obtain URL construction information from the relevant driver vendor.

The screen shot below depicts the URL construction dialog presented:

Figure 8.14. URL Construction


Connection

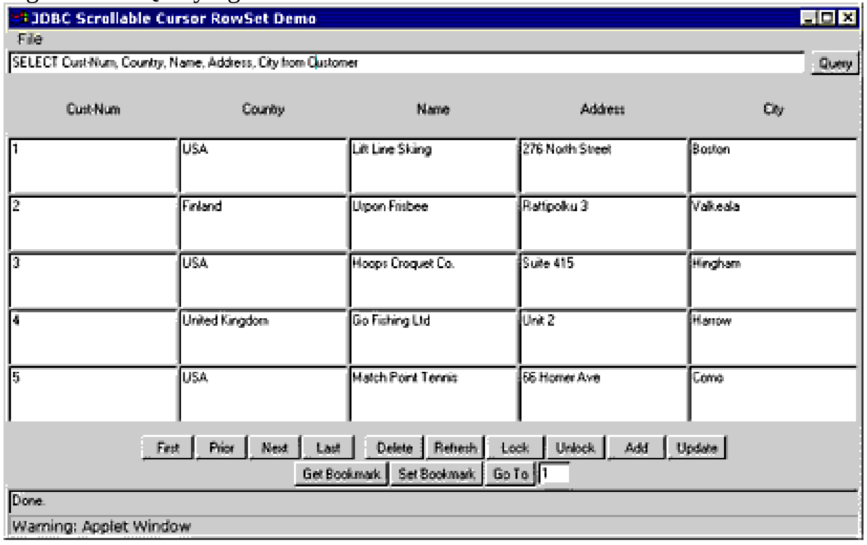
Connection URL :

jdbc:openlink://localhost/DSN=WebRowSetDemo

Warning: Applet Window

7. Enter a valid SQL statement for the back end database that you are connecting to via JDBC and then click on the "Query" button. The screen shot below depicts this process:

Figure 8.15. Querying


JDBC Scrollable Cursor RowSet Demo

SELECT Cust-Num, Country, Name, Address, City from Customer

Cust-Num	Country	Name	Address	City
1	USA	Lift Line Skiing	276 North Street	Boston
2	Finland	Urpon Frisbee	Rattipolku 3	Valkeala
3	USA	Hoops Croquet Co.	Suite 415	Hingham
4	United Kingdom	Go Fishing Ltd	Unit 2	Harrow
5	USA	Match Point Tennis	66 Homer Ave	Como

Done.

Warning: Applet Window

8. JDBC 1.1 functionality provides Forward-Only as opposed to Bi-Directional Resultset Scrolling, JDBC 2.0 provides Scrollable Result sets but does not provide Bookmarking or Attached RowSets (transient RowSets located in the same process space as the ResultSet). OpenLink's Scrollable Resultset Extensions for JDBC address these issues irrespective of JDBC version. As a result this applet has an additional set of Resultset Navigation buttons when compared to the basic JDBC 2.0 Applet in the prior section, the buttons are: "First","Next", "Prior","Last", "Lock", "Unlock", "Add", "Update", "Get Bookmark", "Set Bookmark", "and Go To" . The existence of transient RowSets due to Bi-directional Scrollable Result sets (or Cursors) in JDBC 2.0 is more than likely presumed to exist by end-users and developers alike, it is important that you take note of this before embarking upon JDBC 2.0 application development or product selection. Each of the buttons in the Applet demo is explained below so as to assist in the understanding of these matters:

Table 8.5. Scroll Demo Keys Explained

Button	Explanation
First	takes you to first RowSet in the Resultset
Next	takes you to the next RowSet in the Resultset from your current position
Prior	takes you to the previous RowSet in the Resultset from your current position
Last	takes you to the last RowSet in the Resultset
Lock	locks the current RowSet
Unlock	unlocks the current RowSet
Add	add a new record to database

Button	Explanation
Update	change current record with the current RowSet of
Delete	remove current record from within the current RowSet from the database
Get Bookmark	mark current RowSet within Resultset for future revisit
Set Bookmark	revisit previous marked RowSet position in current ResultSet
Go To	go directly to a specific record number within the current ResultSet
Refresh	Reopen current resultset

10.5.10 JDBC compliant Application Demos

All the JDBC compliant Applet demos described in the previous sections have also been implemented as JDBC compliant Applications Demos, you can run these programs in a number of ways depending on operating system hosting your Java Virtual Machine.

10.5.10.1 Windows 95/98/NT/2000

1. Click on your Windows Start Menu Button
2. Select the "OpenLink Data Access Drivers" Start Menu Group
3. Locate the "JDBC Samples" Menu Item
4. Choose from the list of JDBC Applications presented

10.5.10.2 Linux or UNIX

1. Move into your OpenLink base installation directory
2. The following directory listing shows the location of the various JDBC Application demos by Java Virtual Machine version:

```
JDBC/jdk1.0.2/Applications:
JDBCDemo RowSetDemo ScrollDemo
JDBC/jdk1.0.2/Applications/JDBCDemo:
DialogConnection.class JDBCDemo.class
DialogConnection.java JDBCDemo.java
JDBC/jdk1.0.2/Applications/RowSetDemo:
DataTextField.class DialogConnection.java readme.txt
DataTextField.java RowSetDemo.class
DialogConnection.class RowSetDemo.java
JDBC/jdk1.0.2/Applications/ScrollDemo:
DialogConnection.class ScrollDemo.class readme.txt
DialogConnection.java ScrollDemo.java
JDBC/jdk1.1.x/Applications:
JDBCDemo RowSetDemo ScrollDemo
JDBC/jdk1.1.x/Applications/JDBCDemo:
DialogConnection.class JDBCDemo.class
DialogConnection.java JDBCDemo.java
JDBC/jdk1.1.x/Applications/RowSetDemo:
DataTextField.class DialogConnection.java readme.txt
DataTextField.java RowSetDemo.class
DialogConnection.class RowSetDemo.java
JDBC/jdk1.1.x/Applications/ScrollDemo:
DialogConnection.class ScrollDemo.class readme.txt
DialogConnection.java ScrollDemo.java
JDBC/jdk1.2.x/Applications:
JDBCDemo RowSetDemo ScrollDemo ScrollDemo2
JDBC/jdk1.2.x/Applications/JDBCDemo:
DialogConnection.class JDBCDemo.class
DialogConnection.java JDBCDemo.java
JDBC/jdk1.2.x/Applications/RowSetDemo:
DataTextField.class DialogConnection.java readme.txt
DataTextField.java RowSetDemo.class
DialogConnection.class RowSetDemo.java
JDBC/jdk1.2.x/Applications/ScrollDemo:
DialogConnection.class ScrollDemo.class readme.txt
DialogConnection.java ScrollDemo.java
JDBC/jdk1.2.x/Applications/ScrollDemo2:
DialogConnection.class ScrollDemo2.class
```

```
        DialogConnection.java ScrollDemo2.java
```

3. Move into the appropriate directory and then execute the following command:

   ```
   java <classname>
   ```

   where "<classname>" represents the JDBC class file hosting your JDBC application demo. For instance if you wanted to run the "RowSetDemo" JDBC application you would type the following:

   ```
   java RowSetDemo
   ```

10.5.10.3 Mac OS X

1. Using the Apple 'Finder', browse to the '/Applications/Utilities' Folder and run the Terminal application.
2. Move into the appropriate sample directory beneath:

   /Library/Application support/openlink/Samples/JDBC
3. Execute the following command:

   ```
   java <classname>
   ```

   where "<classname>" represents the JDBC class file hosting your JDBC application demo. For instance if you wanted to run the "RowSetDemo" JDBC application you would type the following:

   ```
   java RowSetDemo
   ```

10.6 OpenLink JDBC Driver (Single-Tier Edition) Important Multi-User JDBC Solution Development & Utilization Issues

10.6.1 Sensitivity To Changes In Underlying Database

It is extremely important to application developers and end-users alike to understand the degree to which the Result sets presented to them by a JDBC solution are actually sensitive to underlying changes in the source database. JDBC 1.1 not only fails to provide you with Bi-directional Resultset Scrolling, it also presents what is basically a snapshot of the data in your database at the time a JDBC query is executed. This has the effect of increasing Multi-User JDBC solution development complexity or limiting the functionality and usability of JDBC by end-users.

Sensitive to changes in underlying database takes many forms, this includes: Static, KeySet, Dynamic, and Mixed modes of sensitivity.

Static. - same as basic JDBC, records scrolling occurs over a database snapshot and is insensitive to underlying change by other users

KeySet. - JDBC resultset records scroll over a set of record identifiers uniquely identifying records in the underlying database, this type of scrolling is sensitive to changes is those records with identifiers at the time of query execution. This form of scrolling is insensitive to record record additions or deletions.

Dynamic. - JDBC resultset records scroll over a set of record identifiers uniquely identifying records in the underlying database, these unique identifiers are recreated before each RowSet traversal (collection of resultset records used as scrolling marker or sliding window or Cursor), rather than once at query execution time. This type of scrolling is sensitive to all changes in the underlying database but may introduce a performance penalties depending on the size of RowSets and available network bandwidth.

Mixed. - JDBC resultset records scroll over a set of record identifiers uniquely identifying records in the underlying database, these unique identifiers are created to a limited size (known as the KeySet Size) at query execution time, only when RowSet traversal goes beyond the existing set of unique row identifiers is another collection of unique identifiers assembled. This type of scrolling is sensitive to all changes in the underlying database, but insensitive to Additions or Deletions affecting records in the current RowSet scrolling across a current KeySet, once KeySet boundaries are crossed Insertions or Deletions are recognized. This mode of sensitivity provides increased performance and the expense of reduced sensitivity.

10.6.2 Concurrency Control

In addition to being sensitive to changes in the underlying database, Multi-User applications need to be able to protect users and application processes from the effects of one another when the same record or collection of records are being manipulated at the same time. The process by which these issue are addressed is known as Concurrency Control.

Concurrency control occurs in one of two ways, Optimistic or Pessimistic control.

Optimistic Concurrency Control. - presumes that probability and frequency of multiple users and processes instigating changes to the same database records is low. As result when an end-user or process attempts to change records it first of all determines if the record values at the point of change are still the same as what they were at the time of retrieval. If they are unchanged at the point of change then the change occurs otherwise the change process is rejected and then re-attempted. Although this reduces concurrent user latency, it does have the knock on effect of reducing data integrity if changes rejections aren't managed carefully.

Pessimistic Concurrency Control. - presumes that the probability and frequency of multiple user processing and instigating changes to the same records is high. As a result an end-user or process attempts to changes records it first of all secures Exclusive Locks on the records in question, performs the changes, and then releases the locks. Although this increases and preserves data integrity it does introduce concurrent use latency , which is perceived as performance degradation by the end-user or application developer.

OpenLink's Scrollable ResultSet and RowSet extensions for JDBC all the Multi-User JDBC solution issues raised in this section, our bundled and

```
http://www.openlinksw.com/demo
```

live online demonstrations enable you to evaluate this for yourself and ultimately make a knowledgeable JDBC Driver product and vendor selection.

11 Chapter 9. Distributed Transaction Processing (XA)

Abstract
The X/Open Distributed Transaction Processing (DTP) model defines a specification for the management of transactions whose operations are distributed among different computers or among different databases from different vendors.

Table of Contents

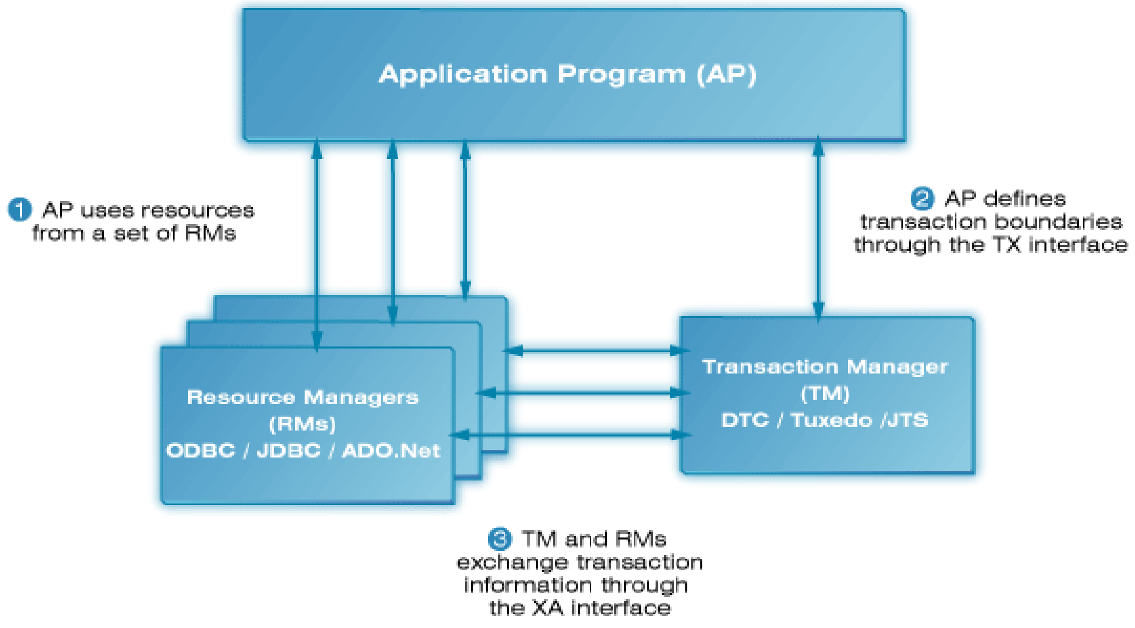
11.1 Distributed Transaction Processing (DTP)

11.1.1 X/Open DTP Model

The X/Open Distributed Transaction Processing (DTP) model defines a specification for the management of transactions whose operations are distributed among different computers or among different databases from different vendors. DTP can be broken down into 3 core components:

* An Application Program (AP) for defining transaction boundires and specifies actions that constitute a transaction.
* Resource Managers (RMs, such as databases or Data Access Drivers ie ODBC, JDBC, ADO.Net for accessing them)provide access to shared resources.
* A Transaction Manager (TM) that assigns identifiers to a transactions, monitors the progress, and takes responsibility for transaction completion and fault recovery.

Figure 9.1. DTP-XA.gif


Application Program (AP)
1 AP uses resources from a set of RMs
2 AP defines transaction boundaries through the TX interface
Resource Managers (RMs) ODBC / JDBC / ADO.Net
Transaction Manager (TM) DTC / Tuxedo /JTS
3 TM and RMs exchange transaction information through the XA interface

The TX standard defines the API used for communication between an application program and a transaction manager. The XA (eXtended Architecture) standard defines the two-phase commit protocol and the API used for communication between a transaction manager and a resource manager. A resource manager is a system service that manages durable data, e.g. a DBMS or file system. A transaction manager manages distributed transactions, which may span multiple resource managers. It manages two-phase commit, coordinating the decision to commit distributed transactions or roll them back, and coordinates failure recovery.

Whenever an application has a single function that needs to access or update the data in multiple transactional resources, it should use a distributed transaction. You can use a separate simple transaction on each of the resources, but this approach is error-prone. If the transaction in one resource commits successfully but another fails and must roll back, the first transaction can no longer be rolled back, so the state of the application becomes inconsistent. If one resource commits successfully but the system crashes before the other resource can commit successfully, the application again is inconsistent. An application moving data from one database to another requires a distributed transaction. Otherwise, the data may be duplicated (if the insert completes and the delete fails) or lost (if the delete completes and the insert fails).

11.1.1.1 Distributed Transaction Coordinator (DTC)

The Microsoft COM and MTS interfaces were unified into a single run-time layer and renamed COM+ for Windows 2000. COM+ includes the transaction support that was created for MTS. Both include a system service, DTC, for coordinating distributed transactions and the two-phase commit protocol. Every machine running COM+ has a DTC system service.

For distributed transactions, each computer has a local transaction manager ie. the DTC on that machine. When a transaction does work at multiple computers, the transaction managers interact with other transaction managers via either a superior or subordinate relationship. These relationships are relevant only for a particular transaction. The root transaction manager, also referred to as the global commit coordinator, is the transaction manager on the system that initiates a transaction.

DTC introduces the notion of a resource dispenser which does two things. It manages a pool of connections to a resource manager (i.e. a DBMS in the context of Data Access) and it automatically enlists the resource manager in a component's transaction. The ODBC Driver Manager is a typical resource dispenser, as is an ADO .NET Data Provider.

11.1.1.2 Tuxedo

BEA Tuxedo provides the framework, or middleware, for building scalable multi-tier client/server applications in heterogeneous (dissimilar), distributed environments that extend from the Web to the Enterprise. Using BEA Tuxedo, users can develop, manage, and deploy distributed applications independently of the underlying hardware, operating system, network, and database environment.

In contrast to classic 2-tier client/server configuration of SQL servers, the Tuxedo brings 3-tier paradigm (clients, services, resource managers).

At the foundation of BEA Tuxedo ATMI is a proven, reliable transaction processor, also known as a transaction processing (TP) monitor. A transaction processor is an example of a 3-tier client/server architecture, where the transaction processor supports the application logic (represented by "services" between the GUI front-end and the back-end resource managers. Examples of resource managers are SQL databases, message queues, legacy applications, and other back-end services.

Tuxedo's Application-to-Transaction Monitor Interface consists of the Tuxedo transaction processor and infrastructure, and the ATMI API. The ATMI API is used to create a Tuxedo client and server.

A Tuxedo ATMI client collects a user request and forwards it to a server offering the requested service. The client "joins" a distributed Tuxedo application by calling the ATMI client initialization routine. The client can then exchange information with the server, sending and receiving data in typed buffers, and define transaction boundaries The client "leaves" the application by issuing an ATMI termination function.

A Tuxedo server process oversees a set of services, calling them automatically for clients that request them. ATMI clients do not call servers by name; they call services. The server is not written as a complete program (i.e. with a standard main). Instead, the server's services are coded as a set of functions that are compiled with Tuxedo binaries to produce a server executable.

11.1.1.3 Java Transaction API (JTA)

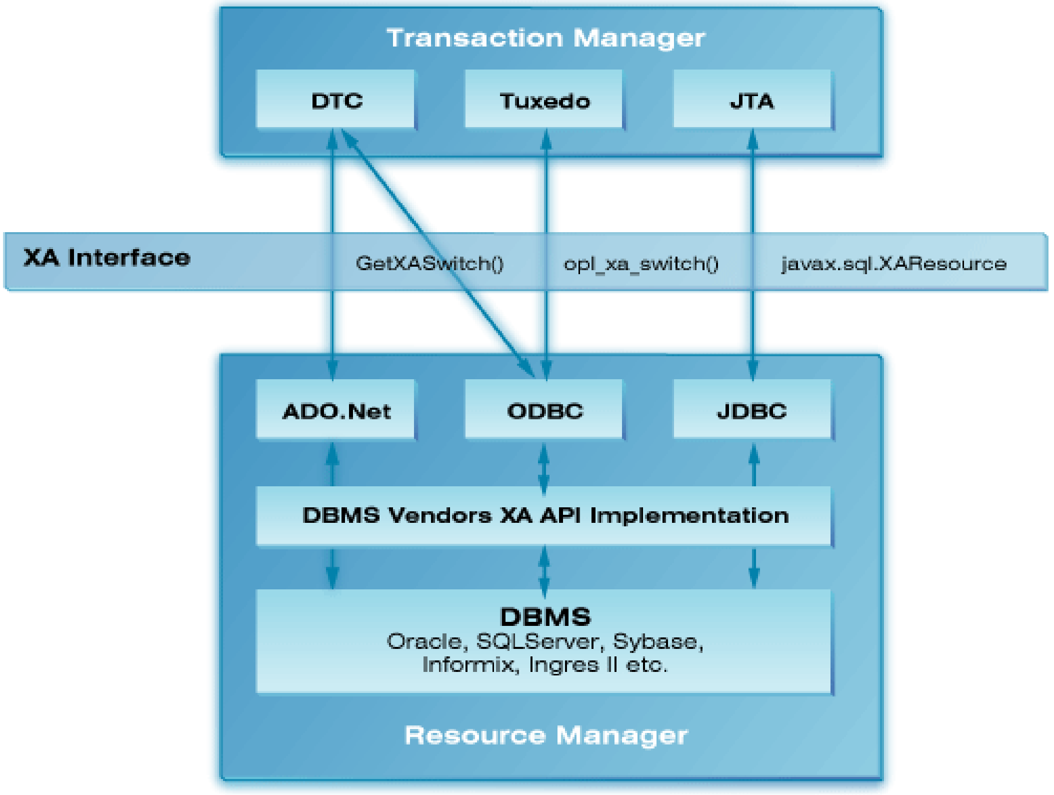
The JTA, or Java Transaction API, is a Java Enterprise API for managing distributed transactions. It defines a Java binding for the standard XA API for distributed transactions (XA is a standard defined by the Open Group). Using the JTA, one can write a program that communicates with a distributed transaction service and uses that service to coordinate a distributed transaction that accesses and update data on two or more networked computer resources, or databases in the case of JDBC.

The XA specification defines an interface between the transaction manager (TM) and resource manager (RM) in a distributed transaction system. This is a generic interface and it does not directly address the use of distributed transactions from Java. The Java mapping of the XA interface is defined in Sun Microsystems Java Transaction API (JTA) and JDBC 2.0/3.0 specifications.

11.1.2 OpenLink Resource Manager XA Interface Implementation

The OpenLink DataAccess drivers (ODBC, JDBC, ADO.Net) form part of the Resource Manager in the overal DTP model, implementing the XA (eXtended Architecture) interface for the comminication between itself as the upper layer of Resource Manager proess and the Transaction Manager (DTC, Tuxedo, JTS), and also providing the binding to the Database Vendors XA API implementation, which forms the lower layer of the Resoure Manager:

Figure 9.2. UDA-XA.gif



Distributed transactions are supported in the OpenLink Multi-Tier and Single-Tier ODBC, JDBC and ADO.Net drivers/providers for Oracle, SQLServer, Sybase, Informix and Ingres II.

11.1.2.1 ODBC

The OpenLink Multi-Tier and Single-Tier ODBC drivers support distributed transactions using the Microsoft Distributed Transaction Co-ordinator (on Windows only) or Tuxedo as the Transaction Manager of the distributed transaction process.

11.1.2.1.1 Distributed Transaction Co-ordinator (DTC)

An OpenLink XA compliant ODBC driver acts as a proxy for an XA capable database (RM) and as such can be thought of as a resource manager. The OpenLink XA compliant ODBC drivers implement and export the function GetXASwitch() which provide the entry points for the DBMS specific XA functions which the DTC can use to communicate directly with the DBMS should an for of distributed transaction recovery need to the performed.

11.1.2.1.1.1 Transaction Enlistment

After initiating a transaction, an application enlists the resource managers it wants to participate in the transaction. Enlistment is done through the ODBC 3.0 connection attribute function call:

SQLSetConnectAttr(SQL_ATTR_ENLIST_IN_DTC)

11.1.2.1.2 Tuxedo

An OpenLink XA compliant ODBC driver acts as a proxy for an XA capable database (RM) and as such can be thought of as a resource manager. The driver exports a function opl_xa_switch:

```
        xa_switch_t * opl_xa_switch (void)
```

which TP monitors can use to retrieve the xa_switch_t structure containing pointers to the XA functions.

11.1.2.1.2.1 Defining the OpenLink Resource Manager in Tuxedo

When integrating a new resource manager into Tuxedo, the file %TUXDIR%/udataobj/RM must be updated to include information about the resource manager. To integrate the OpenLink Lite Driver for Oracle into Tuxedo on Windows, define an*rm_alias* entry in the RM file by adding a line similar to:

OPL_ORA_XA;(*opl_xa_switch());"c:\program files\openlink\lite32\ntl5o9zz.lib

where, in this example, OPL_ORA_XA is the*rm_alias*.. ntl5o9zz.lib is an import library for the ODBC driver associated with the DSN identified by the xa_info string; in this example the OpenLink Windows Lite Driver for Oracle (ntl5o9zz.dll).

To create an*rm_alias*entry in the RM file for the OpenLink Generic Client add a line similar to:

OPL_XA;(*opl_xa_switch());"c:\program files\openlink\olod5032u.lib

On Unix the*rm_alias*is created in a similar way. A line adding an alias for the OpenLink Generic Client is added to $TUXDIR/udataobj/RM as follows:

OPL_XA:(*opl_xa_switch()):/home/openlink/lib/oplodbcu.so

Where /home/openlink is the openlink installation directory.

11.1.2.1.2.2 xa_info, OPENINFO and CLOSEINFO String Formats

The XA functions xa_open and xa_close open or close a connection to a resource manager for the calling thread. Both functions accept an*xa_info*argument.*xa_info*is a string containing instance-specific information for the resource manager. For OpenLink ODBC drivers, the *xa_info*string takes the form of an ODBC Data Source Name. The DSN must be defined in your ODBC.INI file or registry hive using the ODBC Administrator.

In a Tuxedo environment, the xa_info strings required by xa_open and xa_close for a particular RM instance are identified by the OPENINFO and CLOSEINFO entries in the UBBCONFIG configuration file. (An example UBBCONFIG file is given below.) OPENINFO and CLOSEINFO entries must be defined for each server group. These entries must be quoted strings of the form "*rm_alias*:*DSN*". (OPENINFO and CLOSEINFO should not contain the usual*xa_info*string required by the target database. This string is stored as part of the DSN definition when the ODBC data source is configured. The OpenLink ODBC driver retrieves the stored*xa_info*string using the DSN it receives through xa_open or xa_close.)

11.1.2.1.2.3 Using ODBC in an XA Global Transaction

In order for a service to use ODBC functions in the context of a global transaction, the ODBC functions must use the XA connection created when the service connects to the resource manager with which it is linked. (In the sample application, each service connects to a database using tpopen(), when the service is first initialized through tpsvrinit()). OpenLink XA-enabled ODBC drivers provide two functions, SQLGetXaEnv() and SQLGetXaConnect(), which make an XA connection available for use with ODBC. If the XA connection is enlisted in a global transaction, e.g. the client has called tpbegin() before calling the service, then any 'work' done by ODBC functions in the service will be controlled by that global transaction.

SQLGetXaEnv() returns the ODBC environment handle associated with the XA connection. SQLGetXaConnect() returns the ODBC connection handle associated with the XA connection. The prototypes for these functions are:

```
SQLRETURN SQLGetXaEnv(SQLHENV *phenv);
    SQLRETURN SQLGetXaConnect(SQLHDBC *phdbc);
```

When using OpenLink ODBC drivers in a global transaction context, you should not create an environment handle using SQLAllocHandle(), or use SQLSetEnvAttr(). (The SQLHENV associated with the XA connection is created with SQL_ATTR_ODBC_VERSION set to SQL_OV_ODBC3.) If you create an ODBC connection using this SQLHENV, it will not be enlisted in the global transaction.

11.1.2.2 JDBC

The OpenLink Multi-Tier JDBC drivers support distributed transactions using the Java Transaction API (JTA) as the Transaction Manager of the distributed transaction process.

11.1.2.2.1 Java Transaction API (JTA)

The OpenLink UDA Generic JDBC clients (opljdbc3.jar & opljdbc2.jar) support the industry standard XA specification for distributed transaction processing. The XA specification defines an interface between the transaction manager (TM) and resource manager (RM) in a distributed transaction system. This is a generic interface and it does not directly address the use of distributed transactions from Java. The Java mapping of the XA interface is defined in Sun Microsystems Java Transaction API (JTA) and JDBC 2.0/3.0 specifications. The OpenLink UDA Generic JDBC client drivers support the JTA architecture by providing the implementation of JTA resource manager interfaces.

The OpenLink UDA JDBC 3.0 driver provides the openlink.javax.OPLXid, openlink.javax.OPLXADataSource, and openlink.javax.OPLXAConnection classes which implement the interfaces javax.transaction.xa.Xid, javax.transaction.xa.XADataSource, javax.sql.XAConnection, and javax.sql.XAResource respectively. The use if these interfaces is usually transparent for applications and the application developer shouldn't bother with them. They are used only by the JTS transaction manager which normally runs as a part of the J2EE server.

11.1.2.2.1.1 JDBC 3.0 (JDK 1.4 & 1.5)

JTA support is built into the JRE for JDK 1.4 and 1.5, thus the UDA Generic JDBC client (opljdbc3.jar) simply needs to be added to the CLASSPATH and the XA classes will be available for use.

11.1.2.2.1.2 JDBC 2.0 (JDK 1.2 & 1.3)

JTA support was added by Sun Microsystems as an extension to the JDK 1.2 and 1.3 JRE's resulting in the following jar files having to be added to you CLASSPATH in additon to the UDA Generic JDBC client (opljdbc2.jar) :

```
jdbc2_0-stdext.jar
jta-spec1_0_1.jar
jndi.jar
```

11.1.3 Configuring Databases for XA support

11.1.3.1 Oracle

XA support has been tested against Oracle version 9i and 10g

11.1.3.1.1 Granting SELECT Privilege on V$XATRANS$ & DBA_PENDING_TRANSACTIONS Views

In the event that the TM needs to perform recovery, xa_recover will fail if you do not grant the SELECT privilege to the V$XATRANS$ view for all Oracle accounts that XA applications will use. If the view does not already exist in your Oracle installation then it can be manually loaded using the following SQL script which should be included in your Oracle installation:

```
$ORACLE_HOME/rdbms/admin/xaview.sql
```

The example below shows an extract from an Oracle XA Library trace file (for details of how to enable Oracle XA Library tracing in an OpenLink driver see here). Oracle returns error *ORA-00942 : table or view does not exist* because user scott does not have the necessary SELECT privilege on the V$XATRANS$ view.

```
ORACLE XA: Version 10.1.0.0.0. RM name = 'Oracle_XA'.
113956.2352:536.536.1:
xaoopen: xa_info=ORACLE_XA+Threads=true+SesTm=60+Acc=P/scott/tiger+DB=DB01BA5BF8+SQLNET=ORCL+DbgFl=0x1+Lo
113956.2352:536.536.1:
xaolgn_help: version#: 168821248 banner: Personal Oracle Database 10g Release 10.1.0.2.0 - Production
With the Partitioning, OLAP and Data Mining options
113956.2352:536.536.1:
xaoopen: return 0
113959.2352:536.536.1:
xaorecover: xids=0xf8f8f8, count=10, rmid=1, flags=0x1000000
113959.2352:536.536.1:
ORA-00942: table or view does not exist
113959.2352:536.536.1:
xaorecover: xaofetch rtn -3.
113959.2352:536.536.1:
xaoclose: xa_info=DSN=au49-ora10-carlv;UID=scott;PWD=tiger;+DB=DB01BA5BF8, rmid=1769209857, flags=0x0
113959.2352:536.536.1:
xaoclose: rtn 0
```

The syntax for adding the grant privilege to the 'scott' user would thus be:

```
grant select on V$XATRANS$ to scott;
```

In addtion, the "ORA-00942: table or view does not exist" error also occurs if select privileges are not granted on the DBA_PENDING_TRANSACTIONS view as detailed in this Oracle MetaLink Article, requiring the following command to be executed as a DBA user:

```
GRANT SELECT ON DBA_PENDING_TRANSACTIONS TO PUBLIC
```

Note that the V$XATRANS$ did not exist nor did the DBA_PENDING_TRANSACTIONS view have appropriate select privileges in Unix Oracle installations, although they are included in Windows installations by default.

11.1.3.2 Informix

XA support has been tested against versions 9.x and 10.x

11.1.3.2.1 Enable Database Logging

For XA to be supported with an Informix database, the database must be capable of supporting transactions, which for Informix means the database must have logging enabled.

11.1.3.2.2 Useful Links

- Old IBM document (1996), but may contain some useful information: http://www.umiacs.umd.edu/~jhu/DOCS/TX4.2/html/erzhae/erzhae18.htm

11.1.3.3 Sybase

XA support has been tested against Sybase version 12.5.1 and above.

The following instructions need to performed to set up a working XA environment on your database server:

- Ensure your Syabse Server is licensed for Distributed Transaction Management. This can be checked by executing the following query against you Sybase Server:

  ```
  select license_enabled('ASE_DTM')
  ```

The query will return "1", if you have the ASE_DTM license installed.

- Run "sp_configure 'enable DTM',1" , via isql to enable transactions.
- Run "sp_configure 'enable xact coordination',1" , via isql
- Run "grant role dtm_tm_role to USER_NAME" .
- To prevent deadlocks when running transactions, enable row level lock by default, by running "sp_configure 'lock scheme',0,datarows" via isql.

. Note, you must restart Adaptive Server for this changes to take effect.

11.1.3.3.1 Setting the Timeout for Detached Transactions

On the Sybase server, you can set the dtm detach timeout period, which sets the amount of time (in minutes) that a distributed transaction branch can remain in the detached state (without an associated execution thread). After this period, the DBMS automatically rolls back the transaction. The dtm detach timeout period applies to all transactions on the database server. It cannot be set for each transaction. For example, to automatically rollback transactions after being detached for 10 minutes, use the following command:

"sp_configure 'dtm detach timeout period', 10"

You should set the dtm detach timeout period higher than the transaction timeout to prevent the database server from rolling back the transaction before the transaction times out.

11.1.3.4 SQLServer

XA support was tested against the following Microsoft SQLServer versions:

MSSQL 6.5 RTM (WinNt4 Sp3)

MSSQL 7.0EE SP4 (Win2k AdvSrv Sp3)

MSSQL 2000 SP3a (Win2k Sp3)

Before using the Microsoft SQLServer XA features you must install and register the Microsoft SQLServer extented stored procedures, for this :

1) copy xp_oplxa.dll (xp_oplxa65.dll for MSSQL 6.5) to the MSSQLServer_Root/binn directory

2) execute the command :

isql.exe -Usa -Psa_pwd -ig:xp_oplxa.sql

or

isql.exe -Usa -Psa_pwd -ig:xp_oplxa65.sql (for MSSQL 6.5)

11.1.3.5 Ingres II

XA is supported with IngresII version 2.0 and higher and Ingres II DBMS does not require any additional configuration for XA support to be enabled.

The Ingres II XA support was tested against the following versions:

IngresII v2.0

IngresII v2.6

IngresII v3.0 (Open release)

11.1.4 OpenLink XA Connection String Formats

To connect to a database's XA interface or some other XA compliant RM, a TM must connect using xa_open(). The xa_open() call accepts as one of its arguments an xa_info string. When acting as an RM proxy, OpenLink drivers automatically construct the database dependent xa_info string from other connection information received through the driver's data access API. The constructed string is sufficient to open an XA connection, but may omit optional settings. These optional settings are database dependent, details of which are given below. They can be entered in the 'XA Info' text box in the driver's setup dialog.

11.1.4.1 ODBC

11.1.4.1.1 Oracle

For full details of the Oracle syntax for the xa_info string, refer to the "Oracle Application Developer's Guide - Fundamentals : Chapter 20 Working With Transaction Monitors With Oracle XA : Developing and Installing Applications That Use the XA Libraries : Defining the xa_open String".

The OpenLink driver builds an xa_info string of the form:

```
        Oracle_XA+Threads=true+SesTm=60+SqlNet=serviceName+DB=dbName+Acc=P/username/password
```

Fields in the xa_info string automatically inserted by the OpenLink driver should not be present in the 'XA Info' string. You should not include clauses such as "DB=dbname" or "Acc=P/username/password" .

*serviceName*takes the value of the 'Connection String' textbox in the Single-Tier ODBC driver setup dialog or the 'NET x Service Name' textbox in the Multi-Tier ODBC driver setup dialog. If a value isn't specified in the respective setup dialog, *serviceName*defaults to the value of the ORACLE_SID environment variable.

In addition to the tracing facilities provided by the OpenLink driver, Oracle's own XA interface also supports tracing. Ordinarily a trace file is only created at this level when an error occurs, but it is possible to trace all calls to the Oracle XA interface by setting the DbgFl entry appropriately in the xa_info string. To enable tracing by the Oracle XA Library, use an XaInfo string similar to: DbgFl=0x1+LogDir=c:/ For full details of the Oracle XA Library trace facilities see the "Oracle Application Developer's Guide - Fundamentals : Chapter 20 Working With Transaction Monitors With Oracle XA : Troubleshooting XA Applications".

11.1.4.1.2 Informix

The OpenLink driver builds an xa_info string of the form:

```
            DB=dbname@dbserver;USER=username;PASSWD=password;CON=sessionid;
```

No optional xa_info elements are supported.

11.1.4.1.3 Sybase

No optional xa_info elements are supported.

11.1.4.1.4 SQL Server

No optional xa_info elements are supported.

11.1.4.1.5 Ingres

No optional xa_info elements are supported.

11.1.5 Tracing XA calls in OpenLink ODBC Drivers

When logging is enabled in an XA-enabled OpenLink ODBC driver, an XA log file is opened in addition to the usual ODBC log file. For instance, when using a Windows Lite driver, if you specify a log file name of c:\ntl6o10zu.log in the

Lite setup dialog, an XA log file named c:\ntl6o10zu.log-xa will also be created. Because all DSNs which use the same OpenLink driver share the same log file name, if two applications use the same driver simultaneously, the log output from one application will be lost. The last application to connect takes ownership of the log file. This problem can be overcome by including meta-characters in the log file name. This is an OpenLink v6 feature which allows applications to have their own log file. The meta-characters substitute additional information into the log file name. They can also be used when configuring logging for a OpenLink ODBC Lite driver or an OpenLink ODBC generic multi-tier client, on both Windows or Unix.)

Supported meta-characters are:

- $$ - inserts $ (Windows & Unix)
- $P - current process id (Windows & Unix)
- $U - inserts user name (Windows & Unix)
- $H - inserts C:\ (Windows) or user's home directory (Unix)
- $T - timestamp (yyyymmdd-hhmmss) (Windows & Unix)

For instance, when tracing XA, it is useful to include $P, e.g. c:\ntl6i10zu_$P.log, so that each process using the driver gets its own XA log file. This is important when using the MS DTC as the transaction monitor, as the DTC loads the ODBC driver at the same time as the application when connecting to an RM through ODBC.

11.1.6 Enabling XA Transactions on Windows XP SP2 and Windows Server 2003

In Windows 2000, the MSDTC runs as LocalSystem, a special account that is granted all possible privileges to the local computer on which it resides. However, if someone compromises the DTC or any other service running under LocalSystem, that person then has full Administrator access to the computer. To avoid this potential security problem, starting with Windows XP SP2 and Windows Server 2003, Microsoft changed the account under which MSDTC service runs to be "NT AUTHORITY\NetworkService". A service running as NetworkService has the same network access as a service running as System (i.e. the operating system), but has significantly reduced local access. (NetworkService services access local resources as members of the local Users group.) Microsoft also introduced other MSDTC security enhancements. As a result, to enable XA transactions for these environment, some additional steps are needed after installing OpenLink XA/MSDTC enabled drivers.

(If you are using the distributed transactions support in COM+/Enterprise Services components with OpenLink drivers, you must enable XA transactions.)

1) Enable XA transactions

To turn on support for XA transactions, follow these steps:

1. Open Component Services.
2. Expand the tree view to locate the computer where you want to turn on support for XA transactions (for example, My Computer).
3. Right-click the computer name, and then click Properties.
4. Click the MSDTC tab, and then click Security Configuration.
5. Under Security Settings, click to select the check box for XA Transactions to turn on this support.

2) Identify in the registry the XA DLLs you plan to use

Windows Server 2003 and XP SP2 provide a registry entry for specifying the XA DLLs that the MSDTC can use. For each XA enabled OpenLink ODBC driver you plan to use, you must create a registry named-value under the registry key HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\MSDTC\XADLL. In your registry named-value, Name is the file name of the XA DLL (in the format dllname.dll), Type is String (REG_SZ), and the value is the full path name (including the file name) of the DLL file.

e.g.

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\MSDTC\XADLL]
Key name: ntl6o10zu.dll
Data: C:\program files\openlink\bin\ntl6o10zu.dll
```

3) Allow the NetworkService account access to the folder containing the XA DLL

Since NetworkService a very restricted account, you need to provide this account with access to the folder where the XA DLL is located; for instance by modifying the access control list (ACL) for the folder. The ACL for an object is generally found on the Security tab of the object's property sheet.

4) Ensure the system PATH includes the folders of any DLLs loaded by the XA DLL

The MSDTC must be able to locate any DLLs on which the XA DLL depends. The folders containing these DLLs must be included in the global PATH environment variable. (The required DLLs and their paths can be identified easily withDependencyWalkerafter enabling the 'Full Paths' option on the 'View' menu.) Correct the path using Control panel, System Properties, Environment Variables, System Variables, Path. A reboot may be necessary for the change to take effect.

In Windows versions supporting the XADLL registry entry, it is not necessary to include the location of the XA DLL itself in the system PATH, as the registry entry includes the DLL's full path. In all earlier versions of Windows, the system PATH must include the XA DLL's location.

11.1.6.1 Useful Links

Florin Lazar's Weblog - MSDTC Posts

Microsoft Windows XP Professional Resource Kit Documentation(See Part III Security, Chapter 16 Authorization and Access Control)

11.1.7 Using OpenLink Drivers with Tuxedo on Unix

See also "Using the OpenLink Oracle Lite Driver with Tuxedo on Windows" for additional information on configuring Tuxedo.

11.1.7.1 Defining an OpenLink Resource Manager in Tuxedo

When integrating an OpenLink Unix driver into Tuxedo, the file %TUXDIR%/udataobj/RM must be updated to include information about the driver. Add a line similar to one of the examples below:

11.1.7.1.1 OpenLink ODBC Generic Client for Unix (Multithreaded):

```
        OPL_XA:(*opl_xa_switch()):/home/openlink/lib/oplodbcu.so ;; Unicode Driver
        OPL_XA:(*opl_xa_switch()):/home/openlink/lib/oplodbc.so ;; Ansi Driver
```

11.1.7.1.2 OpenLink Unix ODBC Lite Driver for SQLServer or Sybase (Multithreaded):

```
        OPL_XA:(*opl_xa_switch()):/home/openlink/lib/sql_mt_lu.so ;; Unicode Driver
        OPL_XA:(*opl_xa_switch()):/home/openlink/lib/sql_mt_lt.so ;; Ansi Driver
```

11.1.7.1.3 OpenLink Unix ODBC Lite Driver for Informix 9 (Multithreaded):

```
        OPL_XA:(*opl_xa_switch()):/home/openlink/lib/inf9_mt_lu.so -lthxa -lthsql -lthasf -lthgen -lthos -lifgls
        OPL_XA:(*opl_xa_switch()):/home/openlink/lib/inf9_mt_lt.so -lthxa -lthsql -lthasf -lthgen -lthos -lifgls
```

11.1.7.1.4 OpenLink Unix ODBC Lite Driver for Oracle 10g (Multithreaded):

```
        OPL_XA:(*opl_xa_switch()):/home/openlink/lib/ora100_mt_lu.so -lclntsh -lnnz10 ;; Unicode Driver
        OPL_XA:(*opl_xa_switch()):/home/openlink/lib/ora100_mt_lt.so -lclntsh -lnnz10 ;; Ansi Driver
```

11.1.7.1.5 OpenLink Unix ODBC Lite Driver for Ingres II (Multithreaded):

```
        OPL_XA:(*opl_xa_switch()):/home/openlink/lib/ingii_mt_lt.so ;; Ansi Driver
```

Note that due a limitation in the current Ingres II OpenAPI? XA implementation our Ingres II Lite driver cannot be used with Tuxedo as detailed in the OpenLink Ingres II XA Implementation Wiki document, in which case the MT Ingres II agent is the only available solution currently

where /home/openlink is the openlink installation directory and OPL_XA is the rm_alias. Any additional database libraries on which the driver depends (as shown by ldd) must be included after the driver shared library name. The example above for the Oracle Lite driver is for a driver linked against the Oracle 10g Instant Client.

12 Chapter 10. OpenLink ODBC Driver (Single-Tier Edition) Unicode Support

Abstract
Our drivers support the latest releases of all supported database engines. This includes:

1. Oracle 8i & 9i
2. Microsoft SQL Server 2000
3. DB/2 v7
4. Informix 9
5. Sybase Adaptive Server 12.5
6. Progress 9 (SQL-92)

Note that for those Drivers above for which Unicode Support is provided a unicode and non-unicode enabled Driver is provided with ODBC driver names of the form:

```
OpenLink Lite for Database (32 Bit) (Unicode)          ; Unicode enabled driver

OpenLink Lite for Database (32 Bit)                    ; Non-unicode enabled driver
```

Where 'Database' is the name of the Database from the list of unicode enabled drivers above. The Uniocde enabled driver should be used when connecting to a unicode created database, otherwise we recommend you use the non-uniocde driver for connecting to a non-unicode created databases.

Table of Contents

12.1 Database Configuration for Unicode

Below are instructions on the configuration of the Unicode enabled drivers and databases for testing. Typically the first task to be performed is the creation of a Unicode enabled Database, which for most databases means configuring them to store data using the UTF8 encoding.

12.1.1 Oracle 8 & 9

The Oracle 9i, 8i and 8.0 databases store Unicode data in the UTF8 encoding scheme, which is an ASCII compatible multibyte encoding for Unicode.

12.1.1.1 Database Confguration

Using the Oracle Database Configuration Assistant wizard follow the options for creating a new database, selecting the custom option when presented and you will during the configuration of this Custom database be allowed to Change the Character Set , at which point this can be changed to UTF8.

To check the character set in use by your database, execute the following query in SQL*Plus:

```
SQL> SELECT parameter, value FROM nls_database_parameters
   WHERE parameter = 'NLS_CHARACTERSET';
PARAMETER             VALUE
------------------    ---------------------
NLS_CHARACTERSET      UTF8
SQL>.
```

Unicode support is dependent on the Unicode features available through the Oracle Call Interface (OCI). OCI 8.1.5 supports inputting Unicode data into a database and retrieving Unicode data from a database.

The Following Oracle Data types can be using for storing Unicode data:

```
CHAR
VARCHAR
VARCHAR2
```

12.1.1.2 Driver Configuration

The Oracle configuration parameter for control character sets is the NLS_LANG environment variable, which should be set to the correct character set for your client. Oracle 8.1.7 claims to be capable of dynamically determining the character set in use on the client and does not require the NLS_LANG to be set, but it is not a bad idea to set it anyway.

Additional information on Oracle Unicode support can be found from otn.oracle.com

12.1.2 Informix 9.x

12.1.2.1 Database Configuration

When a database is created, the DB_LOCALE in effect at the time is stored in the system catalog and used throughout the lifetime of the database. Using DBACCESS, create a new database with DB_LOCALE set beforehand to EN_US.UTF8 . Specifying UTF8 as the codeset allows the creation of schema objects with names which can contain multibyte characters.

The database locale being used by a database can be viewed in DBACCESS using the menu commands: Database > Info > NLS.

The documentation for Informix GLS states that DB_LOCALE is also used to correctly interpret the locale sensitive datatypes NCHAR and NVARCHAR. The code set specified in DB_LOCALE specifies which characters are valid in any character column as well as the names of database objects.

12.1.2.2 Setting the Client Locale

The codeset to be used by an Informix client application is specified as part of the client locale. The client locale takes the form:

```
language_territory.codeset[@modifier]
```

An Informix 9 Lite driver or agent should use UTF-8 as the codeset. The language and territory should not matter; so it should be possible, for example, to use French (fr_fr) or American English (en_us). For Informix clients on Windows, the client locale is typically set through SetNet32. Rather than rely on the SetNet32 settings, our agent or Lite driver instead sets the client locale at runtime. For an Informix Lite driver on Windows, you must manually add an entry to the registry to set the client locale under the entry for the appropriate DSN in the ODBC.INI hive, add the value:

```
ClientLocale:REG_SZ:<client locale>
e.g.
ClientLocale:REG_SZ:EN_US.57372
```

This example uses a codeset number (57372) rather than a codeset name (UTF8) to specify UTF-8 as the codeset. Either form can be used. The registry file included in an Informix client installation lists the supported code sets and the correspondence between codeset names and numbers.

12.1.2.3 Driver Configuration

For an Informix agent (on Windows or Unix), specify the CLIENT_LOCALE environment variable setting in the [Environment INFORMIX] section of the rulebook. For an Informix Unix Lite driver, set the CLIENT_LOCALE environment variable appropriately.

12.1.3 Sybase 12.5 +

12.1.3.1 Database Configuration

The pre-requisites for Unicode with Sybase are:

- Sybase Active Server (ASE) Version 12.5 or later. (Unicode support is NOT enabled for Version 12.0);
- Default character set for the Sybase Server needs to be "UTF-8".

To set this:

1. Make sure the Sybase SQL Server is not running. (Cancel it from the "Services" screen).
2. Run "Server Configuration" from the "Sybase" entry in the Task Menu bar, or run SYCONFIG.EXE directly;
3. Either Create a new Active Server or Configure an existing Active Server. (Selection is via Pushbuttons on the dialog box);
4. For either method, select the "Language" pushbutton;
5. Select the "Character Set" pushbutton;
6. Select the "Set Default" pushbutton;
7. Select "Unicode 3.0.1 UTF-8" from the list box.

If this entry is not available, you will have to add it. From the Character Set selection dialog box, select the "Add / Delete" pushbutton. Select the character set from the list box of those available. Select the "Add" pushbutton (or the "Add All" pushbutton to make all character sets available). Select OK. One the default character set has been selected, select "OK" and "Exit". Start (or restart) the Sybase SQL-Server.

12.1.3.2 Driver Configuration

There is no need to set anything at the Client end. The character set in use is actually set using Sybase locale functions at connection time. However, it may be useful to ensure that "utf8" is one of the enabled character sets for the relevant platform, in the file [SYBASE]/locales/locales.dat.

12.1.4 Progress 9.1 (SQL-92)

12.1.4.1 Database Configuration

The Progress database can be run in the UTF-8 Unicode codepage. The sql-92 client can be also be run in unicode. The SQL-92 server uses the codepage of the connected database as its internal codepage. Conversion between the database codepage and the SQL-92 client codepage is done by the server. There are no specific functions provided for converting between codepages within an ESQL-92 program.

The easiest method to create to Progress Unicode enabled database is to use the proutil program to convert an existing database to utf8 format using the following command:

```
proutil <db-name> -C convchar convert utf-8
```

Multibyte characters can be used in character and varchar fields. Character string literals and the arguments to string functions can also be multibyte characters. There are some provisos for specific functions noted in the documentation. In addition, when the SQL-92 language element syntax requires single quotes, double quotes, parentheses, or braces, the requirement is for the single-byte ASCII encoding of these characters, and other encodings are not equivalent. The string operators in Progress SQL-92 consider the unit of length to be the character count, not a byte count or a column count.

When a column of type CHAR or VARCHAR is created the maximum length specified is a number of characters so the actual number of bytes storage required depends on the database codepage. The length of character data returned in the sqlda is in bytes not characters.

12.1.4.2 Driver Configuration

For ESQL-92 clients the internal codepage is determined by the value of the client's SQL_CLIENT_CHARSET environment variable, if set. Otherwise, the internal codepage is that of the client's locale. There is a similar environment variable that controls the codepage of messages sent by the database server.

12.1.5 DB/2 v7.x

12.1.5.1 Database Configuration

Using the DB/2 Control Center create a new database instance using the wizard provide. During the create of this database you will be prompted to specify the locale for the new database, which should be set to a code set type of UTF-8. Unicode data can be stored in the following DB/2 datatypes:

- GRAPHIC
- VARGRAPHIC
- LONGVARGRAPHIC
- DBCLOB

12.1.5.2 Driver Configuration

There are no specific environment variables that need to be set for the DB/2 Driver to handle Unicode data. One special consideration when inserting Unicode data into the daatbase though is that you cannot insert literal Unicode values into the database. Instead these values have to be inserted as bound parameters as follows:

```
CREATE TABLE UTEST (F1 GRAPHIC(20), F2 VARGRAPHIC(20), F3 LONG VARGRAPHIC,
        F4 DBCLOB(100));
         Successfully connected to DSN 'UO_db2'.
SQLBindParameter:
  In: StatementHandle = 0x00751860, ParameterNumber = 1,
      InputOutputtype = SQL_PARAM_INPUT=1, ValueType = SQL_C_WCHAR=-8,
      ParameterType = SQL_WCHAR=-8, ColumnSize = 0, DecimalDigits = 0,
      ParameterValuePtr = "?????", BufferLength = 0,
      StrLen_or_IndPtr = SQL_NTS=-3, SQL_LEN_DATA_AT_EXEC = FALSE,
      Buffer Size = 600
   Return:       SQL_SUCCESS=0
SQLExecDirect:
   In: Statementhandle = 0x00751860, StatementText = "insert into utest(f1)
values(?)", Statementlength = 31
   Return:       SQL_SUCCESS=0
SQLExecDirect:
   In: Statementhandle = 0x00751860, StatementText = "select * from utest",
Statementlength = 19
   Return:       SQL_SUCCESS=0
Get Data All:
"F1", "F2", "F3", "F4"
"АБВГД               ", <Null>, <Null>, NO DATA
1 row fetched from 4 columns.
```

This is because the Graphic string data types are compatible only with other graphic string data types, and never with numeric, character string, or datetime data types.

Note that additional Unicode support has been added to the DB/2 agent for VARCHAR, LONGVARCHAR, CLOB & BLOB types, although a specific Patch (FIXPAK7) is required from IBM to obtain this support in DB/2 v 7.2 databases and FIXPAK 3 & 7 are required for DB/2 v7.1 databases.

The application code page must be set to UTF-8, which can be done by issuing the command:

```
db2set DB2CODEPAGE=1208
```

on the client (DB2 Lite) or server (DB2 agent) as appropriate.

12.1.6 MS SQLServer 2000

There are no Unicode-specific settings for SQLServer. When creating a Database, the collation type for the database can be specified but there is no UTF8 or Unicode specific setting, and a wide (Unicode) language type like Chinese or similar has to be selected, after which wide (Unicode) data can be inserted into the SQLServer wide character types NCHAR & NVARCHAR.

12.1.7 Operational Notes

If you are debugging a unicode connection, you can expect to see this in the request broker log - note the serveropts field:

```
...
14:08:11 using mapping: db2:*:*:*:*:*:*
14:08:11 using [generic_db2] ServerProgram=db2_mv
14:08:11 connect params: domain=DB2 db=sample serveropts=W readonly=0
...
```

The Unicode parameters that are supplied to the server options cannot be displayed properly in the broker log so the above will be seen; this is normal behaviour.

13 Chapter 11. OpenLink ODBC Driver Manager (iODBC SDK)

Abstract
This document provides information on linking your ODBC Applications with iODBC. iODBC is an alternative ODBC Driver Manager solution for developing ODBC components and applications for non-Windows systems (e.g. Mac OS Classic, Mac OS X, Linux....). iODBC is a free project licensed exclusively under the LGPL and BSD licenses, developed and maintained by OpenLink Software. iODBC permits non-Windows systems to communicate with databases via ODBC.

The ODBC API consists of a set of functions to enable any C/C++ applications linked against it to access and manage data. The ODBC specification is currently maintained by Microsoft Corporation.

iODBC is compliant with the actual Microsoft ODBC version 3.51.

iODBC SDKs are different for each platform. iODBC SDKs are available free of charge from the iODBC web site, released under the GNU Library General Public License (LGPL). The SDKs are made up of include files (.h), libraries for the corresponding platform, and a sample application for testing and demonstration (odbctest). The sample application is an Interactive Dynamic SQL Interpreter. Its sources are included for your use as you see fit.

There are no drivers included with the iODBC SDK, but you can find many on the OpenLink web site and from other third party middleware vendors.

You can find below a set of URLs for the right iODBC SDK regarding the platform (which is the operating system and the CPU) you are targeting at iodbc.org.

Table of Contents

13.1 iODBC SDK on Unix

Unlike Windows, Unix has historically never come with a system-wide ODBC installation, therefore there is greater scope for setting everything up the way you wish.

Also on Unix, there are two main-stream implementations of ODBC: UnixODBC and iODBC. The former comes with a QT-based implementation of a GUI, while iODBC provides a GTK+-based administrator.

The iODBC package is available in several formats - source tarball, source RPM, and a choice of binary components. Installing the binary packages is a simple exercise - for example,

```
sudo rpm -Uhv libiodbc-3.0.6-2.i386-glibc21.rpm
```

will install the iODBC runtime library.

There follows an alternative, walking through an unpacking, configure and build of the complete sources from tarball:

```
zsh, purple  6:10PM C/ % tar xvpfz libiodbc-3.0.6.tar.gz
libiodbc-3.0.6/
```

```
libiodbc-3.0.6/admin/
libiodbc-3.0.6/admin/Makefile.am
libiodbc-3.0.6/admin/Makefile.in
[snip]
zsh, purple  6:10PM C/ % cd libiodbc-3.0.6
zsh, purple  6:10PM libiodbc-3.0.6/ % ls
AUTHORS       LICENSE       NEWS           bin/          etc/        mac/
COPYING       LICENSE.BSD   README         configure*    include/    samples/
```

Configuration, starting with a check of interesting options specific to iODBC:

```
zsh, purple  6:10PM libiodbc-3.0.6/ % ./configure --help
Defaults for the options are specified in brackets.
Configuration:
  -h, --help              display this help and exit
      --help=short        display options specific to this package
      --help=recursive    display the short help of all the included packages
[snip]
--enable-fast-install=PKGS  optimize for fast installation default=yes
--disable-libtool-lock  avoid locking (might break parallel builds)
--enable-gui            build GUI applications (default),
--disable-gui           build GUI applications
--disable-gtktest       Do not try to compile and run a test GTK program
--enable-odbc3          build ODBC 3.x compatible driver manager (default)
--disable-odbc3         build ODBC 2.x compatible driver manager
[snip]
zsh, purple 6:10PM libiodbc-3.0.6/ % ./configure --prefix=/usr/local/stow/iodbc --with-gtk --enable-gui &
checking for a BSD-compatible install... /bin/install -c
checking whether build environment is sane... yes
checking for gawk... gawk
```

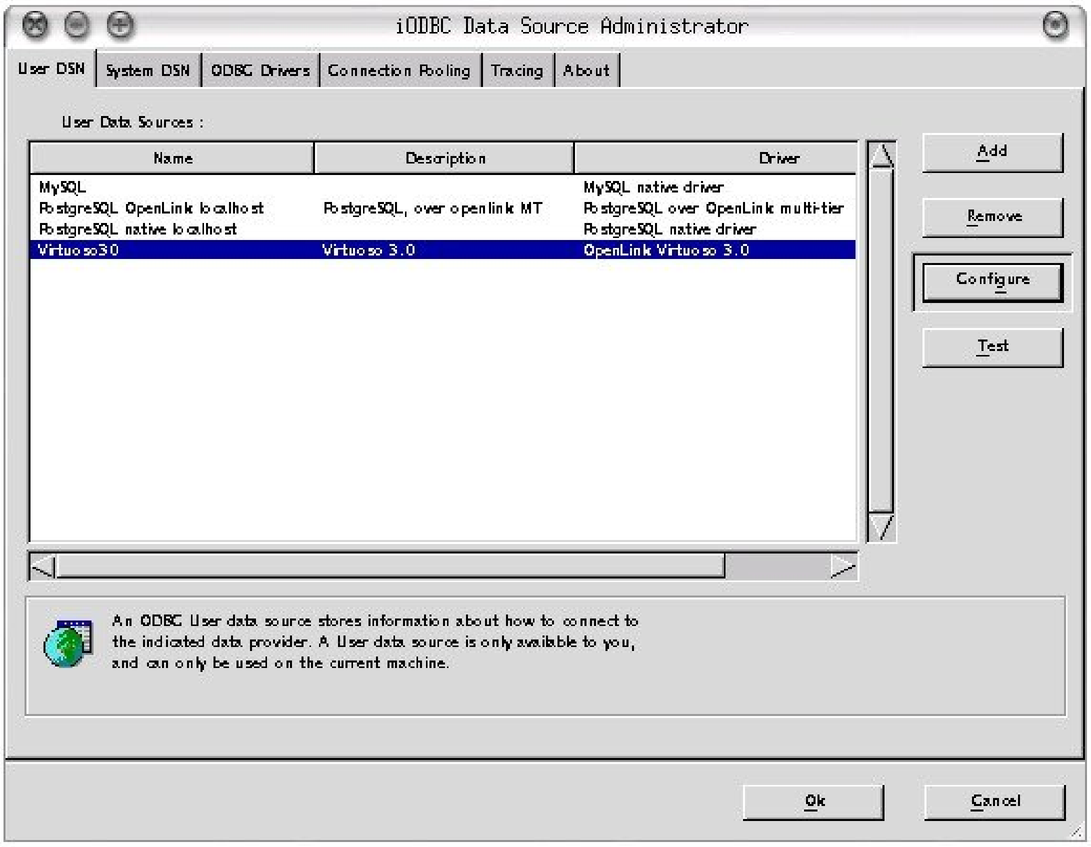
Installation, starting with becoming root by sudo, then stow-ing the package correctly into /usr/local:

```
zsh, purple  6:15PM libiodbc-3.0.6/ % sudo -s
Password:
zsh, purple  6:17PM libiodbc-3.0.6/ # make install
Making install in admin
make[1]: Entering directory `/home/tim/C/libiodbc-3.0.6/admin'
[snip]
make[2]: Nothing to be done for `install-exec-am'.
make[2]: Nothing to be done for `install-data-am'.
make[2]: Leaving directory `/home/tim/C/libiodbc-3.0.6'
make[1]: Leaving directory `/home/tim/C/libiodbc-3.0.6'
zsh, purple  6:18PM libiodbc-3.0.6/ # cd /usr/local/stow/
zsh, purple  6:18PM stow/ # chmod -R og=rX iodbc/
zsh, purple  6:18PM stow/ # stow iodbc/
zsh, purple  6:18PM stow/ # ^D
zsh, purple  6:18PM libiodbc-3.0.6/ % ls /usr/local/stow/iodbc/bin/
iodbc-config*  iodbcadm-gtk*  odbctest*
```

13.2 Configuring Data Sources

The graphical (GTK+-based) configuration screen makes setting up your data-sources (DSNs) quite intuitive, especially if you're used to the setup screens on Windows:

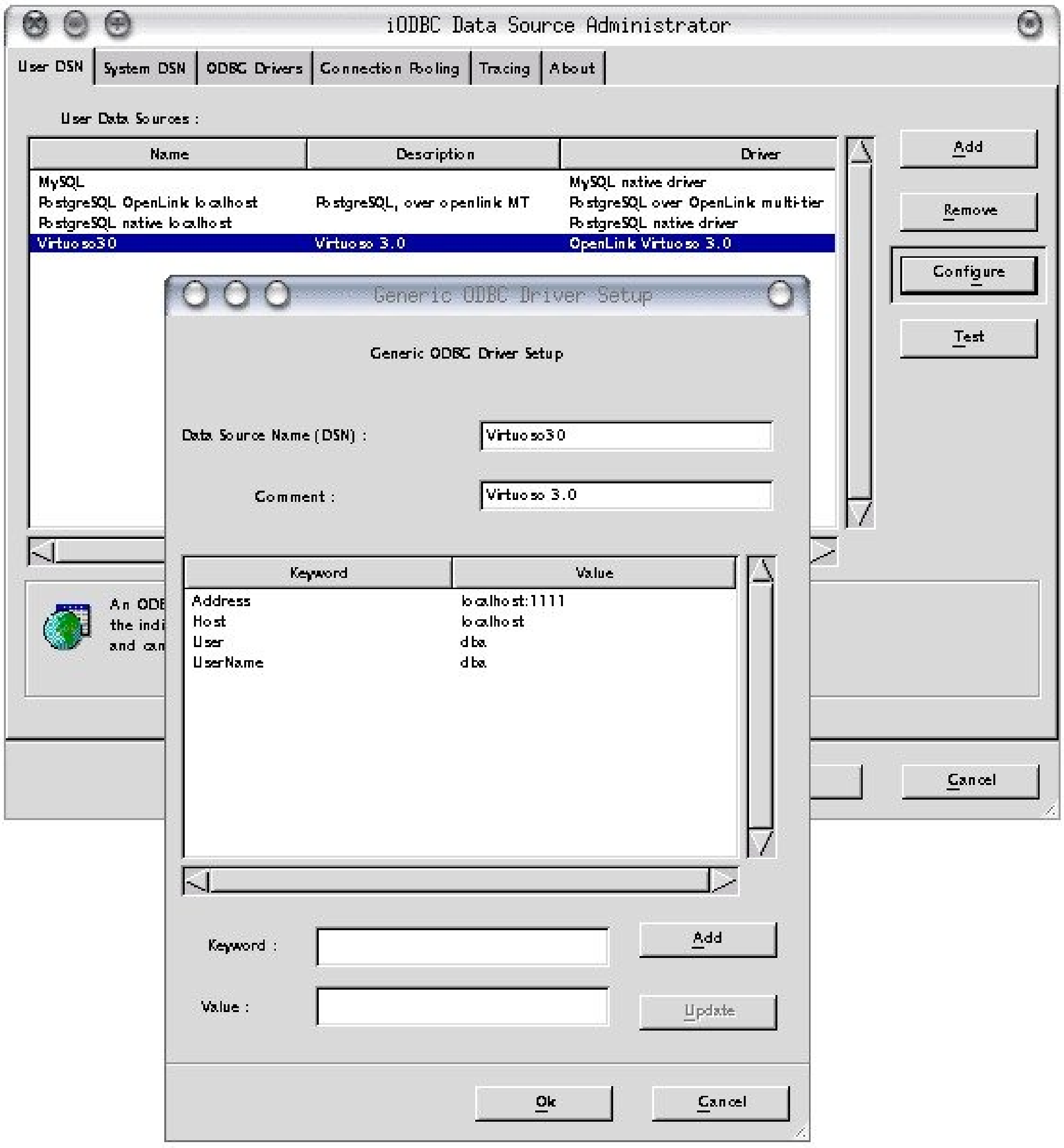
Figure 11.1. iODBC GTK Administrator



Name	Description	Driver
MySQL		MySQL native driver
PostgreSQL OpenLink localhost	PostgreSQL, over openlink MT	PostgreSQL over OpenLink multi-tier
PostgreSQL native localhost		PostgreSQL native driver
Virtuoso30	Virtuoso 3.0	OpenLink Virtuoso 3.0

An ODBC User data source stores information about how to connect to the indicated data provider. A User data source is only available to you, and can only be used on the current machine.

Figure 11.2. iODBC GTK Administrator



User Data Sources :

Name	Description	Driver
MySQL		MySQL native driver
PostgreSQL OpenLink localhost	PostgreSQL, over openlink MT	PostgreSQL over OpenLink multi-tier
PostgreSQL native localhost		PostgreSQL native driver
Virtuoso30	Virtuoso 3.0	OpenLink Virtuoso 3.0

Generic ODBC Driver Setup

Data Source Name (DSN) : Virtuoso30

Comment : Virtuoso 3.0

Keyword	Value
Address	localhost:1111
Host	localhost
User	dba
UserName	dba

Keyword :

Value :

An example of adding a new datasource follows:

13.2.1 The Configuration Files

The iODBC library searches for its DSN through a set few files:

$ODBCINI - the environment variable, if set

~/.odbc.ini - in your home-directory, if it exists

/etc/odbc.ini - a system-wide default

The format of this file is very simple; there are 3 sections, one for ODBC itself (setting up tracing), one for a list of DSNs, and one for the definitions of those DSNs, thus:

```
[ODBC]
Debug         = 1
Trace         = 0
DebugFile     = /home/tim/temp/odbc-debugfile.log
TraceFile     = /home/tim/temp/odbc-tracefile.log
TraceAutoStop = 1

[ODBC Data Sources]
Virtuoso30 = OpenLink Virtuoso 3.0

[Virtuoso30]
Description = Virtuoso 3.0
```

```
        Driver      = /opt/opl/virtuoso-o12/lib/virtodbc.so
        Address     = localhost:1111
        UserName    = dba
        User        = dba
```

Each DSN configured has an entry in the `ODBC Data Sources' section, and a complete definition in a paragraph section of its own.

There is also an ODBCINSTINI file; this contains descriptions of the ODBC drivers available.

```
        [ODBC Drivers]
        OpenLink Generic = installed
        [OpenLink Generic]
        Driver = /opt/openlink/odbcsdk/lib/oplodbc.so
```

13.2.2 Making a Test Connection

To test that a DSN connects correctly, you can use the supplied `odbctest' utility.

```
        zsh, purple  3:58PM bin/ % ls
        iodbc-config*  iodbcadm-gtk*  odbctest*
        zsh, purple  3:58PM bin/ % echo $ODBCINI
        /home/tim/.odbc.ini
        zsh, purple  3:58PM bin/ % ./odbctest
        iODBC Demonstration program
        This program shows an interactive SQL processor
        Enter ODBC connect string (? shows list):
        Progress9.x(solaris)           | OpenLink Generic ODBC Driver
        Progress9.x(solaris)           | OpenLink Generic ODBC Driver
        pgsqlPurple                    | PostgreSQL native driver
        pgsqlPurpleOpl                 | PostgreSQL using OpenLink driver
        pgsqlPurpleVirtDemo            | Virtuoso database driver
        SQLServer                      | OpenLink Generic ODBC Driver
        Enter ODBC connect string (? shows list): DSN=pgsqlPurpleOpl
        Driver: 04.50.0801 OpenLink Generic ODBC Driver (oplodbc.so)
        SQL&gt;select count(*) from timtest;
        count
        -----------
        100
         result set 1 returned 1 rows.
```

Any of the DSN attributes can be overridden in the connect-string, which takes the form

```
        DSN=dsn_name[;attr=value]*
```

The attributes themselves depend on the database driver behind the DSN; normally they control the username (where the attribute could be called`userid' or `uid') and password (if specified) used to connect to the database, some form of server hostname specification (`host=' or `server='), and a means to identify a database instance on that server (`database='). A driver may also have custom attributes, such as FetchBufferSize, Port, etc.

13.2.3 Compiling Sample Program

To compile the sample "odbctest" application, follow these steps:

1. Navigate to the directory:

   ```
   odbcsdk/examples
   ```
2. Type the following commands to use the default Makefile and odbctest.c code:

   ```
   make clean
   make
   ```

13.2.4 Developing ODBC Applications

The ODBC SDK only implements an interface for the 'C' programming language.

To write an ODBC application,you must perform the following tasks:

1. Include the files "sql.h" and "sqlext.h" in your 'C' program(s).
2. Link the application with the following driver libraries:

   ```
   lib/libiodbc.a
   lib/libiodbc.so
   ```
3. At runtime, the ODBC drivers required for the connection are as follows (must be included in your shared library path):

   ```
   libiodbc.so.2.1.2
   libiodbc.so.2
   ```
4. Compile the program in the same directory as the "Makefile" file using the syntax:

   ```
   make
   ```

Note: Some UNIX systems also need -lsocket, -lnsl_s or both.

13.2.5 Further Reading:

"Data Management: SQL Call Level Interface (CLI)"

from X/Open in conjunction with SQL Access Group

ISBN: 1-872630-63-4

X/Open Document Number: S203

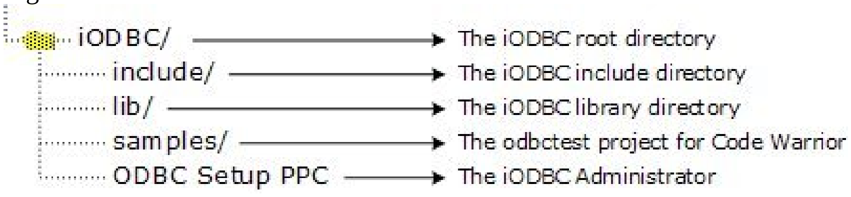
Microsoft ODBC API documentation: http://www.microsoft.com/data/odbc/default.htm

13.3 Linking iODBC and ODBC Applications on Mac OS

13.3.1 Mac OS Classic

The package provided for this platform is a compressed Macintosh format (.sit.hqx). After uncompressing it on your hard drive, you will find below the tree of the iODBC SDK as installed on Mac OS Classic :

Figure 11.3. iODBC SDK Tree for Mac OS Classic


iODBC/
The iODBC root directory
include/
The iODBC include directory
lib/
The iODBC library directory
samples/
The odbctest project for Code Warrior
ODBC Setup PPC
The iODBC Administrator

iODBC is cut down in three parts, and each one has its proper set of include files and libraries.

The iODBC Driver Manager is the core of the ODBC driver manager. Its main task is to load run the right function with the right ODBC driver.

The iODBC Configuration Manager is the ODBC configuration manager. Its main task is to access and manage the DSN configuration files.

The iODBC GUI Manager is the GUI manager. Its main task is to give to the user the ability to access all the ODBC functionality through a GUI.

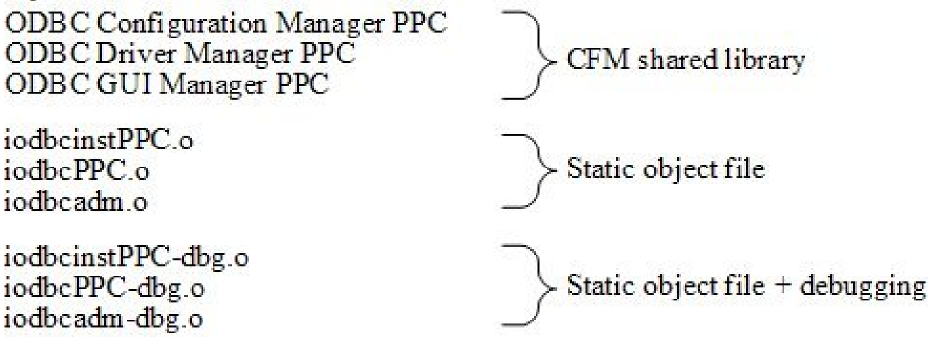
Under the include directory, you will find all the iODBC header files that can be used in your source. The following are the main header files: `isql.h, isqlext.h, isqltypes.h, iodbcadm.h, iodbcinst.h`

These are generally only a proxy for the other header files provided in the same directory: `sql.h, sqlext.h, sqltypes.h, odbcinst.h`

To access all these include files, simply add to your compiler an include path that points to `iODBC/include`. This is compiler dependent, so you may have to look into your compiler's documentation. For Code Warrior, you can do this via the Project Preferences panel.

Under the lib directory, you will find all the iODBC libraries needed to link against your application. All the parts explained before, are shipped through three different forms: CFM shared library, static object file, and static object file with debugging information.

Figure 11.4. iODBC SDK libraries on Mac



You will have to link your application with only one set of libraries. If you choose the CFM shared library set, ensure that at runtime these files are in the System-Extensions folder of your Mac Classic system.

To access the right set of library files, add a library path that points to `iODBC/lib`. This is compiler dependent, consult your compiler documentation. For Code Warrior, you can do this through the Project Preferences panel.

13.3.2 Mac OS X

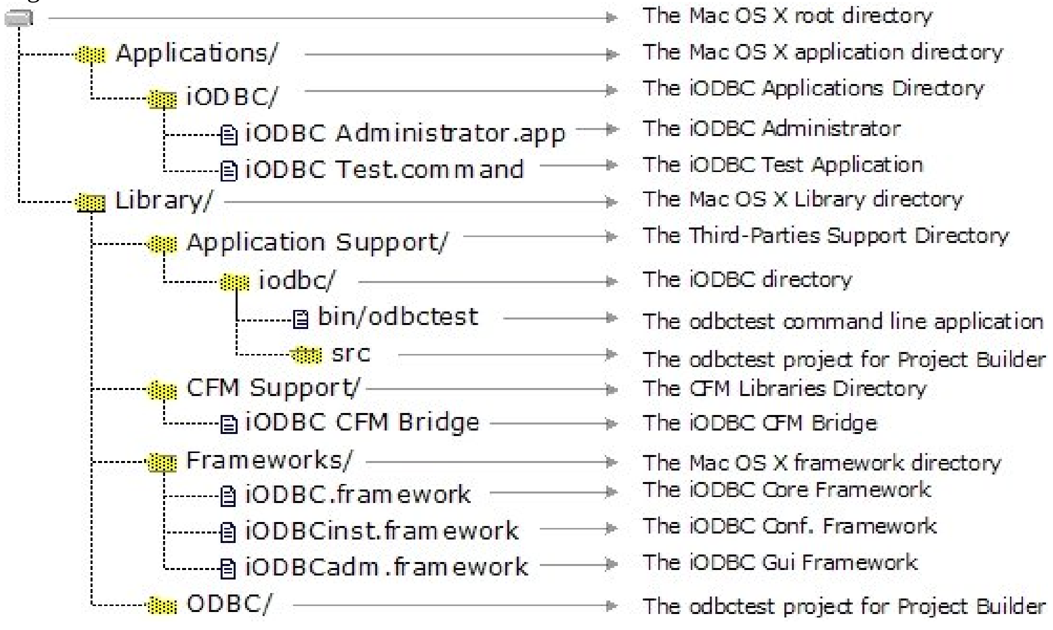
The package provided for this platform is a Macintosh Installer package (.mpkg) inside a disk-image (.dmg) file. After mounting the disk-image by double clicking on it, you will have to launch the Macintosh Installer package (.mpkg). You will be guided through the installation via the Macintosh Installer application.

13.3.3 See Also:

iODBC follows the Programmer and System guidelines defined by Apple, this document can be found at: developer.apple.com

You will find the iODBC SDK installation in the following directory tree structure as installed on Mac OS X:

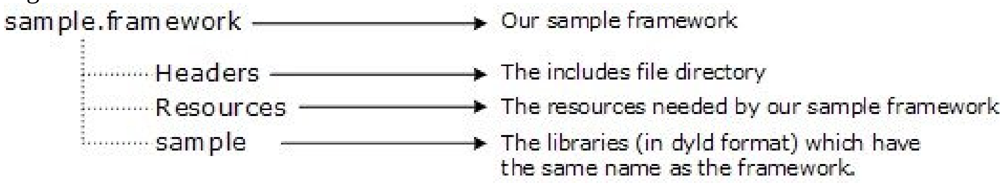
Figure 11.5. iODBC SDK tree on Mac OS X


The Mac OS X root directory
Applications/
The Mac OS X application directory
iODBC/
The iODBC Applications Directory
iODBC Administrator.app
The iODBC Administrator
iODBC Test.command
The iODBC Test Application
Library/
The Mac OS X Library directory
Application Support/
The Third-Parties Support Directory
iodbc/
The iODBC directory
bin/odbctest
The odbctest command line application
src
The odbctest project for Project Builder
CFM Support/
The CFM Libraries Directory
iODBC CFM Bridge
The iODBC CFM Bridge
Frameworks/
The Mac OS X framework directory
iODBC.framework
The iODBC Core Framework
iODBCinst.framework
The iODBC Conf. Framework
iODBCadm.framework
The iODBC Gui Framework
ODBC/
The odbctest project for Project Builder

In Mac OS X, "frameworks" are the central components of all SDKs. They provide everything needed by developers from include files to shared libraries with which you need to link your application. All frameworks support is well managed with Project Builder, shipped by Apple. Simply drag and drop via the provided GUI the corresponding framework you want use. If you want to use a framework through the command line compiler, see below.

The framework is basically a directory, structured as below:

Figure 11.6. iODBC SDK Frameworks on Mac OS X


sample.framework
Our sample framework
Headers
The includes file directory
Resources
The resources needed by our sample framework
sample
The libraries (in dyld format) which have the same name as the framework.

When you need to include one of the framework header files, you have to prepend your header file name with the framework name as below :

```
#include <samples/my_sample_header.h>
```

iODBC is broken down into three frameworks, each having its own proper set of includes files and libraries.

The iODBC.framework is the core of the ODBC driver manager. Its main task is to load run the right function with the right ODBC driver.

The iODBCinst.framework is the ODBC configuration manager. Its main task is to access and manage the DSN files.

The iODBCadm.framework is the GUI manager. Its main task is to give to the user the ability to access all the ODBC functionality through a GUI.

First of all, you have to be sure that the compiler and linker you are using can manage frameworks correctly.

13.3.4 Note:

The iODBC SDK is shipped with the `odbctest` sample application including sources and project file, which is intended as an example of an application utilizing iODBC.

Under Project Builder, you have to put all the frameworks that your application will use into your project. Implicitly, all these frameworks will be used. Also, you have to be sure that the machine where the application will be running includes all the frameworks with which you are linking. In certain cases, iODBC can be shipped with your application and all the frameworks.

This is the most straightforward way, but you can also directly use the compiler and command line linker shipped with Project Builder. In such case, you will have to add certain options to let the compiler and linker know that you want to use a specific framework. However, the sources do not require any changes. During the compilation phase, you will have to use the " `F`" option to add a path to let the compiler search for frameworks under the designated path. The correct syntax is " `Fdir`", where `dir` is the path you want to add. You have to put one path, and there is no limit on the number of `F` options to pass on the command line. For iODBC, you have to add only the following two directories:

```
/Library/Frameworks
/System/Library/Frameworks
```

A complete cc compilation command line may look like:

```
cc  c " F/Library/Frameworks" " F/System/Library/Frameworks" mysources.c
```

During the linkage phase, you will have to use the same option as above, as well as specifying at the end of the command line all the frameworks with which you are linking, preceded by the option `framework`.

A complete `cc` linkage command line may look like:

```
cc  o "myapplication" " F/Library/Frameworks" " F/System/Library/Frameworks"  \
       framework "iODBC"  framework "iODBCinst"  framework "iODBCadm"
```

13.3.5 References

iODBC web site

OpenLink Software web site

ODBC web site

Apple's Developer web site

13.3.6 Porting Mac OS Classic ODBC applications to Mac OS X

Carbon is a framework included with Apple's Mac OS X operating system that is derived from the original Macintosh Toolbox programming interface. Carbon on Mac OS X is an entirely new implementation, with a superset of the original Toolbox functionality, and many changes and additions to run under the Mac OS X operating system.

A subset of Carbon is also available on previous versions of the Mac OS, all the way back to Mac OS 8.1 or Mac OS 8.6 depending on the functionality required. This enables developers to create applications from one set of source code that will run on both the original Macintosh operating system as well as Mac OS X. Carbon applications can even take advantage of special Mac OS X features when running on Mac OS X, and continue to run as they have otherwise on earlier versions of the Mac OS.

Cocoa is a rich set of object-oriented frameworks that allow for the most rapid development of applications on Mac OS X. Using Cocoa, developers can create full-featured applications in a fraction of the time they would need for procedural languages. Applications from UNIX and other OS platforms can also be brought to Mac OS X quickly by using Cocoa to build state-of-the-art Aqua user interfaces while retaining most existing core code.

The Cocoa application environment is designed specifically for Mac OS X-only native applications. It is comprised of a set of object-oriented frameworks that support rapid development and high productivity. The Cocoa frameworks include a full featured set of classes designed to create robust and powerful Mac OS X applications. The object-oriented design simplifies application development and debugging.

Figure 11.7. iODBC SDK on Mac

13.3.7 See Also:

Cocoa

Carbon

13.3.7.1 Migration of iODBC applications to Carbon

The iODBC CFM Bridge is the library that Carbon applications must be linked against. This bridge is responsible for redirecting the ODBC API calls to the right iODBC version applicable to platform that the application is running on, beit Mac OS Classic or Mac OS X.

The iODBC CFM Bridge must be used exclusively. If you link against the iODBC CFM Bridge, ensure that no others iODBC libraries are linked in your project. The iODBC CFM Bridge linked applications require a valid iODBC installation on the target platform in order run successfully.

Any CFM libraries used must be included in your System-Extensions folder of your Mac Classic system in order to successfully support carbon applications at runtime.

13.3.7.2 Migration of iODBC applications to Cocoa

Under Project Builder, you have to put all the frameworks that your application will use in your project. Implicitly, all these frameworks will be used. Also, you have to be sure that the machine where you will run the application include all the frameworks you link with. In such cases, iODBC can be shipped with your application including all the frameworks.

This is the most straight forward way, but you can also directly use the compiler and linker command line shipped with

Project Builder. In a such case, you will have to add some options to inform the compiler and linker that you want to use a specific framework. The sources sources do not have to change.

During the compilation phase, use the `-Fdir` option on the compiler command line to add a search path to the framework path, where dir is the path you want to add. You may only specify one path per `-F` option, but you not limited to the number of `-F` options used. iODBC compilations only require `-F/Library/Frameworks` and `-F/System/Library/Frameworks` options. Hence, complete `cc`= compilation command line may look like:

```
cc -c "-F/Library/Frameworks" "-F/System/Library/Frameworks" ... mysources.c
```

During the linkage phase, you will have to use the same option as above, and to specify at the end of the command line all the framework you want to link with, preceded with the option -framework . A complete cc linkage command line may look like:

```
cc -o "myapplication" "-F/Library/Frameworks" "-F/System/Library/Frameworks" ... \
  -framework "iODBC" -framework "iODBCinst" -framework "iODBCadm"
```

14 Chapter 12. Bugs Fixed

Abstract
An overview of issues fixed:

Table 12.1. Bugs Fixed

Bug	Description
506	Oracle 8.0 on AIX fails InterDev and VB6 tests
734	Mac OS X iODBC isntaller overwrites existing symbolic links.
950	Windows Installer error `Severe -- VJ CLASSPATH too long to update`
1047	Version String for testcono should read `ODBC` not `UDBC`
1227	Modify Tracing tab description on Classic, to match Mac OS X
1486	sql2k_mv needs support for `translate character data` setting
1833	odbctest documentation is incomplete
1841	user-authentication fails, though UID/PWD are known correct
1968	oplrvc scripts are not documented
2074	Progress 9.1C SQL Lite [Release 4.2] does not connect!
2199	DB2 Lite screen shots don't match actual interface & help text is recursive
2220	Current 4.2 SQL 92 Lite installer contains non-working Driver DLL
2229	privileges must be set to permit ADMIN group write access...
2330	iODBC HTTP Admin needs correct version graphic on About tab
2455	Admin Assistant wizard and Mozilla browser
2685	prs91_sv.exe as of 4.2.2002-03-27 installer fails on some Windows boxes
2762	LingerTimeOut option needs to be documented
2831	data type `bit` returns `0.0` for every record, regardless of actual content (all Unix; Windows SQL Lite unavailable)
2863	MS Access "#deleted" errors when primary key is SQL_BIGINT
2880	Unix Lite needs updated filenames
2903	Postgres driver updated fail using the OLEDB rowsetviewer program
2971	Rel 4.2 installer fails to populate classpath, no informative error when no license
3097	SQLDataSources() does not follow API spec
3168	MT 4.2 sql2k driver doesn't bring back bigint data (sql6 driver can)
3254	[SQL Server]Syntax error converting datetime from character string in Sco ODBC SDK
3265	remove notation of `beta release` from iODBC description
3266	Installer must not reboot Macintosh without user confirmation
3272	iODBC 3.5.3 SQLDriverConnect() fails with System DSNs, unless Driver is also specified
3325	client connections to Oracle 9.2 on Mac OS X require new libclntsh.dylib.9.0
3328	Retrieval of Progress Decimals results in DB Server Crash and Driver General Error
3330	SQLSetConnectAttr or SQLSetConnectOption fails to set transaction isolation level
3366	TDS Lite drivers are not "describing" columns as NULLABLE
3423	TDS Lite Driver does not recognise 'option + f' special character on Mac Classic
3464	4.2 Lite driver doesn't bring back BYTE 800 Ingres data (Multi-tier does)
3483	PostgreSQL Lite license for Linux does not work
3487	MIN_FIELD_LEN not available in Progress Lite
3516	SQLGetConnectAttr (SQL_ATTR_CURRENT_CATALOG = 109) fails with `Option type out of range`
3533	Datetime and timestamp columns do not work as expected in TDS Driver