



SequeLink[®]

Administrator's Guide

June 2003

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Preface

This book is your guide to configuring and managing DataDirect® SequeLink® 5.4 from DataDirect Technologies. Read on to find out more about your SequeLink environment and how to use this book.

What Is DataDirect SequeLink?

DataDirect SequeLink is a middleware product that provides point-to-point connections from client to server for the latest data access standards, including Open Database Connectivity (ODBC), JDBC, ActiveX Data Objects (ADO), and ADO.NET.

Using This Book

This book assumes you are familiar with your operating system and its commands; the concept of directories; the management of user accounts and security access; and your network protocol and its configuration.

This book contains the following information:

- [Chapter 1 “Introduction” on page 27](#) introduces some concepts to help you understand how to configure and manage your SequeLink environment.

Part 1: Configuring and Managing SequeLink Services

- [Chapter 2 “Using the SequeLink Manager Snap-in” on page 49](#) describes how to use the SequeLink Manager Snap-in.
- [Chapter 3 “Configuring Server Data Sources Using the SequeLink Manager Snap-in” on page 67](#) describes how to create and manage server data sources with the SequeLink Manager Snap-in.
- [Chapter 4 “Configuring SequeLink Services Using the SequeLink Manager Snap-in” on page 73](#) describes how to create and manage SequeLink services with the SequeLink Manager Snap-in.
- [Chapter 5 “Managing Data Access Activity Using the SequeLink Manager Snap-in” on page 99](#) describes the tasks you perform to manage and monitor SequeLink service activity using the SequeLink Manager Snap-in.
- [Chapter 6 “Using SequeLink Manager Commands” on page 107](#) describes how to use the SequeLink Manager Command-Line Tool, issue SequeLink Manager commands, and lists some commonly used SequeLink Manager commands.
- [Chapter 7 “Using the SequeLink Manager for OS/390” on page 121](#) describes how to use the SequeLink Manager for OS/390.
- [Chapter 8 “Configuring SequeLink Services Using the SequeLink Manager for OS/390” on page 135](#) describes the tasks you may need to perform to configure and manage SequeLink Server for OS/390 services and data access activities locally from an OS/390 machine.
- [Chapter 9 “Configuring Transliteration” on page 185](#) describes how configure transliteration for SequeLink Server.

Part 2: Configuring and Managing SequeLink Clients

- [Chapter 10 “Configuring the ODBC Client” on page 199](#) describes the tasks you may need to perform to configure and manage the SequeLink *for* ODBC Client.
- [Chapter 11 “Configuring the ADO Client” on page 227](#) describes the tasks you may need to perform to configure and manage the SequeLink *for* ADO Client.
- [Chapter 12 “Configuring the JDBC Client” on page 257](#) describes the tasks you may need to perform to configure and manage the SequeLink *for* JDBC Client.
- [Chapter 13 “Configuring the .NET Client” on page 271](#) describes the tasks you may need to perform to configure and manage the SequeLink *for* .NET Client.

Part 3: Using SequeLink Security

- [Chapter 14 “Configuring SequeLink Security” on page 281](#) offers an overview of SequeLink security options and describes how to configure SequeLink security for Windows, UNIX, and OS/390 platforms.
- [Chapter 15 “Configuring the SequeLink Proxy Server” on page 319](#) describes how to configure SequeLink security for Java environments.

Part 4: Appendixes

- [Appendix A “Using LDAP with ODBC and ADO Clients” on page 351](#) explains how SequeLink Clients use LDAP directories to retrieve connection information and describes how to create and update LDAP entries for SequeLink services.
- [Appendix B “OS/390 Workload Manager \(WLM\) Classification” on page 355](#) describes the information used by SequeLink Server to classify WLM enclaves.

- [Appendix C “SequeLink Manager Commands” on page 357](#) lists all available SequeLink Manager commands.
- [Appendix D “Operator Interface Commands for OS/390” on page 395](#) lists all available Operator Interface commands by category.
- [Appendix E “SequeLink Service Attributes” on page 407](#) lists the SequeLink Manager attributes you can use to configure and manage your SequeLink environment.
- [Appendix F “SequeLink Events” on page 479](#) lists and defines the SequeLink events, the attributes associated with events, and explains how to write a filter for an event.
- [Appendix G “Internationalization, Localization, and Unicode” on page 489](#) provides an overview of how internationalization, localization, and Unicode relate to each other.

NOTE: This book refers the reader to Web URLs for more information about specific topics, including Web URLs not maintained by DataDirect Technologies. Because it is the nature of Web content to change frequently, DataDirect Technologies can guarantee only that the URLs referenced in this book were correct at the time of publishing.

SequeLink Documentation

The following table provides a guide for finding information in your SequeLink documentation:

For information about...	Go to...
SequeLink concepts and planning your SequeLink environment	<i>Getting Started with SequeLink</i>
Installing the SequeLink middleware components	<i>SequeLink Installation Guide</i>
Administering your SequeLink environment	<i>SequeLink Administrator's Guide</i>
Developing ODBC, ADO, JDBC, and .NET applications for the SequeLink environment	<i>SequeLink Developer's Reference</i>
Troubleshooting and referencing error messages	<i>SequeLink Troubleshooting Guide and Reference</i>

SequeLink documentation is provided on your DataDirect CD in PDF format, which allows you to view it online or print it. You can view the SequeLink online documentation using Adobe Acrobat Reader. The DataDirect CD includes Acrobat Reader 5.x with Search for Windows, and Acrobat Reader 4.x with Search for UNIX. SequeLink product documentation is also available on the DataDirect Technologies Web site:

http://www.datadirect-technologies.com/techres/proddoc_product.asp

On Windows and UNIX, you can choose to install the online books on your system. When installed, they are located in the books directory that is created beneath the SequeLink installation directory.

When you install the JDBC, .NET, or ODBC Client, HTML-based online help for developing applications is placed by default in the help directory that is created beneath the SequeLink installation directory. To access help, you must have Internet Explorer 5.x or higher, or Netscape 4.x or higher, installed. (Netscape 6.0. does not support the help system; however, 6.1 or higher does.) After you have opened the main screen of the help system in your browser (as described below), you can bookmark it in the browser for quick access later.



On Windows platforms, help is available from the setup dialog for the ODBC driver and ADO data provider. When you click **Help**, your browser will open to the correct topic. There are three navigation buttons at the left end of the grey menu bar at the top of the help screen. Clicking the left-hand button displays the table of contents and the index for the entire help system in the left pane. After the left pane is displayed, clicking the left-hand button synchronizes the contents of the right-hand pane with its location in the table of contents. The next two buttons navigate to the previous and following pages. The two buttons at the right end of the menu bar allow you print or bookmark the page. The program group for SequeLink also contains an icon for launching the help system.

There are three navigation buttons at the left end of the grey menu bar at the top of the help screen. Clicking the left-hand button synchronizes the contents of the right-hand pane with its location in the table of contents. The next two buttons navigate to the previous and following pages. The two buttons at the right end of the menu bar allow you print or bookmark the page.

Conventions Used in This Book

This section describes the typography and other conventions used in this book.

Typographical Conventions





This book uses the following typographical conventions:

Convention	Explanation
<i>italics</i>	Introduces new terms you may not be familiar with, and is used occasionally for emphasis.
bold	Emphasizes important information. Also indicates button, menu, and icon names on which you can act. For example, click Next .
UPPERCASE	Indicates the name of a file. For operating environments that use case-sensitive filenames, the correct capitalization is used in information specific to those environments. Also indicates keys or key combinations you can use. For example, press the ENTER key.
monospace	Indicates syntax examples, values that you specify, or results that you receive.
<i>monospaced italics</i>	Indicates names that are placeholders for values you specify; for example, <i>filename</i> .
forward slash /	Separates menus and their associated commands. For example, Select File / Copy means to select Copy from the File menu.
vertical rule	Indicates an OR separator to delineate items.
brackets []	Indicates optional items. For example, in the following statement: SELECT [DISTINCT], DISTINCT is an optional keyword.

Convention	Explanation
braces { }	Indicates that you must select one item. For example, {yes no} means you must specify either yes or no.
ellipsis . . .	Indicates that the immediately preceding item can be repeated any number of times in succession. An ellipsis following a closing bracket indicates that all information in that unit can be repeated.

Environment-Specific Information

This book supports users of various operating environments. Where it provides information that does not apply to all supported environments, the following symbols are used to identify that information:

Symbol	Environment
	<i>Windows</i> . Information specific to the Microsoft Windows 98, Windows Me, Windows NT, Windows 2000, Windows Server 2003, and Windows XP environments is identified by the Windows symbol.
	<i>Windows NT</i> . Information specific to the Microsoft Windows NT environment is identified by the Windows symbol and the letters NT.
	<i>Windows 200x</i> . Information specific to the Microsoft Windows 2000 and Windows Server 2003 environments is identified by the Windows symbol and the characters 200x.
	<i>Windows XP</i> . Information specific to the Microsoft Windows XP environment is identified by the Windows symbol and the letters XP.

Symbol Environment



Windows Server. Information specific to the Microsoft Windows platforms on which SequeLink Server runs is identified by the Windows symbol and the word Server.



Windows Client. Information specific to the Microsoft Windows platforms on which SequeLink Client runs is identified by the Windows symbol and the word Client.



UNIX. Information specific to UNIX environments is identified by this symbol, which applies to all supported UNIX environments. UNIX is a registered trademark in the United States and other countries, licensed exclusively through X/Open Company Ltd.

z/OS

z/OS. Information specific to OS/390 and z/OS environments is identified by the characters z/OS.

Contacting Technical Support

DataDirect Technologies provides technical support for registered users of this product, including limited installation support, for the first 30 days. Register online for your SupportLink user ID and password for access to the password-protected areas of the SupportLink web site at http://www.datadirect-technologies.com/support/support_index.asp. Your user ID and password are issued to you by email upon registration.

For post-installation support, contact us using one of the methods listed below or purchase further support by enrolling in the SupportLink program. For more information about SupportLink, contact your sales representative.

The DataDirect Technologies web site provides the latest support information through SupportLink Online, our global service network providing access to support contact details, tools, and valuable information. Our SupportLink users access information using the web and automatic email notification. SupportLink Online includes a knowledge base so you can search on keywords for technical bulletins and other information.

World Wide Web

http://www.datadirect-technologies.com/support/support_index.asp

E-Mail

USA, Canada, and Mexico	supportlink@datadirect-technologies.com
Europe, Middle East, and Africa	int.supportlink@datadirect-technologies.com
Japan	jpn.answerline@datadirect.co.jp
All other countries	http://www.datadirect-technologies.com/contactus/distributor.asp provides a list of the correct e-mail contacts.

Local Telephone Support

Local phone numbers can be found at:

http://www.datadirect-technologies.com/support/support_contact_aline.asp

SupportLink support is available 24 hours a day, seven days a week.

Fax Information

Fax US, Mexico, and Canada	1 919 461 4527
Fax EMEA	+32 (0) 15 32 09 19

When you contact us, please provide the following information:

- The **product serial number** or a case number. If you do not have a SupportLink contract, we will ask you to speak with a sales representative.
- Your **name and organization**. For a first-time call, you may be asked for full customer information, including location and contact details.
- The **version number** of your DataDirect product.
- The type and version of your **operating system**.
- Any **third-party software or other environment information** required to understand the problem.
- A **brief description of the problem**, including any error messages you have received, **and the steps preceding the occurrence of the problem**. Depending on the complexity of the problem, you may be asked to submit an example so that we can recreate the problem.
- An assessment of the **severity level** of the problem.

1 Introduction

This chapter introduces some concepts to help you understand how to configure and manage your SequeLink environment. For a complete discussion of planning issues, including configuration, administration, and migration issues, refer to *Getting Started with SequeLink*.

SequeLink Server System Administration

SequeLink provides the following options for configuring and managing your SequeLink environment:

- **Local system administration** allows you to configure and manage your SequeLink environment using the SequeLink Manager installed locally on a SequeLink Server.
- **Remote system administration** allows you to configure and manage your SequeLink environment using the SequeLink Manager installed on the desktop of a networked client.

NOTE: Only SequeLink 5.4 services can be configured, managed, or monitored with the SequeLink Manager 5.4.

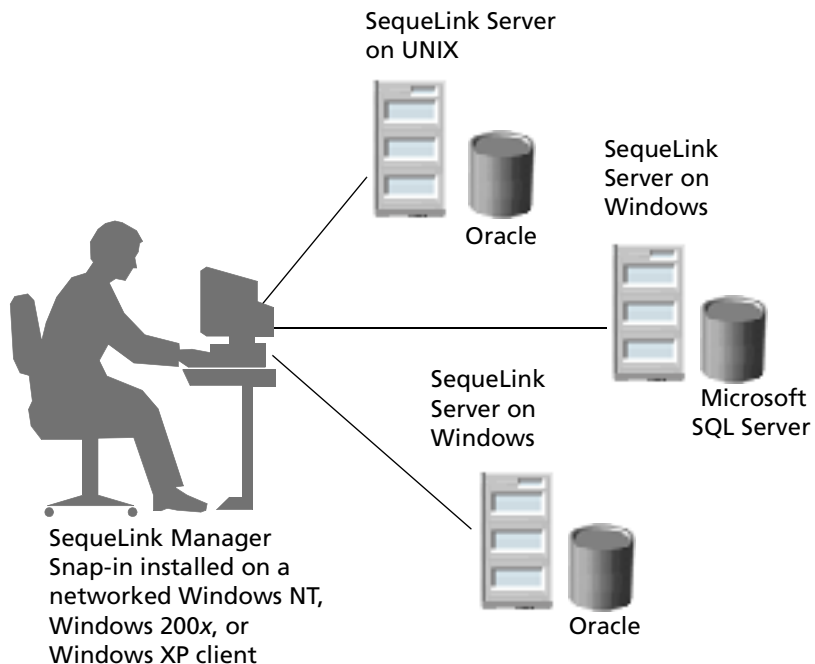
Local System Administration

You can use the SequeLink Manager locally from the SequeLink Server to configure and manage your SequeLink environment; however, which SequeLink Manager tool you can use locally depends on your SequeLink Server platform.

Remote System Administration

Remote system administration allows you to configure and manage your data access environment from the convenience of your desktop regardless of your SequeLink Server platform. For example, suppose you are responsible for administering an environment with distributed data access involving a variety of data stores across your enterprise, such as Oracle on UNIX and Windows, and Microsoft SQL Server on Windows as shown in [Figure 1-1](#). You can install the SequeLink Manager Snap-in on a Windows NT, Windows 200x, or Windows XP networked client and perform administration tasks, such as configuring SequeLink service settings, from the convenience of your desktop.

Figure 1-1. Remote System Administration for Data Access Environments



Using the SequeLink Manager

The SequeLink Manager tool can be used to perform administrative and monitoring requests.

Administrative Requests

The type of administrative requests you can issue to a SequeLink Agent and the SequeLink Manager tool you can use to issue the requests depends on the platform you are administering—Windows, UNIX, or OS/390. The following list describes the types of administrative requests you can issue:

■ Configuration

- Creating and managing SequeLink services
- Creating and managing SequeLink server data sources
- Configuring monitoring profiles, which determine the data access events that can be monitored (viewed) using the SequeLink Manager
- Configuring event-tracing profiles, which determine the data access events that are written to an event trace file

■ Management

- On Windows and UNIX only: starting and stopping SequeLink services
- Stopping active data access user sessions
- Reviewing traced events to analyze a problem during an earlier data access activity

Monitoring Requests

The SequeLink Manager allows you to perform the following monitoring tasks:

- Viewing details about active services
- Viewing active user sessions and information about "live" data access activities

For example, you can easily view the number of transactions that have been processed or the number of rows that have been fetched by all user sessions. Also, if a user session is not performing correctly (such as the session repeatedly fetches thousands of rows), you can use the SequeLink Manager to identify and end that specific user session.

Additionally, the SequeLink Manager allows you to troubleshoot previous events. For example, if an error occurs during a nightly data processing job, you can view an event trace to troubleshoot the problem.

SequeLink Manager Implementations

SequeLink provides the following implementations of the SequeLink Manager:

- **SequeLink Manager Snap-in** is a GUI designed as a snap-in to the Microsoft Management Console (MMC). It can be used to configure and manage SequeLink services, and to monitor data access activity on Windows and UNIX platforms.

NOTE: The SequeLink Manager Snap-in can be used to configure and manage SequeLink services running on OS/390, and monitor data access activity. To create data access services on OS/390, use the SequeLink Manager for OS/390.

- **SequeLink Manager Command-Line Tool** is a command-line interface that can be used to configure and manage SequeLink services on Windows and UNIX platforms. Similarly, it can be used to monitor data access activity on Windows and UNIX platforms.

NOTE: The SequeLink Manager Command-Line Tool can be used to configure and manage SequeLink services running on OS/390, and monitor data access activity. To create data access services on OS/390, use the SequeLink Manager for OS/390.

- **SequeLink Manager for OS/390** is an ISPF dialog tool that can be used to create data access services on the OS/390 platform, as well as configure and manage SequeLink services and monitor data access activity on OS/390. It can be installed only on OS/390 platforms.

[Table 1-1](#) shows the platforms on which you can install and run the different implementations of the SequeLink Manager.

Table 1-1. Installation Platforms for the SequeLink Manager Tools

SequeLink Manager	Win NT/ 200x/XP	UNIX	OS/390
SequeLink Manager Snap-in	X		
SequeLink Manager Command-Line Tool	X	X	
SequeLink Manager for OS/390			X

NOTE: Only SequeLink 5.4 services can be configured, managed, or monitored with the SequeLink Manager 5.4.

About SequeLink Services

SequeLink Server installs the following server software service components to provide data connectivity, performance, and administration for two-tier client/server and n -tier Web/application server environments:

- **SequeLink data access services** handle data access requests from any SequeLink Client. Multiple SequeLink data access services can run on the same SequeLink Server. For example, SequeLink Server for Oracle and SequeLink Server for Microsoft SQL Server can run side-by-side on the same machine.
- **SequeLink Agent services** carry out configuration, management, and monitoring requests from any SequeLink Manager. The SequeLink Agent can service multiple SequeLink services on the same SequeLink Server.

When you complete the installation of the SequeLink Server software as documented in the *SequeLink Installation Guide*, a SequeLink data access service is configured for the type of SequeLink Server you installed (for example, SequeLink Server for Oracle). In addition, a SequeLink Agent is configured to handle configuration, management, and monitoring requests from any SequeLink Manager.

SequeLink Service Attributes

When a client application connects to a SequeLink data access service using a SequeLink Client, the data access functionality of the session is governed by a set of service attributes for the SequeLink data access service. Service attributes also include attributes defined for server data sources associated with the SequeLink service. For example, if you set

DataSourceReadOnly=Select, the client application will only be able to perform Select statements when using that service.

NOTES:

- SequeLink service attributes beginning with "DataSource", such as DataSourceReadOnly, are server data source attributes.
- SequeLink Agent services do not have server data source attributes.

When you create a SequeLink service, only commonly used service attributes are included in the default configuration of a SequeLink service. To configure other attributes, you must add that attribute explicitly to your SequeLink configuration. You configure SequeLink services and their attributes using the SequeLink Manager.

SequeLink service attributes are static or dynamic:

- **Static attributes** require you to restart a SequeLink service when you add or change the attribute before the change becomes effective.
- **Dynamic attributes** become effective after the attribute is added or changed and the configuration is saved. Most dynamic attributes affect the behavior of a database connection; therefore, when you add or change an attribute, the new values are used for the next connection, active connections do not use the new values.

NOTE: Server data source attributes are always dynamic.

See ["Server Data Sources" on page 36](#) for more information about server data sources. See [Appendix E "SequeLink Service Attributes" on page 407](#) for a complete list of SequeLink service attributes, including server data source attributes, and for information about whether they are static or dynamic.

SequeLink Service Templates

When you install SequeLink Server, at least one SequeLink data access service is installed using default attributes for that service. Default service attributes are defined in the SequeLink service templates. Using the SequeLink Manager, you can create additional services based on the SequeLink service templates:

- [SequeLink 5.4] Agent Service
- [SequeLink 5.4] Agent Service for OS/390
- [SequeLink 5.4] DB2 service for OS/390
- [SequeLink 5.4] DB2 UDB service
- [SequeLink 5.4] DB2 UDB service (enhanced code page support)
- [SequeLink 5.4] Informix service
- [SequeLink 5.4] Oracle 8.0 service
- [SequeLink 5.4] Oracle 8.1 service
- [SequeLink 5.4] Oracle 8.1 service (enhanced code page support)
- [SequeLink 5.4] Oracle 9i service
- [SequeLink 5.4] Oracle 9i service (enhanced code page support)
- [SequeLink 5.4] Socket service
- [SequeLink 5.4] Socket service (enhanced code page support)
- [SequeLink 5.4] SQL Server service
- [SequeLink 5.4] SQL Server service (enhanced code page support)
- [SequeLink 5.4] Sybase service
- [SequeLink 5.4] Sybase service (enhanced code page support)

Monitoring SequeLink Service Activity

SequeLink can monitor services, sessions, statements, and data access events. To configure what you want SequeLink to monitor,

you can use the SequeLink Manager. For information about setting monitoring profiles using the:

- SequeLink Manager Snap-in, see [Chapter 4 “Configuring SequeLink Services Using the SequeLink Manager Snap-in”](#) on page 73.
- SequeLink Manager Command-Line Tool, see [Chapter 6 “Using SequeLink Manager Commands”](#) on page 107.
- SequeLink Manager for OS/390, see [Chapter 8 “Configuring SequeLink Services Using the SequeLink Manager for OS/390”](#) on page 135.

You can integrate SequeLink monitoring with the Windows Performance Monitor tool, which allows you to access monitoring information from this Windows tool. See [“Integrating SequeLink Monitoring with the Windows Performance Tool”](#) on page 94 for instructions on integrating SequeLink monitoring with the Windows Performance Monitor tool.

Event Handling

All important server actions, such as data access activity and stopping and starting the server, cause an event to be generated. Depending on which SequeLink profiles are active, the information generated by the event is displayed as it occurs on the runtime monitor and stored in a file named the *event trace file*. By default, the event trace file is located in the *installdir/tracing* directory, where *installdir* is your SequeLink Server installation directory.

By setting profiles in your SequeLink service configuration to control which events are traced, you can inspect information generated by these events. Event tracing allows you to monitor ongoing activity, troubleshoot problems, and fine-tune your data access infrastructure. For example, if you want to monitor

the number of transactions a SequeLink Server processes for capacity planning purposes, you could set a profile in the SequeLink service configuration to return only that information. In addition, the information stored in the event trace file is persisted, meaning that you can inspect the information at a later time.

Events are identified by:

- An event ID
- The service in which the event occurred
- The time the event occurred
- List of attributes and their values

Examples of information that can be monitored and traced are SQL statements, number of transactions, failures, and authentication information.

See [“Deleting a Monitoring Profile” on page 88](#) for instructions on configuring the events to be monitored and traced by the SequeLink Manager.

About Data Sources

SequeLink uses two types of data sources—server data sources and client data sources.

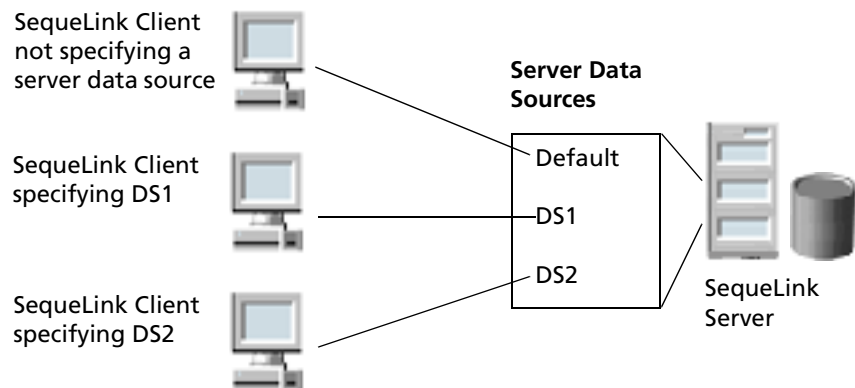
Server Data Sources

Server data sources are data sources configured on the SequeLink Server. These data sources contain settings that affect how the SequeLink service operates and settings that affect how data is accessed by SequeLink Clients. Centralizing this information on the server, instead of distributing it among hundreds of SequeLink Clients, provides easier management of your entire

data access infrastructure. When you install SequeLink Server, a default server data source, named *Default*, is automatically created on the server. If necessary, you can modify the definition of the default server data source.

If you do not specify a server data source for the connection when you configure the SequeLink Client, the attributes of the Default server data source govern the data access functionality of the connection. For example, if you configured two server data sources named DS1 and DS2 as shown in [Figure 1-2](#), and configured a SequeLink Client that did not specify a particular server data source, the data access functionality of the connection between the SequeLink Client and the SequeLink Server would be governed by the Default server data source.

Figure 1-2. SequeLink Clients Specifying Server Data Sources



For instructions on configuring server data sources using the:

- SequeLink Manager Snap-in, see [Chapter 3 “Configuring Server Data Sources Using the SequeLink Manager Snap-in”](#) on page 67.
- SequeLink Manager Command-Line Tool, see [Chapter 6 “Using SequeLink Manager Commands”](#) on page 107.

- SequeLink Manager for OS/390, see [Chapter 8 “Configuring SequeLink Services Using the SequeLink Manager for OS/390”](#) on page 135.

Client Data Sources

Client data sources are minimal data sources configured on the SequeLink Client that contain connection instructions to a SequeLink data access service. Client data sources are required when configuring the SequeLink *for* ODBC Client or the SequeLink *for* ADO Client. For SequeLink *for* JDBC Clients, you can configure a client data source or a connection URL. For SequeLink *for* JDBC clients, you configure a connection string.

See the following chapters for instructions on configuring client data sources for the SequeLink *for* ODBC Client and SequeLink *for* ADO Client:

- [Chapter 10 “Configuring the ODBC Client”](#) on page 199
- [Chapter 11 “Configuring the ADO Client”](#) on page 227

See [“Specifying JDBC Driver Connection URLs”](#) on page 257 for instructions on specifying connection URLs for SequeLink *for* JDBC Clients. Configuring JDBC client data sources is considered an advanced topic.

See [“Specifying Connection Properties”](#) on page 271 for instructions on specifying connection attributes for the SequeLink *for* .NET.



Synchronizing ODBC and ADO Client Data Sources

On Windows platforms, you can use the SequeLink Data Source SyncTool to create ODBC or ADO data source files containing collections of client data source definitions that can be distributed easily to hundreds of SequeLink Clients. The SequeLink Data Source SyncTool has two different user implementations—one for the SequeLink administrator and another for the end user. The end user simply imports these client data source definitions from the distributed data source file using the end user implementation of the SequeLink Data Source SyncTool.

See the following chapters for instructions on exporting and importing ODBC and ADO client data source definitions to data source files:

- [“Importing and Exporting ODBC Client Data Sources” on page 221](#)
- [“Importing and Exporting ADO Client Data Sources” on page 252](#)

In addition, you can create a customized, installable image of SequeLink *for* ODBC Client or SequeLink *for* ADO Client called a *Quick Install image* that contains predefined settings, including data source files created with the SequeLink Data Source SyncTool. Quick Install images can be distributed to and installed on each client in your workgroup. When installed, any data sources in the specified data source file are configured on the workstation automatically. Using Quick Install images allows you to install a consistent, fully configured SequeLink Client installation on every workstation. For instructions on creating Quick Install images for SequeLink *for* ODBC Clients and SequeLink *for* ADO Clients, refer to the *SequeLink Installation Guide*.

Choosing a SequeLink Connection Model

The type of connection model you choose for your SequeLink configuration partly depends on your SequeLink Server platform, the scalability requirements, and whether you are using the distributed transaction functionality of a DBMS. SequeLink provides the following types of connection models:

- The **ThreadPool** connection model starts SequeLink with a preallocated minimum number of threads that can be increased when needed to a specified maximum number of threads. These threads can be shared by multiple SequeLink Clients connected to the SequeLink Server. This connection model provides optimum scalability—many client connections can be serviced with the same system resources on the server. It is the default connection model for all platforms. (ServiceConnectionModel=ThreadPool)



NOTE: If you are using distributed transactions with DB2 Universal Database on Windows or UNIX platforms, do **not** use the ThreadPool connection model; use the Process/Connection model.

See [“Allocating the Number of Threads to the Thread Pool” on page 41](#) and [“Returning Threads to the Thread Pool” on page 41](#) for more information about configuring how the thread-pool engine operates.

- The **Process/Connection** connection model creates a separate operating system task for each SequeLink Client connection request. This connection model is **not** valid on OS/390. (ServiceConnectionModel=Process/Connection)



NOTE: If you are using distributed transactions with DB2 Universal Database on Windows or UNIX platforms, use the Process/Connection model.

- The **Thread/Connection** connection model provides a dedicated thread for each SequeLink Client connection to a

SequeLink Server. Use the Thread/Connection connection model for client applications that are database-intensive, such as bulk load or bulk transfer applications.
(ServiceConnectionModel=Thread/Connection)

See [Appendix E “SequeLink Service Attributes” on page 407](#) for more information about service attributes.

Allocating the Number of Threads to the Thread Pool

SequeLink can accommodate both low and high user activity by using a minimum number of pre-started threads in the thread pool that can be dynamically increased to accommodate peak user activity. When the SequeLink Server is started, the number of threads specified by the ServiceMinThreads service attribute will populate the thread pool to wait for data access requests from SequeLink Clients. If, during the working day, frequent user activity causes the number of threads specified by ServiceMinThreads to be active concurrently, SequeLink Server will dynamically create additional threads up to the number specified by the ServiceMaxThreads service attribute.

z/OS NOTE: On z/OS, a thread is equivalent to an attached TCB.

Returning Threads to the Thread Pool

SequeLink allows you to accommodate idle periods and heavy workload traffic by setting service attributes that let you govern when threads are returned to the thread pool, and consequently, when the threads become available to service other client connections.

The DataSourceThreadMaxRpc attribute specifies the maximum number of data access requests to be accepted from the same

client before the thread allocated to that connection is returned to the thread pool. For example, if `DataSourceThreadMaxRpc=10`, the thread will not be returned to the thread pool until after 10 connection requests have been made. When the time specified by the `DataSourceThreadRpcTimeout` attribute has been exceeded, the thread is returned to the thread pool to serve another connection. This attribute avoids a client connection monopolizing a thread by not responding to it in a timely manner.

The `ServiceThreadLockThreshold` attribute specifies a percentage of the value specified by the `ServiceMaxThreads` attribute. When the number of active threads is less than this percentage, a connection that has executed more RPCs than the value specified by the `DataSourceThreadMaxRpc` attribute on the current thread is allowed to lock this thread for the time specified by the `DataSourceThreadRpcTimeout` attribute. For example, if `ServiceMaxThreads=10` and `ServiceThreadLockThreshold=50`, and only 4 threads are active, a connection can lock the thread it is using for another time period specified by the `DataSourceThreadRpcTimeout` attribute.

These data source attributes ensure that the SequeLink Server can continue to process additional client data access requests, even under heavy workload conditions that can cause all threads to be active concurrently.

Using SequeLink with Workload Management in OS/390 Environments

z/OS SequeLink supports OS/390 sysplex clusters and the Workload Manager (WLM). OS/390 sysplex cluster technology allows multiple servers to work in a cluster to provide sufficient processing power and availability to handle disparate demands of clients. For example, you can distribute multiple SequeLink Servers running on different OS/390 and z/OS servers over a sysplex cluster. These multiple SequeLink Servers appear as a single SequeLink Server to your SequeLink Clients. As new SequeLink connections arrive, they are distributed over the multiple SequeLink Servers based on workload and availability information.

Sysplex Clusters

OS/390 sysplex cluster technology provides the following features:

- **Sysplex distributor** ensures that client connections appear to be connected to a single TCP/IP host even if the connections are established with different servers in the same sysplex cluster.
- **Network dispatcher** optimizes performance by balancing traffic across multiple servers based on their current load. This balancing is transparent to users and to applications. During peak demand periods, Network Dispatcher can automatically find the optimal server to handle incoming requests.
- **Domain Name System (DNS)/Workload Manager (WLM)** provides connection optimization within a sysplex cluster. WLM provides services to manage workload distribution, balance workload, and distribute resources. WLM can

dynamically assess resource utilization on all hosts within a sysplex. Also, a DNS server running on a host in the sysplex can use WLM's knowledge to control how often an address for a particular host in the sysplex is returned on a DNS query.

For more information about how SequeLink supports DNS/WLM on z/OS, continue with the next section. See [“Configuring SequeLink Server for Workload Management” on page 181](#) for information about configuring SequeLink Server for workload management.

DNS/WLM

WLM provides services to balance workload and distribute resources. A *workload* is a collection of service classes that are tracked and reported as a unit. You can define different performance goals and processing rules for different workloads. For example, you can assign a higher priority to the workload for your Customer Orders department than the workloads for the Human Resources and Marketing departments, which do not require the same urgent level of service.

SequeLink Server supports WLM by using enclaves. An *enclave* is a z/OS construct, which serves as a unit of priority and accounting for a transaction. You define performance criteria for an enclave using *service policies*, which are a collection of performance goals and processing capacity rules.

You can use service policies to define groups of *service classes*, which can be used for workloads with similar performance requirements. For example, you can define a service class that requires an average response time, sets a high business importance, and uses a resource group that guarantees a minimum amount of CPU is granted even if the enclave does not meet the response time goal. For more information about defining service classes, refer to your IBM documentation.

Enclaves can be one of the following types:

- **Independent enclaves** are used to represent new transactions that have not yet been associated with an address in the sysplex. The address space used to issue the enclave creation macro (IWMECREA) becomes the owner of the enclave.
- **Dependent enclaves** are used to continue an existing transaction that will run under TCBs and SRBs not associated with the current address space. It derives its performance goal from the address space that owns it.

When WLM is enabled for SequeLink Server and a connection is made to the SequeLink Server, an independent enclave is created and classification information is passed to WLM (see [Appendix B “OS/390 Workload Manager \(WLM\) Classification” on page 355](#)). This classification information allows you to define rules in the WLM policy so that WLM can determine which service class to use for the connection. Each connection is managed separately according to its performance goal or performance group, depending on the mode in which WLM is running.

Each SequeLink thread-pool task or each task in the DB2 address space assigned to this connection joins the enclave when the task is created and leaves the enclave when their work is completed. This mechanism allows the WLM administrator to specify response time goals without regard to network wait-time or client application processing time.

When the connection to the SequeLink Server ends, the enclave is deleted and CPU consumption of the enclave is reported in the SMF record, if activated (see [“Configuring SMF Accounting” on page 182](#)). When the SequeLink Server stops, it disconnects from WLM.

Part 1: Configuring and Managing SequeLink Services

This part contains the following chapters:

- [Chapter 2 “Using the SequeLink Manager Snap-in” on page 49](#) describes how to use the SequeLink MMC Snap-In Administrator.
- [Chapter 3 “Configuring Server Data Sources Using the SequeLink Manager Snap-in” on page 67](#) describes how to create and manage server data sources with the SequeLink MMC Snap-In Administrator.
- [Chapter 4 “Configuring SequeLink Services Using the SequeLink Manager Snap-in” on page 73](#) describes how to create and manage SequeLink services with the SequeLink MMC Snap-In Administrator.
- [Chapter 5 “Managing Data Access Activity Using the SequeLink Manager Snap-in” on page 99](#) describes the tasks you perform to manage and monitor SequeLink service activity using the SequeLink MMC Snap-In Administrator.
- [Chapter 6 “Using SequeLink Manager Commands” on page 107](#) describes how to use the SequeLink Command-Line Administrator Tool, issue SequeLink Manager commands, and lists some commonly used SequeLink Manager commands.
- [Chapter 7 “Using the SequeLink Manager for OS/390” on page 121](#) describes how to use the SequeLink Manager for OS/390.
- [Chapter 8 “Configuring SequeLink Services Using the SequeLink Manager for OS/390” on page 135](#) describes the tasks you may need to perform to configure and manage SequeLink Server for OS/390 services locally from an OS/390 machine.

- [Chapter 9 “Configuring Transliteration”](#) describes how to configure transliteration for SequeLink Server.

2 Using the SequeLink Manager Snap-in



On the Windows platforms on which SequeLink Server runs, you can use the SequeLink Manager Snap-in to configure, manage, and monitor your SequeLink environment on the same machine or on a remote networked machine. The SequeLink Manager Snap-in is designed as a snap-in tool to the Microsoft Management Console (MMC). This chapter describes how to use the SequeLink Manager Snap-in. See ["SequeLink Server System Administration" on page 27](#) for more information about the SequeLink Manager.



You can download MMC 1.2 from the Microsoft Web site.

z/OS

NOTE: To configure and manage SequeLink services on OS/390 or to create OS/390-specific core entities such as UID maps, DB2 interfaces, use the SequeLink Manager for OS/390. See [Chapter 8, "Configuring SequeLink Services Using the SequeLink Manager for OS/390," on page 135](#) for more information. Monitoring can be performed using any SequeLink Manager.

Adding the SequeLink Manager Snap-in to the MMC

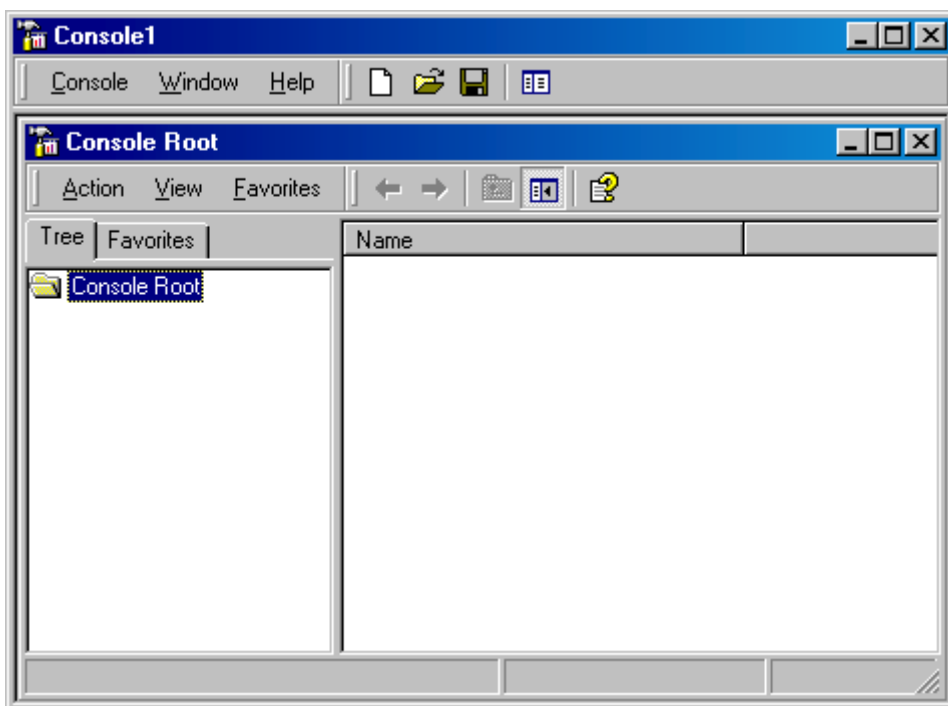
Before you can use the SequeLink Manager Snap-in to administer a remote SequeLink Server, you must add it to the MMC. You do not need to add the SequeLink Manager Snap-in to the MMC if you are administering a local SequeLink Server because a default .MSC file, which defines the local SequeLink

Manager configuration, is installed when you install SequeLink Server. For local administration, you can simply open the .MSC file in the MMC. The default .MSC file is named `sladmin54.msc` and is installed in the *install_dir*\admin directory, where *install_dir* is your SequeLink Server installation directory (for example, `\Program Files\DataDirect\slserver54\admin`).

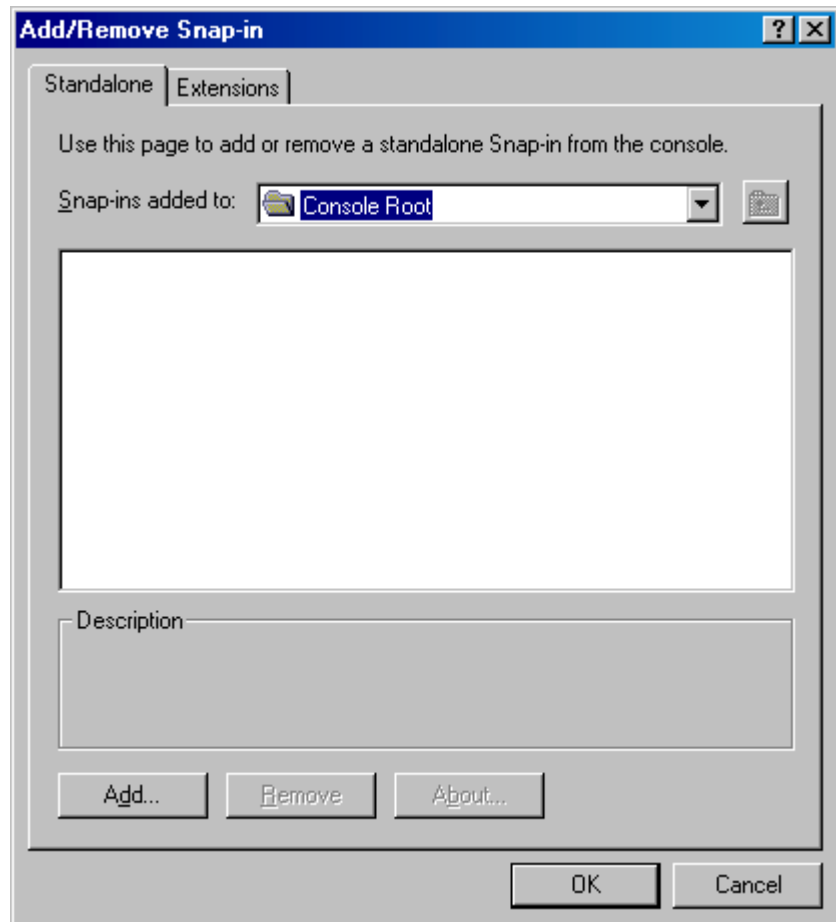
When you add the SequeLink Manager Snap-in to the MMC, you must choose a configuration option to connect to a SequeLink Agent on the same machine or connect to a SequeLink Agent on another machine. Once you have added the configuration to the MMC, you can save the configuration in an .MSC file.

To add the SequeLink Manager Snap-in to the MMC:

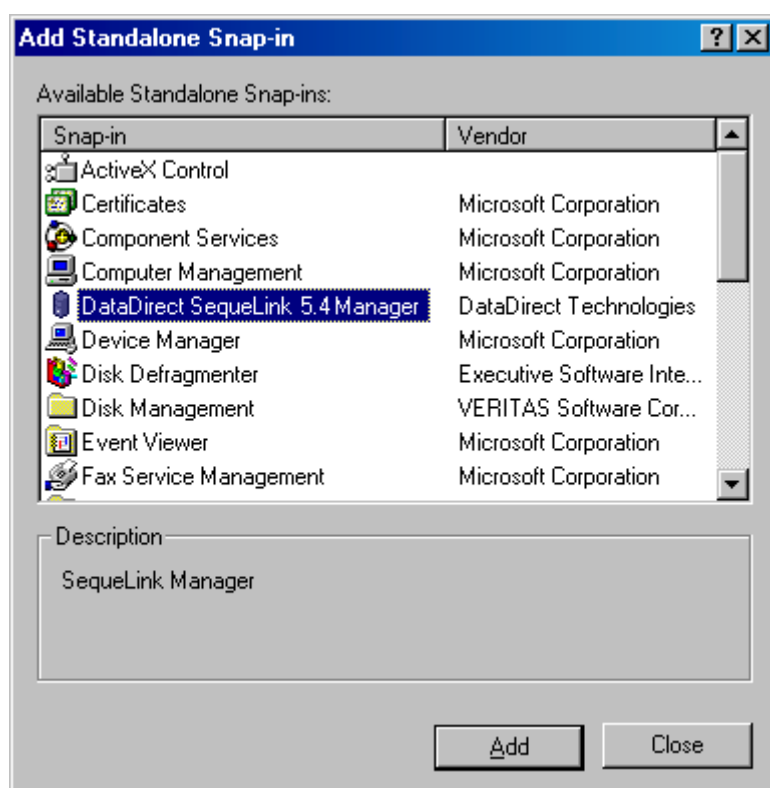
- 1 Start the MMC. Select **Start / Run**, and type `mmc` in the Open field; then, click **OK**. An MMC console window appears.



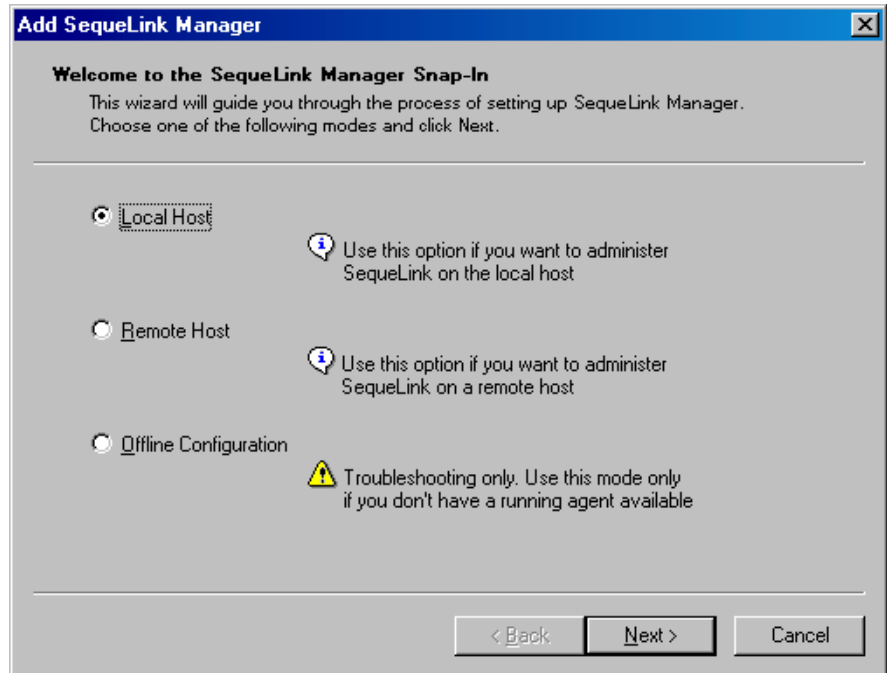
- 2 From the MMC toolbar, select **Console / Add/Remove Snap-in**. The Add/Remove Snap-in window appears.



- 3 Click the **Add** button. The Add Standalone Snap-in window appears.



- 4 From the Available Standalone Snap-ins list, select the **DataDirect SequeLink 5.4 Manager**, and click the **Add** button. The Add SequeLink Manager window appears.



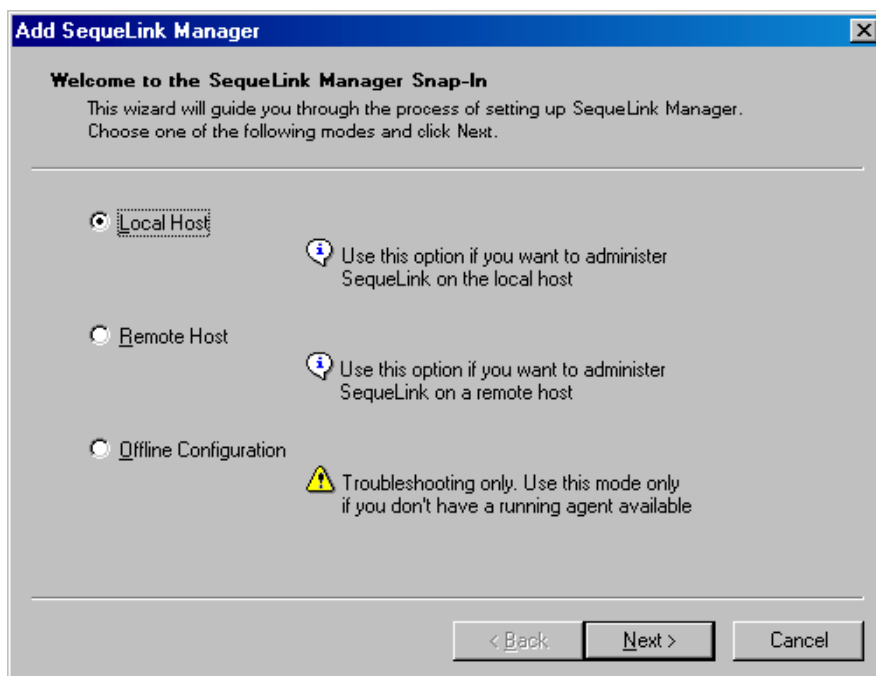
- 5 Choose one of the following SequeLink Manager configuration options:
 - Choose the **Local Host** option to configure and manage SequeLink services on the same machine. Continue with ["Local Host Configuration" on page 54.](#)
 - Choose the **Remote Host** option to configure and manage SequeLink services on another machine. Continue with ["Remote Host Configuration" on page 56.](#)

- Choose the **Offline Configuration** option to open the local configuration file in offline mode. You must specify the local configuration file in the Configuration File field. The local configuration file is *installdir\cfgswandm.ini* where *installdir* is the SequeLink Server installation directory.

IMPORTANT: Only use this option when instructed to do so by DataDirect Technologies technical support.

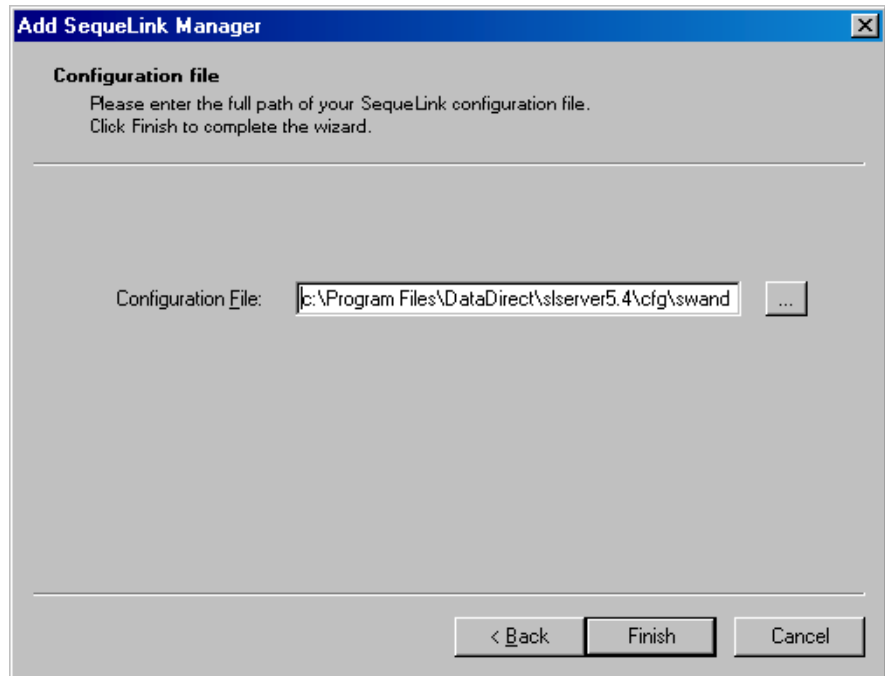
Local Host Configuration

- 1 On the Add SequeLink Manager window, select the **Local Host** option; then, click **Next**.



- 2 The Local window appears showing the location and name of the local configuration file in the Configuration File field. The local configuration file defines SequeLink Server configuration information such as SequeLink services, server data sources, and profiles.

NOTE: The default local configuration file is *install\dir\cfg\swandm.ini* where *install\dir* is the SequeLink Server installation directory.



Click **Finish**. The SequeLink Manager Snap-in is added to the MMC.

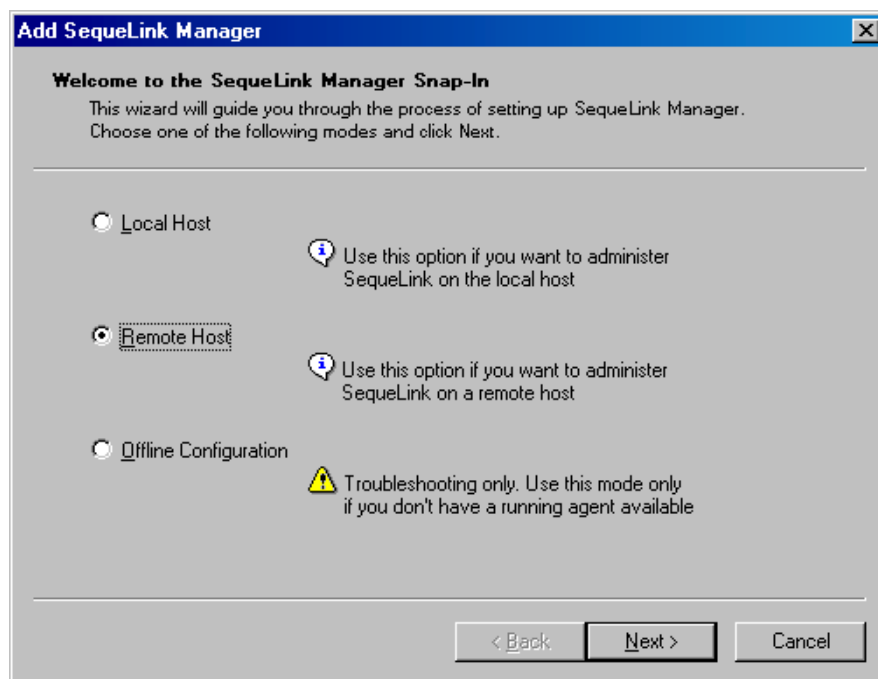
You can now use the SequeLink Manager Snap-in to configure and manage SequeLink services on the same machine.

- 3 To save the SequeLink Manager Snap-in to an MMC file (.MSC), select **Console / Save** from the MMC console window.

Remote Host Configuration

IMPORTANT: Before you can add the SequeLink Manager Snap-in to the MMC as a remote host configuration, make sure that the SequeLink Agent is active on the remote host.

- 1 On the Add SequeLink Manager window, select the **Remote Host** option. Then, click **Next**.



2 The Add SequeLink Manager window appears.

Add SequeLink Manager

SequeLink Agent
Please enter the connection information to your SequeLink Agent.
Click Finish to complete the wizard.

Specify the host on which your SequeLink Agent is running.
The host can be specified by either the host name or the host address.

Host:

The port is the TCP port on which your SequeLink Agent is listening.
The TCP port must be in the range 1024 to 65534.

TCP Port:

< Back Finish Cancel

Perform the following actions:

- a In the Host field, type the host name of the remote SequeLink server.
- b In the TCP port field, type the TCP/IP port the SequeLink Agent is listening on for connection requests. The port you specify must be the same as the one specified for the SequeLink Agent service when the SequeLink Server was installed; the default is 19995.
- c Click **Finish**. The SequeLink Manager Snap-in is added to the MMC.

You can now use the SequeLink Manager Snap-in to configure and manage SequeLink services on another machine.

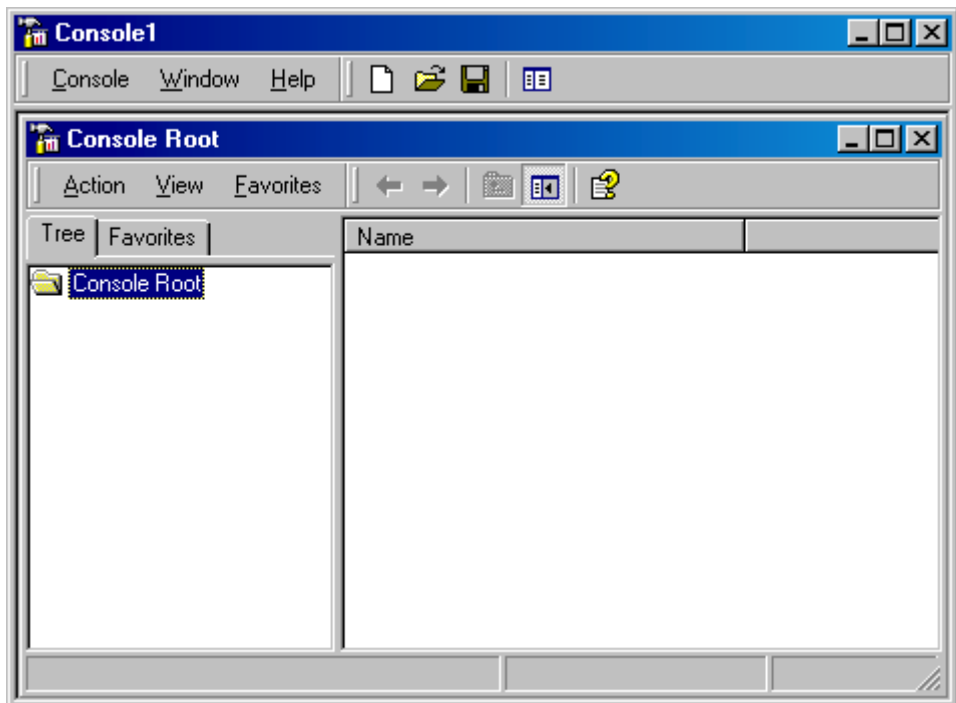
- 3 To save the SequeLink Manager Snap-in to an MMC file (.MSC), select **Console / Save** from the MMC console window.

Starting the SequeLink Manager Snap-in

Before you can use the SequeLink Manager Snap-in to administer a remote SequeLink Server, you must add the SequeLink Manager Snap-in to the MMC. See "[Adding the SequeLink Manager Snap-in to the MMC](#)" on page 49 for instructions on adding the SequeLink Manager Snap-in to the MMC.

To start the SequeLink Manager Snap-in:

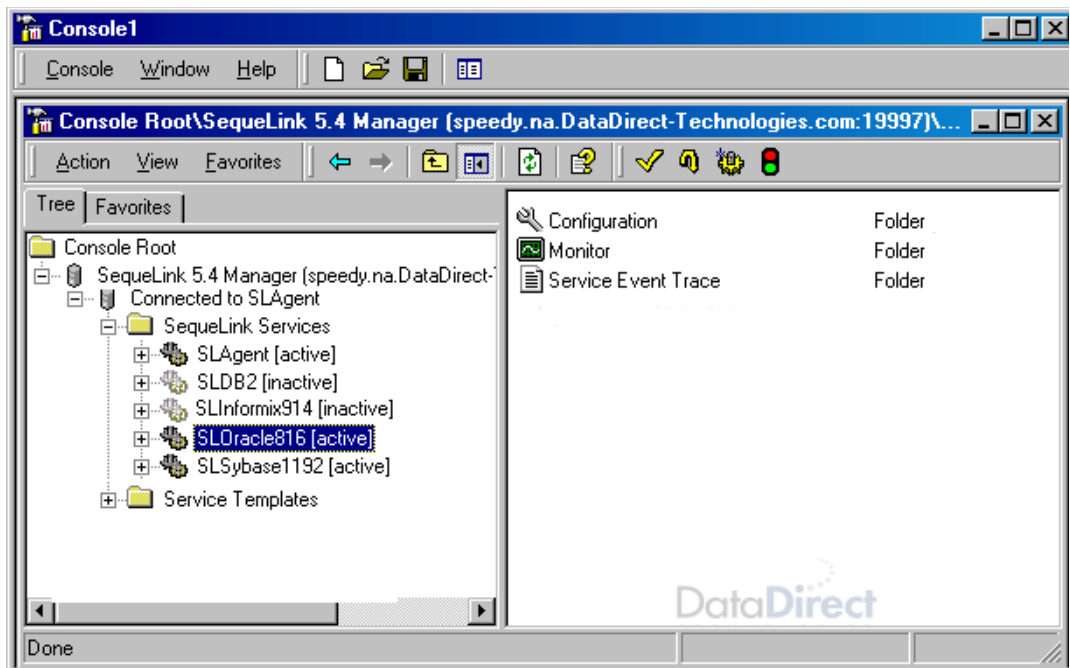
- 1 Select **Start / Run**. Type `mmc` in the Run field, and click **OK**. An MMC console window appears.



- 2 From the Console menu, select **Console / Open**.
- 3 Select the SequeLink Manager Snap-in you want to start; then, click **Open**.

Working with the SequeLink Manager Snap-in

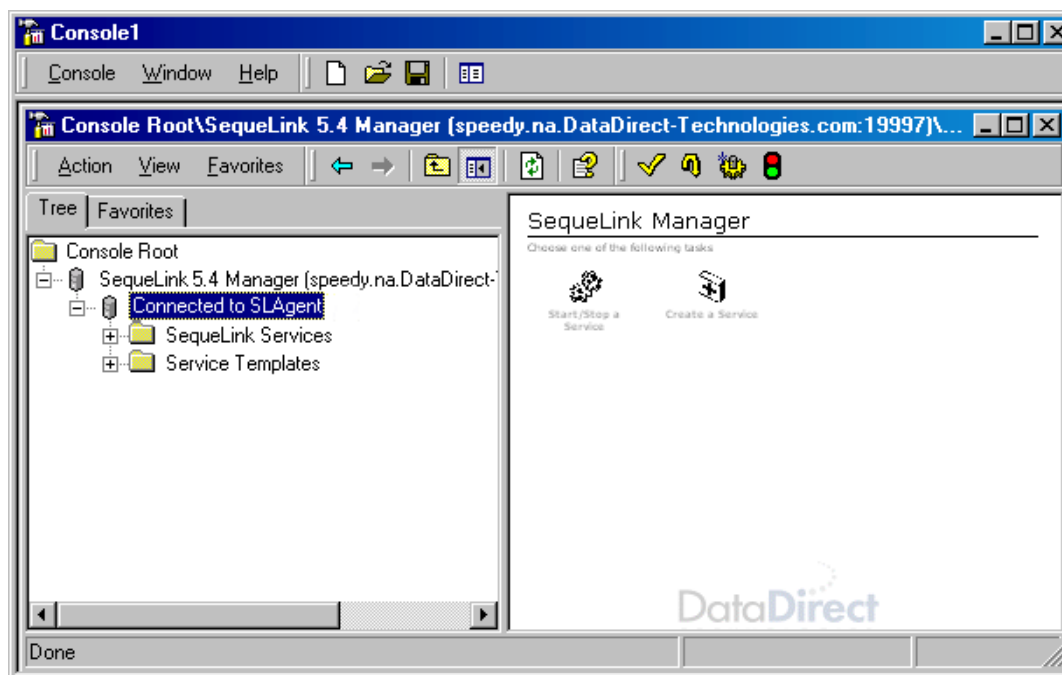
The MMC Console window, by default, is divided into two panes. The left pane shows the *console tree* in the Tree tab. Each node in the tree for the SequeLink Manager Snap-in represents an item in your SequeLink configuration. You can expand any node in the console tree by double-clicking that node or by single-clicking the + (plus sign) for that node.



The Favorites tab of the left pane contains views you have added to your list of favorites. When you select an item in the left pane, the right pane (*details pane*) displays information about the item you selected or shows wizards you can use to perform common tasks that affect that item. To use any wizard, click the wizard icon.

Connecting to SequeLink Agents

To view or change information about a local or remote SequeLink service, you must connect to the SequeLink Agent servicing that SequeLink service. To connect to a SequeLink Agent, double-click the SequeLink Agent in the left pane. If a user name and password is required to connect to the SequeLink Agent, the SequeLink Manager Snap-in will prompt you for that information. If prompted for a user name and password, enter the appropriate user name and password in the connection dialog box.



NOTE: This window shows a remote host. A local host displays an additional wizard in the details pane—the Start/Stop the Agent wizard.

Displaying SequeLink Service Attributes

Once you are connected to a SequeLink Agent, you can view the following types of attributes:

- Attributes of the SequeLink Agent service
- Attributes of any SequeLink data access service (active and inactive) serviced by the connected SequeLink Agent

SequeLink service attributes are logically grouped into the following categories:

- | | |
|---------------------------|---------------------------|
| ■ General | ■ Application Security |
| ■ Advanced | ■ Environment |
| ■ Logging | ■ Installation parameters |
| ■ Administration Security | ■ Workarounds |
| ■ User Security | |

To view the attributes in a specific category, expand the category by selecting that node or by selecting the + (plus sign) for that node. See [Appendix E "SequeLink Service Attributes" on page 407](#) for more information.

Refreshing Active Information

You can refresh the active information being viewed in the SequeLink Manager Snap-in, such as active sessions or active services, by using the Refresh button on the SequeLink Manager Snap-in toolbar or by turning on the Auto Refresh option for the current session. The Auto Refresh option can only be used for the Monitor node (and all its subnodes) and the SequeLink Services node. It allows you to specify an interval in seconds to automatically refresh the display.

To turn on the Auto Refresh option:

- 1 Select the node you want to turn on the Auto Refresh option for, and then, select **View / Auto Refresh**.
- 2 Choose one of the following Auto Refresh options:
 - **Slow** (refreshes every 10 seconds)
 - **Normal** (refreshes every 5 seconds)
 - **Fast** (refreshes every 2 seconds)
 - **Custom** (specify a refresh interval in seconds)

The Auto Refresh option is turned off by default and is not saved when you save your configuration to an .MSC file. To turn off the Auto Refresh option, select **View / Auto Refresh**.

Using the SequeLink Manager Snap-in Toolbar








[Table 2-1](#) lists some important elements of the toolbar and describes the actions they allow you to perform.

Table 2-1. SequeLink Manager Snap-in Toolbar

Item	Description	
Console menu	Commands that perform the following actions:	
	New	Creates a new console.
	Open	Opens a console.
	Save	Saves changes you make to the current console.
	Save as	Saves the current console with another name.











Shortcut Tip: Right-clicking on any item in the console tree displays a menu allowing you to perform the same actions available from the toolbar.

Table 2-1. SequeLink Manager Snap-in Toolbar (cont.)

Item	Description	
	Add/Remove Snap-in	Adds or removes MMC snap-ins to or from the MMC.
	Options	Options that affect how the console can be used.
Window menu	Options that affect the console window.	
Help menu	Accesses online help for the MMC.	
	Creates a new console.	
	Opens a console.	
	Saves changes to the current console.	
	Creates a new window.	
Action menu	Commands that perform actions applicable to the selected object. For example, if an active SequeLink Service is selected, the Stop command is available.	
View menu	Allows you to customize how the console appears. It also allows you to turn on the Auto refresh option for the Monitor nodes and SequeLink Services nodes for the current session.	
Favorites menu	Allows you to add views to your Favorites list.	
	Moves back to the last configurable item in the console tree.	
	Moves forward to the next configurable item in the console tree.	
	Moves up one level in the console tree.	

Shortcut Tip: Right-clicking on any item in the console tree displays a menu allowing you to perform the same actions available from the toolbar.

Table 2-1. SequeLink Manager Snap-in Toolbar (cont.)

Item	Description
	Shows or hides the console tree.
	Displays the properties of a SequeLink service.
	Deletes an attribute when you select it while a service attribute is selected.
	Refreshes active information in the console tree.
	Accesses online help for the MMC and for the SequeLink Manager Snap-in.
	Saves all modifications to the configuration file.
	Discards all modifications and reverts to the original configuration file.
	Adds a SequeLink data access service.
	Saves changes to the SequeLink configuration.
	Starts and stops SequeLink services.

Shortcut Tip: Right-clicking on any item in the console tree displays a menu allowing you to perform the same actions available from the toolbar.

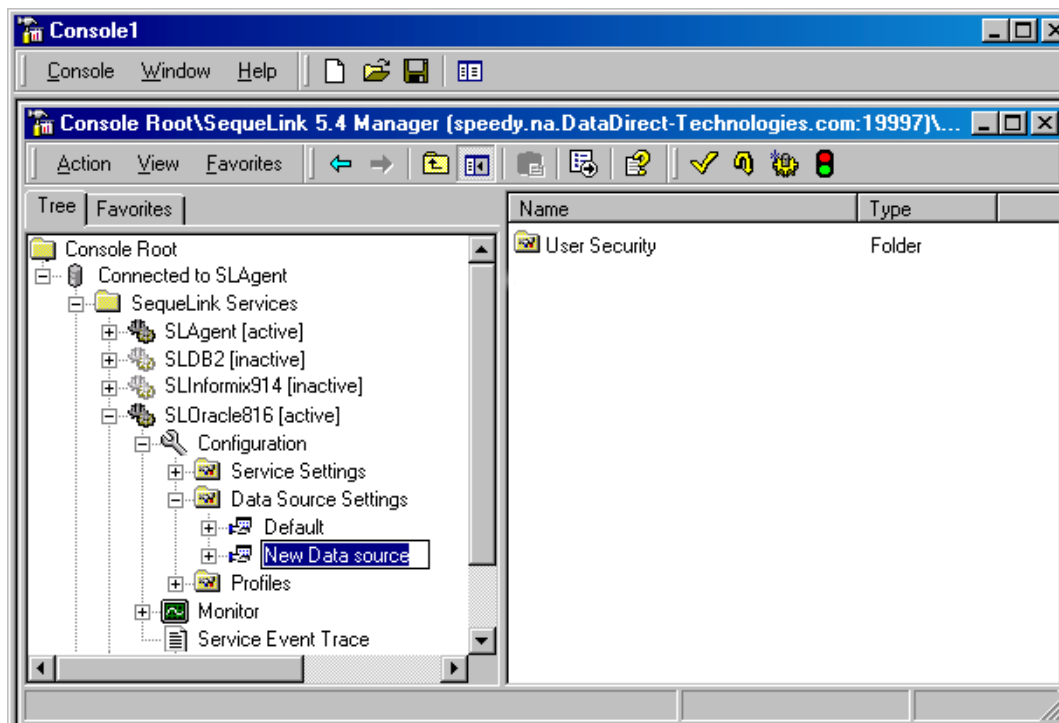
3 Configuring Server Data Sources Using the SequeLink Manager Snap-in

This chapter describes how to create and manage server data sources with the SequeLink Manager Snap-in. See ["About Data Sources" on page 36](#) for more information about data sources.

To do this...	See...
Create a server data source	"Creating a Server Data Source" on page 68
Delete a server data source	"Deleting a Server Data Source" on page 69
Rename a server data source	"Renaming a Server Data Source" on page 69
View server data source attributes	"Viewing Server Data Source Attributes" on page 69
Add a server data source attribute	"Adding a Server Data Source Attribute" on page 70
Change the default value of a server data source attribute	"Changing the Value of a Server Data Source Attribute" on page 71

Creating a Server Data Source

- 1 Right-click the Data Source Settings node and select **New / Data source**. A new server data source appears in the Details pane.



- 2 When created, the new data source is an editable field. Type the name of the data source and press ENTER.
- 3 Save the configuration.

When you create a server data source, the attributes for the new server data source are copied from the default data source. This default data source is created when the data access service is created. See ["Viewing Server Data Source Attributes" on page 69](#) for instructions on viewing server data source attributes. See ["Changing the Value of a Server Data Source Attribute" on](#)

[page 71](#) for instructions on changing server data source attributes.

Deleting a Server Data Source

- 1 Right-click the server data source you want to delete, and select **Delete**.
- 2 You are asked to confirm the deletion. To confirm, click **OK**. The server data source is deleted.

NOTE: You cannot delete the default data source.

- 3 Save the configuration.

Renaming a Server Data Source

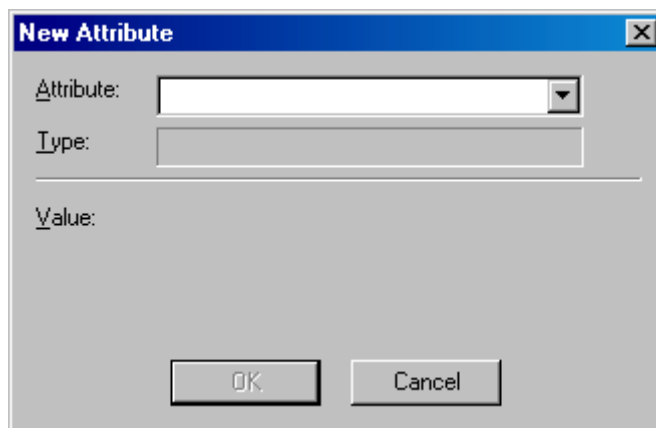
- 1 Right-click the server data source you want to rename, and select **Rename**. The data source becomes an editable field. Type the name of the data source, and press ENTER.
- 2 Save the configuration.

Viewing Server Data Source Attributes

To view attributes for a data source, select the server data source. The available attribute categories appear in the Details pane. To view the attributes, select any attribute category. The attributes and their values appear in the Details pane. See [Appendix E "SequeLink Service Attributes" on page 407](#) for a description of SequeLink service attributes.

Adding a Server Data Source Attribute

- 1 Right-click the data source to which you want to add an attribute, and select **New / Attribute**. The New Attribute window appears.



- 2 In the Attribute drop-down list, select the attribute you want to add to the server data source. The Type field adjusts to show the type of value required.
- 3 In the Value field, change the default value of the attribute if necessary; then, click **OK**. The attribute is added to the server data source.
- 4 Save the configuration.

See [Appendix E "SequeLink Service Attributes" on page 407](#) for a description of SequeLink data source attributes.

Changing the Value of a Server Data Source Attribute

When you create a server data source, the attributes of the new data source are copied from the default data source.

To change the value of a server data source attribute:

- 1 Right-click the data source attribute, and select **Properties**. The Properties window for that attribute appears.
- 2 Type a new value for the attribute in the Value field, and click **OK**. The attribute is changed.
- 3 Save the configuration.

See [Appendix E "SequeLink Service Attributes" on page 407](#) for a description of SequeLink data source attributes.

4 Configuring SequeLink Services Using the SequeLink Manager Snap-in

This chapter describes how to create and manage SequeLink services with the SequeLink Manager Snap-in.

To do this...	See...
Start and stop SequeLink services	"Starting and Stopping SequeLink Services" on page 74
Create a SequeLink service	"Creating a SequeLink Service" on page 75
Delete a SequeLink service	"Deleting a SequeLink Service" on page 78
View service attributes	"Viewing Service Attributes" on page 79
Change a service attribute	"Changing a Service Attribute" on page 80
Add a service attribute	"Adding a Service Attribute" on page 81
Delete a service attribute	"Deleting a Service Attribute" on page 82
Configure monitoring	"Configuring Monitoring" on page 83
Configure event tracing	"Configuring Event Tracing" on page 89

To do this...

Integrate monitoring with Windows performance monitoring

See...

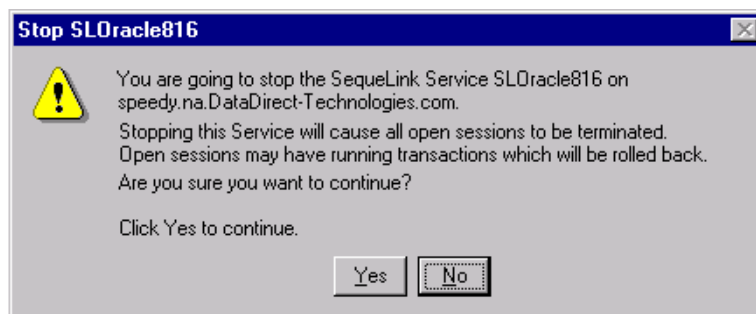
["Integrating SequeLink Monitoring with the Windows Performance Tool" on page 94](#)

z/OS NOTE: SequeLink Server DB2 services for OS/390 must be created, started, stopped, and deleted locally using the SequeLink Manager for OS/390. See [Chapter 8 "Configuring SequeLink Services Using the SequeLink Manager for OS/390" on page 135](#) for more information about creating and managing SequeLink services on OS/390.

Starting and Stopping SequeLink Services

NOTE: You can only start and stop the SequeLink Agent locally from the SequeLink Server on which it runs.

- 1 Click the **Stop Service** or **Start Service** wizard in the Details pane. You are prompted to confirm the stopping or starting of the service. The following dialog box shows an example of the message that appears when you stop a service.



- 2 Click the **Yes** button to stop or to start the service.

Creating a SequeLink Service

When you install SequeLink Server, at least one SequeLink data access service is installed using default attributes for that service. Default service attributes are defined in the SequeLink service templates. Using the SequeLink Manager, you can create additional services based on the SequeLink service templates:

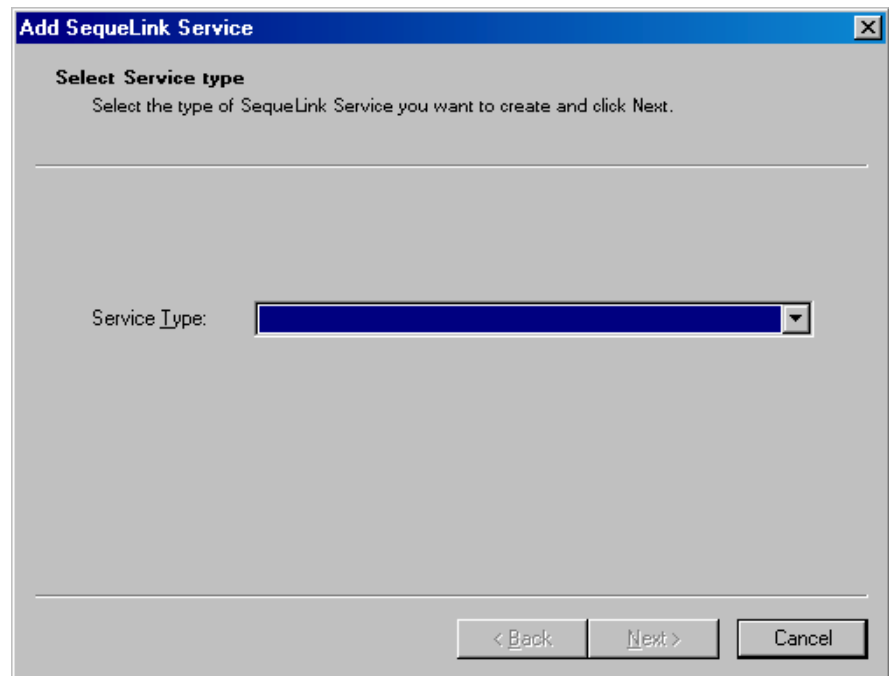
- [SequeLink 5.4] Agent Service
- [SequeLink 5.4] Agent Service for OS/390
- [SequeLink 5.4] DB2 service for OS/390
- [SequeLink 5.4] DB2 UDB service
- [SequeLink 5.4] DB2 UDB service (enhanced code page support)
- [SequeLink 5.4] Informix service
- [SequeLink 5.4] Oracle 8.0 service
- [SequeLink 5.4] Oracle 8.1 service
- [SequeLink 5.4] Oracle 8.1 service (enhanced code page support)
- [SequeLink 5.4] Oracle 9i service
- [SequeLink 5.4] Oracle 9i service (enhanced code page support)
- [SequeLink 5.4] Socket service
- [SequeLink 5.4] Socket service (enhanced code page support)
- [SequeLink 5.4] SQL Server service
- [SequeLink 5.4] SQL Server service (enhanced code page support)
- [SequeLink 5.4] Sybase service
- [SequeLink 5.4] Sybase service (enhanced code page support)

z/OS NOTE: SequeLink DB2 services for OS/390 must be created with the SequeLink Manager for OS/390. See [Chapter 8, "Configuring SequeLink Services Using the SequeLink Manager for OS/390"](#) for more information.

In most cases, the SequeLink service templates provide a configuration that can be used without any modification. Not all SequeLink service attributes are not defined in the templates. See [Appendix E "SequeLink Service Attributes" on page 407](#) for a list of all SequeLink service attributes.

To create a SequeLink data access service:

- 1 In the console tree, select the SequeLink Agent to service the new SequeLink data access service.
- 2 In the Details pane, click the **Create a Service** wizard. The wizard prompts you to choose the type of service to create.



From the Service drop-down list, select the type of SequeLink service you want to create; then, click **Next**.

3 The wizard prompts you for service information.

Add SequeLink Service

Service information
Provide a name and a TCP port for your SequeLink Service.

Choose a name for this SequeLink Service. This Service Name must be unique for this SequeLink installation.

Service Name:

Choose a TCP port number for this SequeLink Service. The TCP port must be in the range 1024 to 65534.

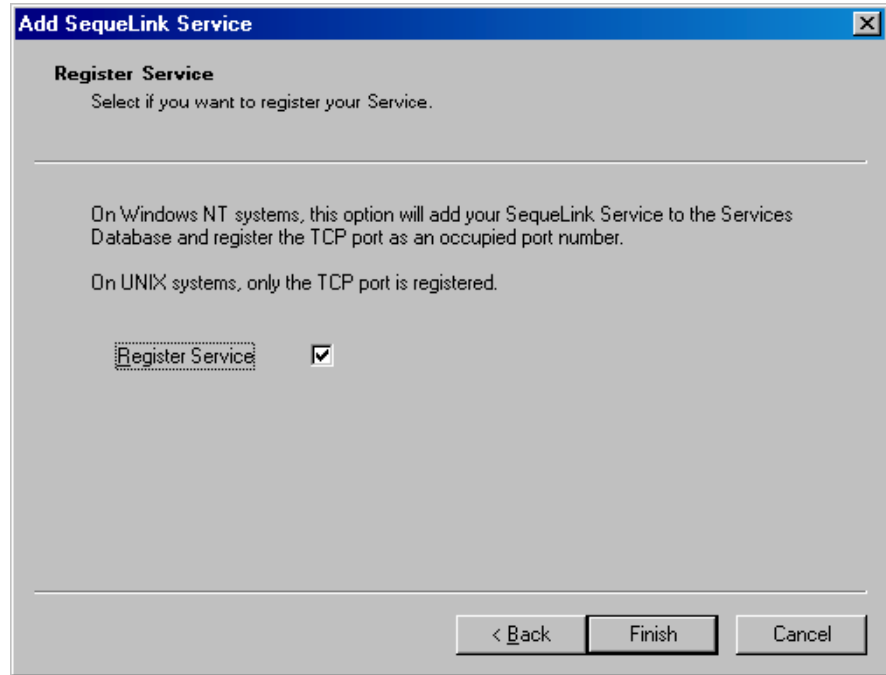
TCP Port:

< Back Next > Cancel

Perform the following actions:

- a In the Service Name field, type the service name you want to use for the new SequeLink service. The service name must be unique (not used by another service).
 - b In the TCP port field, type the number of the TCP/IP port on which the new SequeLink service will be listening. The port must be an available port (cannot be used by another service).
 - c Click **Next**.
- 4 The wizard prompts you to register the SequeLink service on the host machine. The default is to register the service, which makes the service information available to the operating

system. This is required on Windows if you want to start your service through the SequeLink Manager or the Service Control Manager.



- 5 Click **Finish** to create the new SequeLink service.

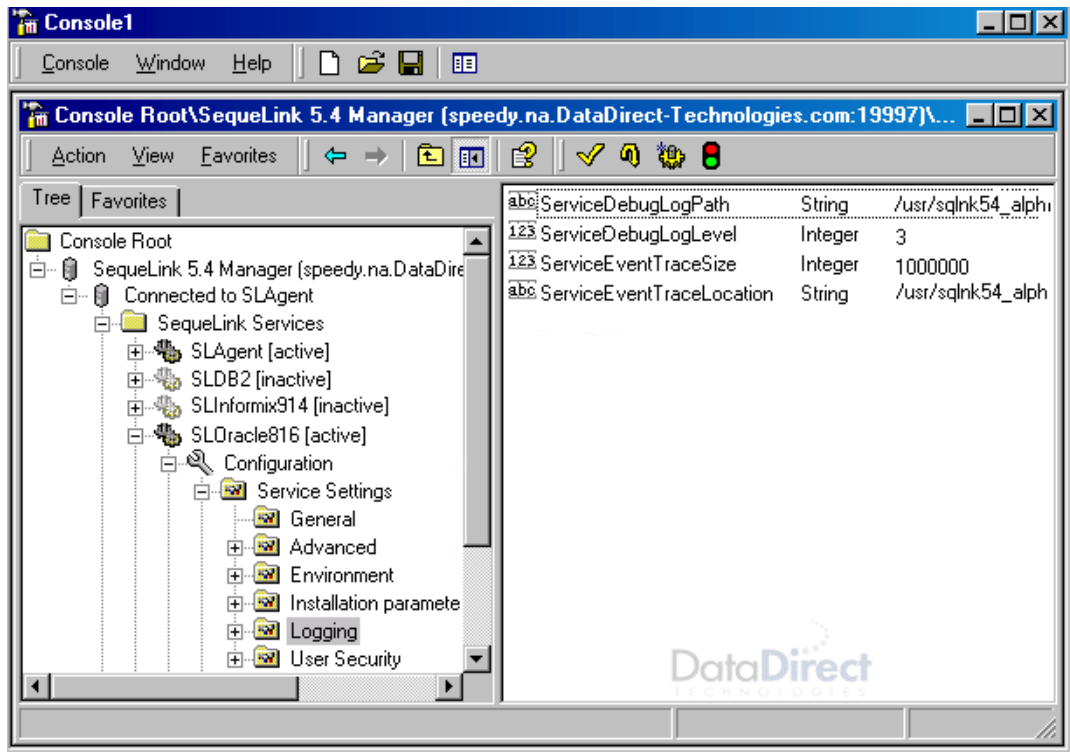
Deleting a SequeLink Service

NOTE: Before deleting a SequeLink service, you must stop the service you want to delete.

- 1 Right-click the SequeLink service you want to delete in the left pane, and select **Delete**.
- 2 You are prompted to confirm the deletion. Click **OK** to confirm. The service is deleted.

Viewing Service Attributes

To view SequeLink service attributes, select an attribute category from the Service Settings node. The Details pane shows all attributes in that category and their current values. For example, if you select the Logging attribute category, the settings display in the Details pane.



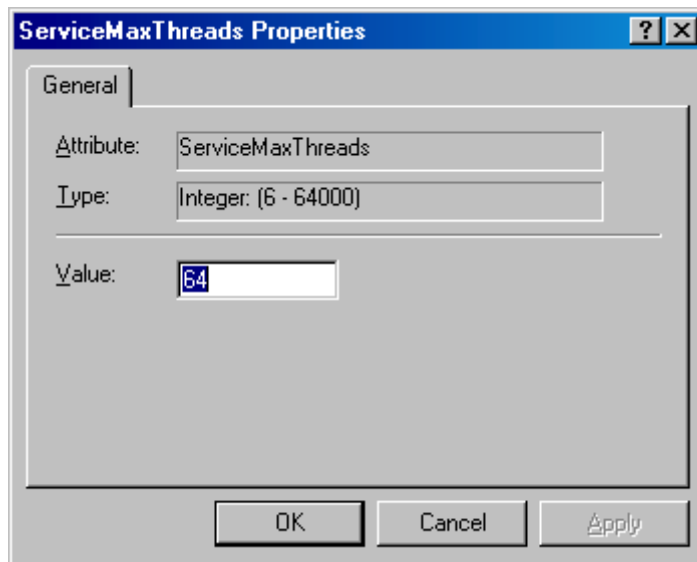
NOTE: Only commonly used attributes are included in the configuration of a newly created SequeLink service. To configure other attributes, you must add the attribute explicitly to your SequeLink configuration.

See [Appendix E "SequeLink Service Attributes" on page 407](#) for a description of SequeLink service attributes.

Changing a Service Attribute

- 1 Right-click any SequeLink service attribute and select **Properties**. The properties window for that attribute appears.

For example, to change the `ServiceMaxThreads` attribute, right-click **ServiceMaxThreads**, and select **Properties**. The `ServiceMaxThreads` Properties window appears.



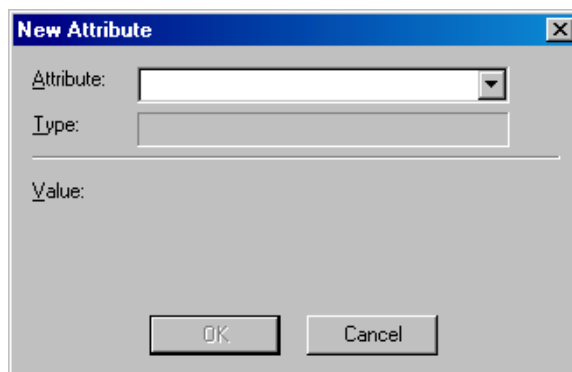
- 2 Type a new value for the attribute in the Value field, and click **OK**. The attribute is changed.
- 3 Save the configuration.

NOTE: When you add or change a static attribute, you must restart the SequeLink service before the change takes affect. Dynamic attributes become effective after the attribute is added or changed and the configuration is saved.

See [Appendix E "SequeLink Service Attributes" on page 407](#) for a description of SequeLink service attributes and whether the attribute is static or dynamic.

Adding a Service Attribute

- 1 Right-click any SequeLink service attribute category, and select **New / Attribute**. The New Attribute window appears.



NOTE: If you do not know the attribute category, you can right-click the Service Settings node, and select **New / Attribute**. In this case, the drop-down list displays all attributes.

- 2 From the Attribute drop-down list, select the attribute you want to add to the service. The Type field adjusts to show the type of value required.

NOTE: If an attribute is already defined and only one instance of the attribute is allowed, the attribute is not displayed in the drop-down list.

- 3 In the Value field, type a value for the attribute (or in some cases, select an option), and click **OK**. The attribute is added to the service.
- 4 Save the configuration.

NOTE: When you add or change a static attribute, you must restart the SequeLink service before the change takes effect. Dynamic attributes become effective after the attribute is added or changed and the configuration is saved.

See [Appendix E "SequeLink Service Attributes" on page 407](#) for a description of SequeLink service attributes.

Deleting a Service Attribute

- 1 Right-click the SequeLink service attribute you want to delete, and select **Delete**.
- 2 You are prompted to confirm the deletion. Click **OK** to confirm. The attribute is deleted from the service configuration.
- 3 Save the configuration.

NOTE: When you delete a static attribute, you must restart the SequeLink service before the change takes affect. Deletion of dynamic attributes becomes effective after the attribute is deleted and the configuration is saved.

See [Appendix E "SequeLink Service Attributes" on page 407](#) for a description of SequeLink service attributes.

Configuring Monitoring

SequeLink provides the following levels of monitoring for SequeLink data access services, listed here from highest-level to lowest-level. Some of the monitoring levels are also supported for the SequeLink Agent service.

- **Service monitoring** monitors these activities by service:
 - Statistics of received packets and sent packets
 - Sessions started and statements opened
 - Active statements and sessions
 - Fetched rows and affected rows
 - Transactions
- **Session monitoring** monitors these activities by session within a service:
 - Statistics of received packets and sent packets
 - Statements opened and active statements
 - Fetched rows and affected rows
 - Transactions
 - Information about each session, such as start time, client information (network address, data source used by the client, and type of client), native database session identification, and database user
- **Statement monitoring** monitors these activities by statement within a session:
 - Fetched rows and affected rows
 - SQL statements issued

To enable monitoring at one of the listed levels, higher-level monitoring must be enabled. For example, you cannot monitor Session information unless Service monitoring is enabled. Similarly, you cannot monitor Statement information unless both Service monitoring and Session monitoring are enabled.



On UNIX, both a monitoring and an event trace profile are enabled when you install SequeLink Server.

After installation, you can create a monitoring profile or modify an existing profile.

NOTES:

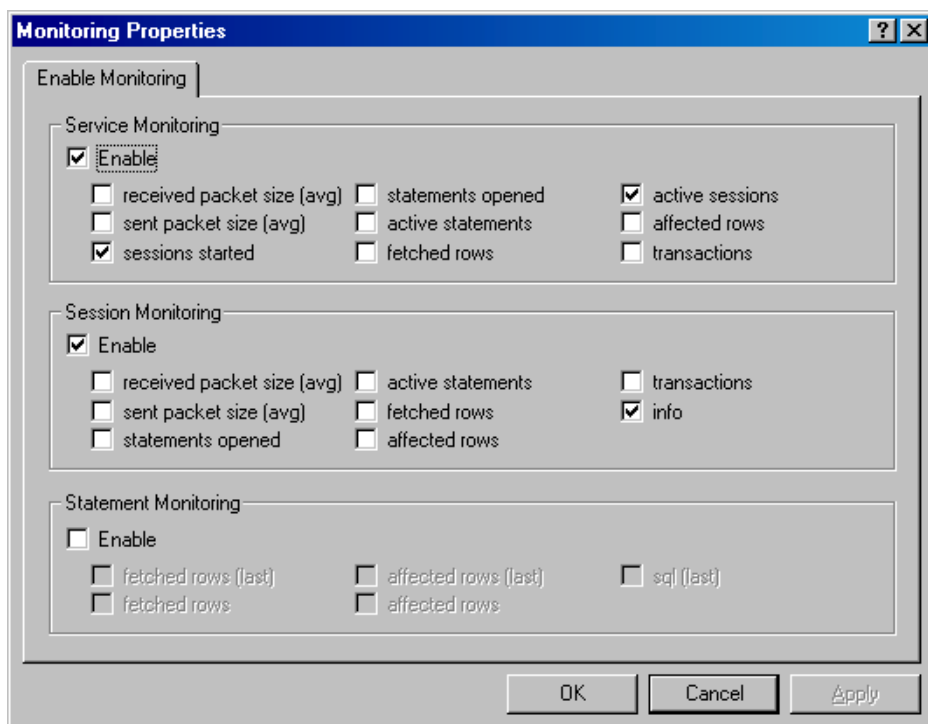
- You can configure only one monitoring profile for each SequeLink service.
- After changing the connection model for a service, you must delete any monitoring or event profiles for the service. For example, if you changed the connection model from Threadpool to Threadconnection, you must delete the monitoring and event profiles, and create new profiles.



You can integrate SequeLink monitoring with the Windows Performance Monitor tool, which allows you to access monitoring information from the Windows tool.

Creating a Monitoring Profile

- 1 Select the **Profiles** node for a SequeLink service (which is beneath the Configuration node). Select **Action / New / Monitoring Profile**. The Monitoring Properties window appears.



For Windows users: When you create a profile, the Enable Performance Monitoring window appears before the Monitoring window if you have the Windows Performance Monitor tool installed on the same Windows server on which the SequeLink Server and SequeLink Manager Snap-In are installed.

If you want to integrate SequeLink monitoring with the Windows Performance Monitor tool, select the **Enable** check box. Then, click **Next**. The Monitoring window appears.

See ["Integrating SequeLink Monitoring with the Windows Performance Tool" on page 94](#) for instructions on integrating SequeLink with the Windows NT Performance Tool.

- 2 Perform any of the following actions in the Monitoring window:
 - To enable a type of monitoring (Service Monitoring, Session Monitoring, and Statement Monitoring), select the **Enable** check box within the appropriate Monitoring group. Remember that to enable monitoring information at a monitoring level, you must enable the higher-level monitoring. Therefore, if you disable Service Monitoring, all lower-level monitoring information is also disabled.
 - To enable a property, select the check box beside the property.
 - To disable types of monitoring (Service Monitoring, Session Monitoring, and Statement Monitoring), clear the **Enable** check box within the appropriate Monitoring group.
 - To disable any property, clear the check box beside the property.
- 3 Click **OK**.
- 4 Restart the SequeLink service to activate the new monitoring profile.

Changing an Existing Monitoring Profile

- 1 Select the **Profiles** node for a SequeLink service (beneath the Configuration node). The monitoring profile is displayed in the Details pane. Double-click the monitoring profile. The Monitoring Properties window appears.

The **Monitoring Properties** dialog box is shown with the **Enable Monitoring** tab selected. It contains three main sections for configuring monitoring:

- Service Monitoring:**
 - ☒ **Enable**
 - ☐ received packet size (avg) ☐ statements opened ☒ active sessions
 - ☐ sent packet size (avg) ☐ active statements ☐ affected rows
 - ☒ sessions started ☐ fetched rows ☐ transactions
- Session Monitoring:**
 - ☒ **Enable**
 - ☐ received packet size (avg) ☐ active statements ☐ transactions
 - ☐ sent packet size (avg) ☐ fetched rows ☒ info
 - ☐ statements opened ☐ affected rows
- Statement Monitoring:**
 - ☐ **Enable**
 - ☐ fetched rows (last) ☐ affected rows (last) ☐ sql (last)
 - ☐ fetched rows ☐ affected rows

At the bottom are buttons for **OK**, **Cancel**, and **Apply**.

- 2 Perform any of the following actions in the Monitoring window:
 - To enable a type of monitoring (Service Monitoring, Session Monitoring, and Statement Monitoring), select the **Enable** check box within the appropriate Monitoring group. Remember that to enable monitoring information at a monitoring level, you must enable the higher-level

monitoring. Therefore, if you disable Service Monitoring, all lower-level monitoring information is also disabled.

- To enable a property, select the check box beside the property.
 - To disable types of monitoring (Service Monitoring, Session Monitoring, and Statement Monitoring), clear the **Enable** check box within the appropriate Monitoring group.
 - To disable a property, clear the check box beside the property.
- 3 Click **OK**.
 - 4 Restart the SequeLink service to activate the changed monitoring profile.

Deleting a Monitoring Profile

- 1 Select the Profiles node for a SequeLink service (which is beneath the Configuration node). The existing monitoring profile is displayed in the Details pane.
- 2 Right-click the monitoring profile, and select **Delete**.
- 3 You are prompted to confirm the deletion. Click **OK** to confirm. The profile is deleted from the service configuration.
- 4 Save the configuration.

Configuring Event Tracing

Events are generated when the client application accesses data and when specific server activities occur, such as when a service starts or an error occurs. Depending on which SequeLink profiles are active, the information generated by the event is displayed as it occurs in the runtime monitor and is stored persistent in the event trace file.

By default, the event trace file is located in the *installdir\tracing* directory where *installdir* is your SequeLink Server installation directory.

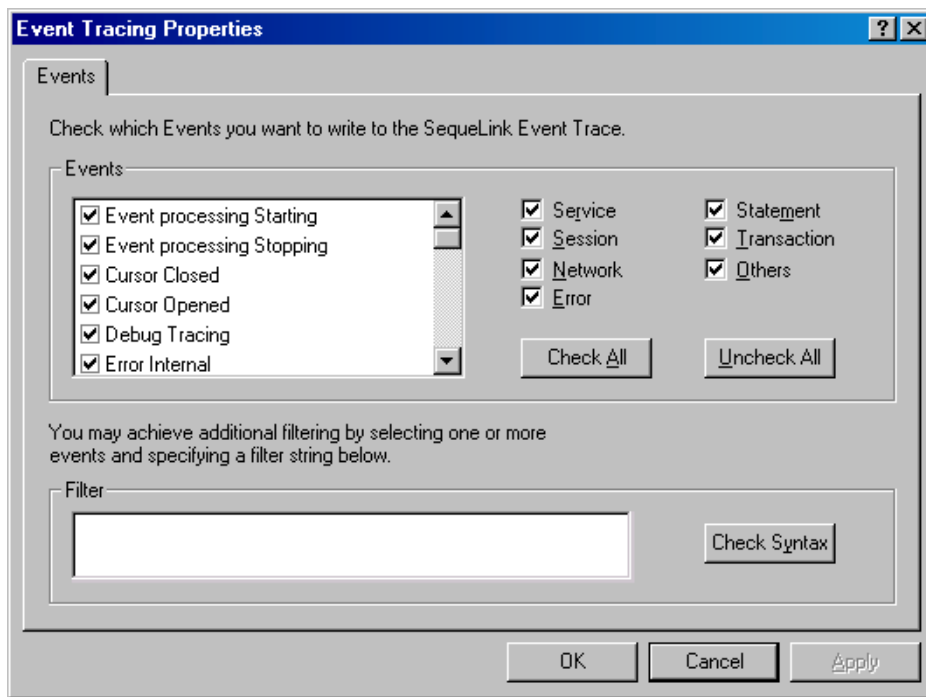


On UNIX, both a monitoring and an event trace profile are enabled when you install SequeLink Server.

NOTE: You can configure only one event trace profile for each SequeLink service.

Creating an Event Trace Profile

- 1 Select the **Profiles** node for a SequeLink service (beneath the Configuration node). Select **Action / New / Event Trace Profile**. The Events window appears.



- 2 Enable and disable events:
 - To enable a group of events, select the check box beside the appropriate group name (Service, Session, Network, Error, Statement, Transaction, or Others).
 - To enable individual events, select the check box beside the event in the scroll box. See [Appendix F "SequeLink Events" on page 479](#) for a list and a description of all events.

- To disable a group of events, clear the check box beside the appropriate group name (Service, Session, Network, Error, Statement, Transaction, or Others).

NOTE: Event names that do not start with Service, Session, Network, Error, Statement, or Transaction are Other events (for example, Cursor Closed).

- To disable individual events, clear the check box beside the event in the scroll box.
- 3 Optionally, you can place a filter on any event or group of events. To add a filter, type the filter in the Filter text box. Some events have a set of attributes. You can place a filter on the attributes of an event. For example, if you want to monitor and trace only authentication events for sessions started by administrators, you could write the following filter for the Session Authenticated event:

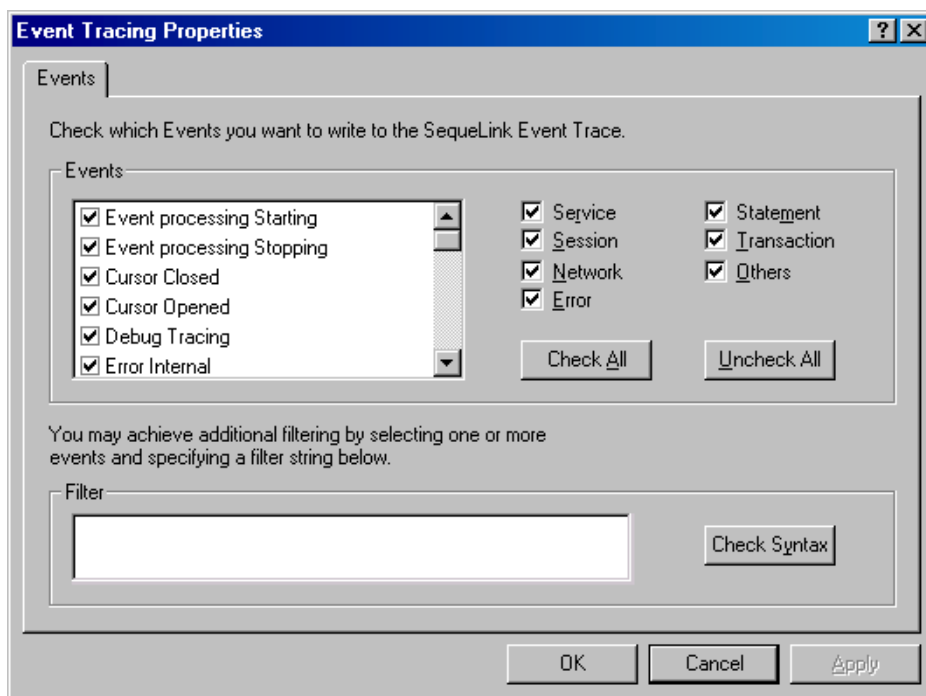
```
${Authorization} = "administrator"
```

See [Appendix F "SequeLink Events" on page 479](#) for an explanation of the filter syntax, and a list and description of the attributes for each event.

- 4 Click **Next**. The Add Event Trace Profile window appears. Click **Finish** in this window to add the profile.
- 5 Save the configuration.
- 6 Restart the SequeLink service to activate the new event trace profile.

Changing an Existing Event Trace Profile

- 1 Select the Profiles node for a SequeLink service (beneath the Configuration node). The existing event trace profile is displayed in the Details pane. Double-click the event trace profile. The Events window appears.



- 2 Enable and disable events:
 - To enable a group of events, select the check box beside the appropriate group name (Service, Session, Network, Error, Statement, Transaction, or Others).
 - To enable individual events, select the check box beside the event. See [Appendix F "SequeLink Events" on page 479](#) for a list of all events and their definition.

- To disable a group of events, clear the check box beside the appropriate group name (Service, Session, Network, Error, Statement, Transaction, or Others).
 - To disable individual events, clear the check box beside the event in the scroll box.
- 3 Optionally, you can place a filter on an event or group of events. Type a filter in the Filter text box. Some events have a set of attributes. You can place a filter on the attributes of an event. For example, if you want to monitor and trace only authentication events for sessions started by administrators, you could write the following filter for the Session Authenticated event:


```
${Authorization} = "administrator"
```

See [Appendix F "SequeLink Events" on page 479](#) for an explanation of the filter syntax, and a list and description of the attributes for each event.
 - 4 Click **OK**.
 - 5 Save the configuration.
 - 6 Restart the SequeLink service to activate the new event trace profile.

Deleting an Event Trace Profile

- 1 Select the Profiles node for a SequeLink service (beneath the Configuration node). The existing event trace profile is displayed in the Details pane.
- 2 Right-click the event profile, and select **Delete**.
- 3 You are prompted to confirm the deletion. Click **OK** to confirm. The event profile is deleted from the service configuration.
- 4 Save the configuration.

Integrating SequeLink Monitoring with the Windows Performance Tool



If you are integrating SequeLink monitoring with the Windows Performance Monitoring tool on the Windows platforms on which the SequeLink Server runs, you must explicitly set the required counters in the Windows registry. When the SequeLink Server installation finishes, the files SWEVPERF.INI and SWEVPERF.H appear in your temporary directory (for example, C:\temp).

To integrate SequeLink monitoring with Windows performance monitoring:

- 1 Using a command prompt, change the directory to the directory containing the SWEVPERF.INI file (for example, C:\temp).
- 2 Type the following command; then, press ENTER:

```
lodctr swevperf.ini
```
- 3 If you do not have an active (enabled) monitoring profile that is configured for integration with the Windows Performance Monitor tool, configure one. See ["Configuring Monitoring" on page 83](#) for instructions on configuring monitoring. To activate a new monitoring profile, restart the SequeLink service for which you defined the profile.

NOTE: If you have a monitoring profile that is not configured for integration with the Windows Performance Monitor Tool, delete that monitoring profile and create one that is configured for integration. Integration must be configured when you create the profile.

- 4 Start the Windows Performance tool and select the **Add to Chart** menu item. In the window that appears, select the **SequeLink 5.4 Services** object and select the counters you want to monitor from the Instance list box.

Configuring SequeLink Server for ODBC Socket

Many of the SequeLink service templates provide a configuration that can be used without any modification; however, the SequeLink Server for ODBC Socket must be configured before it can be used.



Configuring the SequeLink Server for ODBC Socket on Windows

You can use the same SequeLink Server for ODBC Socket to connect with different ODBC drivers. For each ODBC driver you want to access, create a new ODBC system data source. In the server data sources of the SequeLink service, you can then specify a different DataSourceSOCODBCConnStr service attribute.

To configure the SequeLink Server:

- 1 Create a system data source for the SequeLink Server for ODBC Socket. Refer to your ODBC driver documentation for instructions on creating a system data source for that driver.
- 2 Open the MMC. See "[Adding the SequeLink Manager Snap-in to the MMC](#)" on page 49 for instructions on starting the MMC and using the SequeLink Manager Snap-in to the MMC.
- 3 From the Console menu, select **Console / Open**. Select the SequeLink Manager Snap-in you want to start; then, click **Open**.
- 4 Select **SequeLink Services**.
- 5 Select the **SequeLink Socket Service**.

- 6 Select the **Configuration** Node.
- 7 Select the **Data Source Settings** node.
- 8 Select the data source you want to change.
- 9 Right-click the **Advanced** node, and select **New / Attribute**. The Properties window appears.
- 10 From the drop-down list, select **DataSourceSOCODBCConnStr**.
- 11 In the Value field, type the connect string of the data source you created in [Step 1](#). For example, if you want the Socket Server to use the Oracle9i_on_host data source, type in the string `DSN=Oracle9i_on_host`.
- 12 Click **OK**. The attribute is changed.
- 13 Save the configuration.



Configuring the SequeLink Server for ODBC Socket on UNIX

You can use one SequeLink Server for ODBC Socket to connect with different ODBC drivers. For each ODBC driver you want to access, make a new data source. In each server data source, you can then specify a different DataSourceSOCODBCConnStr.

To configure the SequeLink Server for ODBC Socket:

- 1 Determine which `odbc.ini` the SequeLink Server for ODBC Socket will use.
- 2 Open the MMC. See ["Adding the SequeLink Manager Snap-in to the MMC" on page 49](#) for instructions on starting the MMC and using the SequeLink Manager Snap-in to the MMC.

- 3 Verify that the `odbc.ini` is set correctly as an environment variable in the configuration of SequeLink Server for ODBC Socket:
 - a Select **SequeLink Services**, for example, **SLSocket54**.
 - b Select the **Configuration Node**.
 - c Select the **Service Settings** node.
 - d Select the **Environment** node. Make sure that it contains the `ServiceEnvironmentVariable` service attribute with the value `ODBCINI=file-path/file-name`. For example, `ODBCINI=/usr/odbc/odbc.ini`.
 - e In the `odbc.ini` file, create a data source to which the Socket Server will connect. See "[Configuring ODBC Client Data Sources on UNIX](#)" on page 215 for instructions on creating a data source.
- 4 Set the connection string the SequeLink Server for ODBC Socket service will use to connect.
 - a Select **Data Source Settings**; then select a node.
 - b Right-click the **Advanced** node and select **New / Attribute**. The Properties window appears.
 - c From the drop-down list, select **DataSourceSOCODBCConnStr**.
 - d In the Value field, type the connect string of the data source you want SequeLink Server for ODBC Socket to use. For example, if you want SequeLink Server for ODBC Socket to use the `Oracle9i_on_host` data source you created in [Step 1](#), type in the string `DSN=Oracle9i_on_host`.

- 5 If the ODBC driver you are going to use has required environment variables, add them as service attributes to the SequeLink Server for ODBC Socket configuration:
 - a Right-click the **Environment** node and select **New / Attribute**.
 - b Select **EnvironmentVariable** from the drop-down list.
 - c Type the name of the environment variable and its value, for example, `ORACLE_HOME=/db/oracle9i`. The library-search path will be set as an EnvironmentVariable. The ODBC driver might need additional path information. Separate the values with a semicolon. For example on Solaris, `LD_LIBRARY_PATH=/usr/odbc/lib;/db/oracle9i/lib`.
- 6 Click **OK**. The attribute is changed.
- 7 Save the configuration.

5 Managing Data Access Activity Using the SequeLink Manager Snap-in

This chapter describes the tasks you perform to manage and monitor data access activity using the SequeLink Manager Snap-in.

To do this...

Kill a session

View event tracing information

View details about an active service

View active sessions and details about an active session

See...

["Killing a Session" on page 100](#)

["Viewing Event Tracing Information" on page 100](#)

["Viewing Details About an Active Service" on page 104](#)

["Viewing Active Sessions and Details About an Active Session" on page 105](#)

Killing a Session

NOTE: To view or kill sessions for a SequeLink service, monitoring must be enabled for the service. See ["Configuring Monitoring" on page 83](#) for information about enabling monitoring for a SequeLink service.

To kill a session:

- 1 Click the **Monitor / Active sessions** node of the SequeLink service. The Details pane shows a list of active sessions.
- 2 Right-click the session you want to kill, and select **Kill**.

Viewing Event Tracing Information

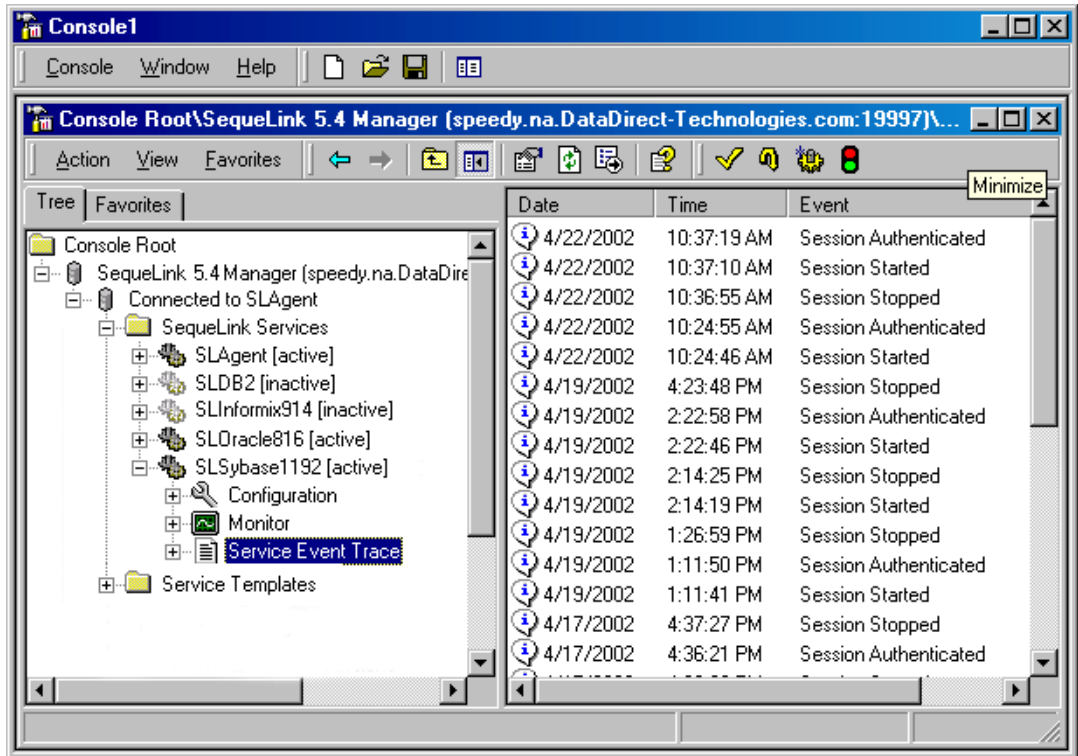
You can view all events of a service or filter the events to view. You can also use the Find function to search for a specific event in the events that are displayed in the Details pane.

NOTE: When the service event trace is refreshed, it is possible that the displayed information may no longer be available in the event trace file because the event trace file is circular, meaning that the oldest events are overwritten with the newest events. If this happens, the SequeLink Manager displays *Information not available*.

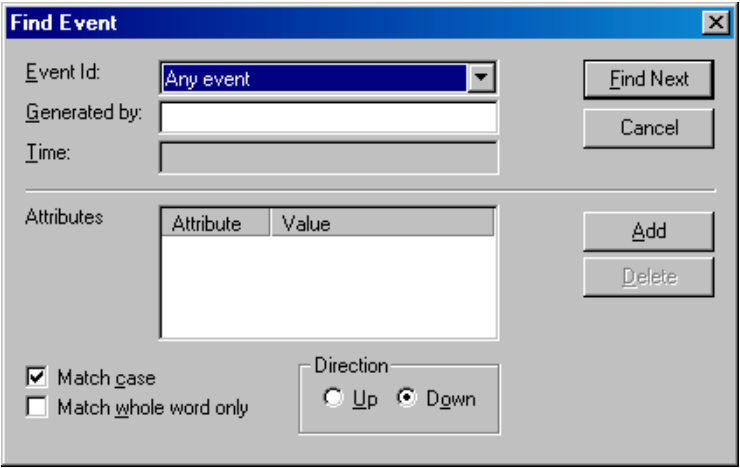
See ["Event Handling" on page 35](#) for general information about event handling.

To view event trace information:

- 1 Click the **Service Event Trace** node of a service. The Details pane displays a list of all events, which depends on how event tracing is configured. See ["Deleting a Monitoring Profile" on page 88](#) for more information.



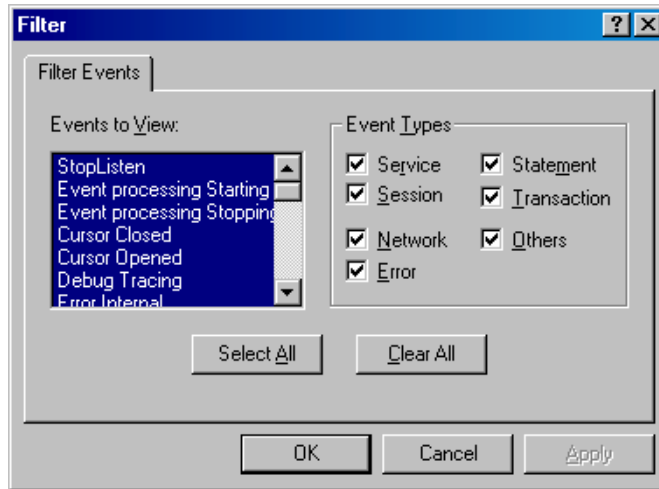
- 2 Optionally, you can search for a specific event in the Details pane. To do this, right-click the **Service Event Trace** node of a service; then, select **Find Event**. The Find Event window appears.



In this window, perform the following actions:

- a Select the type of event you want to view from the Event ID drop-down list.
- b To search down in the event list, select **Down** in the Direction group. To search up, select **Up**.
- c Optionally, you can define search criteria for the event. Click **Add**. The New Attribute window appears. In this window, select the attribute by which you want to search from the Attribute drop-down list. In the Value field, type the search criteria for the attribute. For example, if you want to search for Session Started events from a certain client host (such as 'sales1.company.com'), you would select **Session Started** in the Find Event window, click **Add**, select **ClientInfo** from the Attribute drop-down list, and type 'sales1.company.com' in the Value field.
- d Click **Find Next** to find the next event.

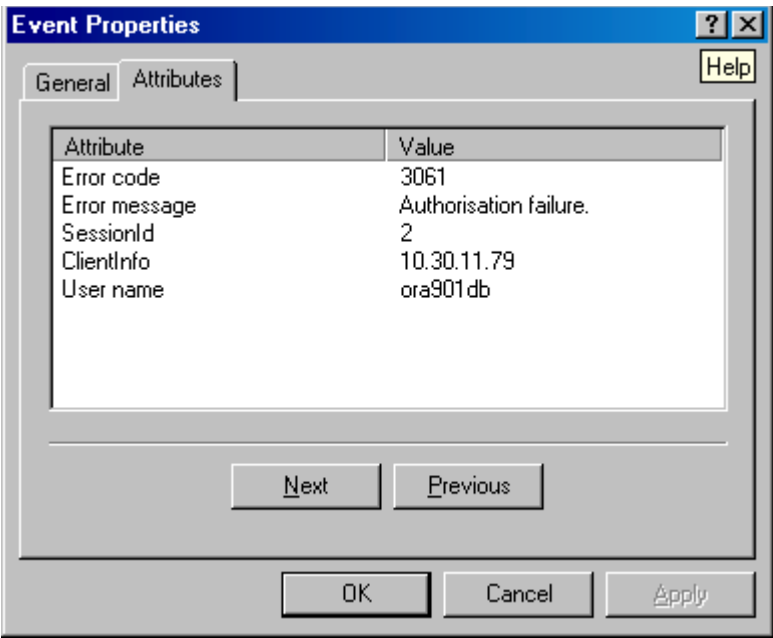
- 3 Optionally, you can filter the search to display only specific events in the Details pane. To do this, click the **Service Event Trace** node of a service; then, select **View / Filter**. The Filter window appears.



In this window, perform one of the following actions:

- Select the events you want to view from the Events to View list. To select non-adjacent events from the list, hold down the CTRL key while selecting the events. To select adjacent events from the list, hold down the SHIFT key while selecting the events.
 - Select the types of events you want to view by selecting the appropriate Event Types check boxes. When you select an event type, the corresponding events are highlighted in the Events to View list.
- 4 To view information about a specific event, right-click an event in the Details pane, and select **Properties**. The Event Properties window appears.

- 5 Click the **Attributes** tab to view the attributes for that event.



Viewing Details About an Active Service

Select the **Monitor** node of the service for which you want details. The Details pane shows details about the active service. The level of detail that is displayed depends on how the monitoring is configured. See ["Configuring Monitoring" on page 83](#) for more information.

See ["Refreshing Active Information" on page 62](#) for information about refreshing information about active services.

Viewing Active Sessions and Details About an Active Session

- 1 Select the **Monitor** node of the SequeLink service for which you want to view active sessions.
- 2 Select the **Active sessions** node. The Details pane shows all active sessions for that SequeLink service.

NOTE: Optionally, you can sort active sessions that appear in the Details pane based on session name, session type, IP address, or DBMS user. To do this, click the appropriate header category at the top of the Details pane. The active session list is sorted based on the criteria you selected.

- 3 To view details about an active session, expand the **Active sessions** node. In the console tree in the left pane, select the session for which you want details. The Details pane displays details about that session.

See ["Refreshing Active Information" on page 62](#) for information about refreshing information about active sessions.

6 Using SequeLink Manager Commands

This chapter describes how to use the SequeLink Manager Command-Line Tool, issue SequeLink Manager commands, and lists some commonly used SequeLink Manager commands. See [“SequeLink Server System Administration” on page 27](#) for general information about the SequeLink Manager.

Using the SequeLink Manager Command-Line Tool



The SequeLink Manager Command-Line Tool runs on Windows and UNIX only. It allows you to configure and manage your SequeLink environment remotely from a networked client or locally from a SequeLink Server by issuing commands through the command-line interface.

You can use any of the following methods to issue SequeLink Manager commands:

- Direct
- Batch
- Interactive

z/OS NOTE: To configure and manage SequeLink services on OS/390 or to create OS/390-specific core entities such as DB2 interfaces, use the SequeLink Manager for OS/390. See [Chapter 8 “Configuring SequeLink Services Using the SequeLink Manager for OS/390” on page 135](#) for more information. Monitoring can be performed using any SequeLink Manager.

Direct Command Execution

Using direct command execution, you can invoke one command at a time on the command line. The command syntax for direct execution is:

```
executable command_name [parameters]
```

where:

executable is *installdir*\admin\swcla.exe on Windows and *installdir*/admin/swcla.sh on UNIX. See [“Invoking the SequeLink Manager Command-Line Tool” on page 110](#) for the parameters you can specify when invoking the tool.

command_name is any SequeLink Manager command (short or long name). See [Appendix C “SequeLink Manager Commands” on page 357](#) for a list and description of each command.

parameters are valid options for the specified command. When using direct command execution to issue a command, you must provide all of a command’s required and optional parameters in the correct position (specify the parameters in the order they are documented).

Batch Command Execution

The batch method of executing commands allows you to execute a script file that contains SequeLink Manager commands. The command syntax for batch execution is:

```
executable -i script_file
```

where:

executable is *installdir*\admin\swcla.exe on Windows and *installdir*/admin/swcla.sh on UNIX. See [“Invoking the SequeLink Manager Command-Line Tool” on page 110](#) for the parameters you can specify when invoking the tool.

script_file is the name of the file to execute. This file can contain SequeLink Manager commands only. When using a script file to execute commands, you must provide all of a command's required and optional parameters in the script file (specify the parameters in the order they are documented).

Interactive Command Execution

Using interactive command execution, you do not have to specify all the command parameters on the command line. The command-line tool will prompt you for the required parameters. To start interactive mode, type:

```
executable
```

where:

executable is *installdir*\admin\swcla.exe on Windows and *installdir*/admin/swcla.sh on UNIX. See [“Invoking the SequeLink Manager Command-Line Tool” on page 110](#) for the parameters you can specify when invoking the tool.

The tool is invoked and a command prompt is displayed, along with copyright text (unless you invoked the tool with the -nologo flag):

```
swcla>
```

At the swcla command prompt, type either a command with all of its parameters or a command name, and the tool will prompt you for the required parameters.

To exit interactive mode, type:

```
exit
```

General Rules

- SequeLink Manager command names are not case-sensitive; however, the command parameter *service_name* is case sensitive.
- If the value of a command parameter contains spaces, the value must be enclosed within single quotes (') or double quotes (").
- If the value of a command parameter contains single or double quotes, use single quotes to quote double quotes and double quotes to quote single quotes.
- The pound sign (#) is a comment character. All text that follows the pound sign on the same line is ignored.
- When issuing commands using the direct or batch method, you must specify all of a command's required and optional parameters in the correct position (specify the parameters in the order they are documented).

Invoking the SequeLink Manager Command-Line Tool

You invoke the SequeLink Manager Command-Line Tool using the following syntax:

```
executable [-nologo] [-i script_file] [-o output_file] [-e error_file]
[-l | -r host:port] [-uid user_id [-pwd password]] [command]
```

where:

executable is *installdir*\admin\swcla.exe on Windows and *installdir*/admin/swcla.sh on UNIX.

-nologo disables the display of the copyright banner.

-i *script_file* specifies a script file to execute.

`-o output_file` specifies the name of a file in which the command-line tool will write all of its output (except errors).

`-e error_file` specifies the name of a file in which the command-line tool will write all its errors (not normal output). All error and normal output can be written to the same file if the file specified for the `-o` and `-e` flags is the same.

`-l` specifies to use the local host configuration.

`-r host:port` specifies to use the remote host configuration. In this case, you must specify the host name and port of the remote server.

`-uid user_id` specifies the user ID to use for local or remote host configuration. This parameter is valid only in combination with the `-l` or `-r` parameters.

`-pwd password` specifies a password to use for local or remote host configuration. This parameter is valid only in combination with the `-l` or `-r` parameters.

`command` is the name of any SequeLink Manager command and its parameters. See [Appendix C “SequeLink Manager Commands” on page 357](#) for a list and description of each command.

When invoking the SequeLink Manager Command-Line Tool, you must choose whether you want the tool to connect to a local SequeLink Agent (a SequeLink Agent service running on the same machine as the tool) or a remote SequeLink Agent (a SequeLink Agent service running on another machine). If you have not connected to a SequeLink Agent, the SequeLink Manager Command-Line Tool will return the following message when you issue a command:

```
[SequeLink error 5509] Command not available for current
configuration.
```

You can invoke the SequeLink Manager Command-Line Tool and connect to a local or remote SequeLink Agent after you invoke

the tool or when you invoke the tool as shown in the following examples:

Example A: Connecting to a Local or Remote SequeLink Agent After Invoking the Tool

```
SLServer54\admin\swcla.exe
```

This example invokes the tool without specifying whether it will connect to a local or remote SequeLink Agent. You must now explicitly connect to a local or remote SequeLink Agent using the `ActivateLocalConfig` or `ActivateRemoteConfig` commands described in [Appendix C “SequeLink Manager Commands” on page 357](#) before you can enter any other commands.

Example B: Connecting to a Local SequeLink Agent When Invoking the Tool

```
SLServer54\admin\swcla.exe -l
```

This example connects the tool to a local SequeLink Agent. The administrator will be prompted for the user ID and password for the SequeLink administrator. The administrator can now enter any SequeLink Manager command described in [Appendix C “SequeLink Manager Commands” on page 357](#).

Example C: Connecting to a Remote SequeLink Agent When Invoking the Tool

```
SLServer54\admin\swcla.exe -r
```

This example connects the tool to a remote SequeLink Agent. The administrator will be prompted for the host name and port of the remote server. Then, the administrator will be prompted for the user ID and password for the SequeLink administrator. The administrator can now enter any SequeLink Manager command described in [Appendix C “SequeLink Manager Commands” on page 357](#).

Displaying Help for a Command

To display help for a command, type the following at a command-line tool prompt:

```
help [long_command_name | short_command_name]
```

For example:

```
help DataSourceCreate
```

You can also display help about the different options you have when invoking the command-line tool. To do this, type the following at a command-line tool prompt:

```
help
```

Commonly Used SequeLink Manager Commands

This section lists some commonly used SequeLink Manager commands. Both long and short command names are listed. See [Appendix C “SequeLink Manager Commands” on page 357](#) for a complete list of SequeLink Manager commands.

Starting a SequeLink Service

Command: ServiceStart | ss

Syntax: {ServiceStart | ss} *service_name*

Example: ss SLOracle81

Stopping a SequeLink Service

Command: ServiceStop | sst

Syntax: {ServiceStop | sst} *service_name*

Example: sst SLOracle81

Creating a SequeLink Service

Command: ServiceCreate | sc

Syntax: {ServiceCreate | sc} *service_name service_ID tcp_port*

Service template IDs can be obtained using the ServiceTemplateList|stl command.

Example: sc SLOracle81 SL5_Oracle81W 19996

Deleting a SequeLink Service

NOTE: Before deleting a SequeLink service, you must stop the service you want to delete.

Command: ServiceDelete | sd

Syntax: {ServiceDelete | sd} *service_name*

Example: sd SLOracle81

Viewing Service Attributes

Command: ServiceInfo | si

Syntax: {ServiceInfo | si} *service_name*

Example: si SLOracle81

Changing a Service Attribute

Command: ServiceAttributeReplace | sar

Syntax: {ServiceAttributeReplace | sar} *service_name attribute_name value*

Example: sar SLOracle81 ServiceUser[2] devuser

Adding a Service Attribute

Command: ServiceAttributeAdd | saa

Syntax: {ServiceAttributeAdd | saa} *service_name attribute_name value*

Example: saa SLOracle81 ServiceUser sqlnk

Deleting a Service Attribute

Command: ServiceAttributeDelete | sad

Syntax: {ServiceAttributeDelete | sad} *service_name attribute_name*

Example: sad SLOracle81 ServiceCodePage
sad SLOracle81 ServiceUser[2]

Creating a Server Data Source

Command: DataSourceCreate | dsc

Syntax: {DataSourceCreate | dsc} *service_name data_source_name*

Example: dsc SLOracle81 DS_Employees

Deleting a Server Data Source

Command: DataSourceDelete | dsd

Syntax: {DataSourceDelete | dsd} *service_name data_source_name*

Example: dsd SLOracle81 DS_Employees

Changing a Server Data Source Attribute

Command: DataSourceAttributeReplace | dsar

Syntax: {DataSourceAttributeReplace | dsar} *service_name data_source_name attribute_name value*

Example: dsar SLOracle81 DS_Employees DataSourceCurrentCatalog partners

Adding a Server Data Source Attribute

Command: DataSourceAttributeAdd | dsaa

Syntax: {DataSourceAttributeAdd | dsaa} *service_name data_source_name attribute_name value*

Example: dsaa SLOracle81 DS_Employees DataSourceCurrentCatalog employees

Deleting a Server Data Source Attribute

Command: DataSourceAttributeDelete | dsad

Syntax: {DataSourceAttributeDelete | dsad} *service_name*
data_source_name attribute_name

Example: dsad SLOracle81 DS_Employees DataSourceCurrentCatalog

Killing a Session

Command: SessionStop | sess

Syntax: {SessionStop | sess} *service_name session_ID*

Session IDs can be obtained with the ServiceActiveInfo | sai command.

Example: sess SLOracle81 5

Viewing Event Tracing Information

Command: EventList | el

Syntax: {eventlist | el} *service_name* | [remote]file=
event_trace_file_name
[details]
[[{service | srvc}] |
[{session | sess}] |
[{statement | stmt}] |
[{transaction | trans}] |
[{network | net}] |
[{error | err}] |
[{other | oth}]]]
[count=[{ + | - }] {all | number}]
[offset={begin | end} [{ + | - }] number]
[query='custom_event_filter_string']

Example: Local host or remote configuration examples:

```
el SLAgent details

el SLOracle details service count=all offset=10

el SLOracle81 stmt query='${ReturnCode} != 0'

el "file=C:\Program Files\DataDirect\slserver54\tracing\
SLOracle81.trc" count=10

el "remotefile=C:\Program Files\DataDirect\slserver54\
tracing\SLOracle81.trc" service details
```

Offline configuration examples:

```
el "file=C:\Program Files\DataDirect\slserver54\tracing\
SLOracle81.trc"

el "file=C:\Program Files\DataDirect\slserver54\tracing\
SLOracle81.trc" count=10

el "file=C:\Program Files\DataDirect\slserver54\tracing\
SLOracle81.trc" count=-all offset=end

el "file=C:\Program Files\DataDirect\slserver54\tracing\
SLOracle81.trc" offset=5 service session

el "file=C:\Program Files\DataDirect\slserver54\tracing\
SLOracle81.trc" service details
```

Viewing Active Services

Command: ServiceList | sl**Syntax:** {ServiceList | sl}**Example:** sl

Viewing Details About an Active Service (Including Active Sessions)

Command: `ServiceActiveInfo | sai`

Syntax: `{ServiceActiveInfo | sai} service_name`

Example: `sai SLOracle81`

Viewing Details About an Active Session

Command: `SessionInfo | sesi`

Syntax: `{SessionInfo | sesi} service_name session_ID`

Session IDs can be obtained using the `ServiceActiveInfo | sai` command.

Example: `sesi SLOracle81 5`

7 Using the SequeLink Manager for OS/390

z/OS You can use the SequeLink Manager for OS/390 to configure and manage SequeLink Server for OS/390 locally using an ISPF dialog. This chapter describes how to use the SequeLink Manager and the SequeLink Manager Operator Interface.

Starting the SequeLink Manager for OS/390

How you start the SequeLink Manager for OS/390 depends on whether you have allocated the SequeLink ISPF libraries to the TSO session, which allows you to use a simpler command syntax to start the SequeLink Manager for OS/390.

If you are planning to use the SequeLink Manager for OS/390 regularly, we recommend that you allocate the SequeLink ISPF libraries to the TSO session as shown in [Table 7-1](#).

Table 7-1. SequeLink ISPF Library Allocation (z/OS, OS/390)

SequeLink ISPF Libraries	Allocate to...
<i>SequeLink_HLQ</i> .CLIST	SYSPROC or SYSEXEC
<i>SequeLink_HLQ</i> .LOADLIB	ISPLLIB
<i>SequeLink_HLQ</i> .MSGS	ISPMLIB
<i>SequeLink_HLQ</i> .PANELS	ISPLLIB

NOTE: *SequeLink_HLQ* is the SequeLink high-level qualifier identifying the libraries.

Table 7-1. SequeLink ISPF Library Allocation (z/OS, OS/390)
(cont.)

SequeLink ISPF Libraries	Allocate to...
<i>SequeLink_HLQ</i> .SKELS	ISPSLIB
<i>SequeLink_HLQ</i> .TABLES	ISPTLIB
NOTE: <i>SequeLink_HLQ</i> is the SequeLink high-level qualifier identifying the libraries.	

Starting the SequeLink Manager When ISPF Libraries Are Allocated

Type the following command:

```
TSO %SSMC ['HLQ(SequeLink_HLQ)']
```

where *SequeLink_HLQ* is the SequeLink high-level qualifier that identifies *all* SequeLink libraries. You are only required to type the SequeLink high-level qualifier the first time you start the SequeLink Manager for OS/390 because this qualifier is saved in the user's ISPF profile.

For example:

```
TSO %SSMC 'HLQ(DDTEK.SL54)'
```

or

```
TSO %SSMC
```

In this case, your ISPF profile will be searched for the high-level qualifier.

Starting the SequeLink Manager When ISPF Libraries Are Not Allocated

Type the following command:

```
TSO EX 'SequeLink_HLQ.CLIST(SSMC)' ['HLQ(SequeLink_HLQ)']
```

where *SequeLink_HLQ* is the SequeLink high-level qualifier that identifies the libraries. The HLQ used will be the HLQ from which the SSMC CLIST is fetched. You are only required to type the SequeLink high-level qualifier the first time you start the SequeLink Manager for OS/390.

For example:

```
TSO EX 'DDTEK.SL54.CLIST(SSMC)' 'HLQ(DDTEK.SL54)'
```

or

```
TSO EX 'DDTEK.SL54.CLIST(SSMC)'
```

NOTE: In the first example, the HLQ specified to locate the SSMC CLIST might be different from the HLQ argument passed. This is especially important when administering two different versions of SequeLink. We recommend that you always specify the HLQ argument explicitly when you need to administer two versions of SequeLink.

Working with the SequeLink Manager for OS/390

When you start the SequeLink Manager for OS/390, a copyright appears. Press ENTER to continue. The SequeLink Manager for OS/390 main menu appears.

```
DataDirect SequeLink Manager for OS/390 - Main menu

Command ===>

Choose a dialog to start and press Enter:

    0.  Settings
    1.  Sequelink Server management dialog
```

Generally, the SequeLink Manager for OS/390 ISPF panels list items in your SequeLink configuration, allow you to select actions that affect these items, or allow you to view or change attributes.

For example, from the SequeLink Manager for OS/390 main menu, you can perform the following tasks:

- Type 0 to change the default dialog settings, such as changing the high-level qualifier for the SequeLink ISPF data sets. See [“Changing the Default Dialog Settings” on page 126](#) for instructions on changing the default dialog settings.
- Type 1 to configure and manage SequeLink services locally on the OS/390 machine. The ServerList panel appears listing all SequeLink Servers defined in the 'HLQ.TABLES(SSMCSV)' ISPF table. See [Chapter 8 “Configuring SequeLink Services Using the SequeLink Manager for OS/390” on page 135](#) for instructions on configuring SequeLink services on OS/390.

Using the Function Keys

When working with the SequeLink Manager for OS/390, you can use the function keys listed in [Table 7-2](#).

Table 7-2. SequeLink Manager for OS/390 Function Keys

Key	Description
F1	Panel/field help
F2	Split
F3	End with save of changes
F5	Display errors
F7	Scroll up
F8	Scroll down
F9	Swap
F10	Scroll left
F11	Scroll right
F12	Cancel without save of changes or clear validation messages

NOTE: You can use the standard ISPF command FKA ON to switch on the display of the function key labels at the bottom of each panel.

Changing the Default Dialog Settings

- 1 From the SequeLink Manager for OS/390 main menu, type 0; then, press ENTER. The Settings panel allows you to change the high-level qualifier used by the dialog to locate the SequeLink ISPF data sets.

```
Menu List Mode Functions Utilities Help
      DataDirect SequeLink Manager for OS/390 - Settings

Change the default dialog settings:

Sequelink High-Level Qualifier   SQLNK.SL54

If you change any of the default settings, you must restart
this application to activate them.

Command ===>
```

- 2 To change the high-level qualifier for the SequeLink data sets, press the TAB key to navigate to the SequeLink High Level Qualifier field and type the new high-level qualifier. This change will only be meaningful if your ISPF datasets are allocated to your TSO session.
- 3 Press ENTER to validate the changes that were made.

NOTE: You must restart the SequeLink Manager.

Using the Server Management Tree

When you select a SequeLink Server, the server management tree appears.

```

DataDirect SequeLink Manager for OS/390

Command ===>                                Scroll > CSR

Management Tree for server ACCT1
To see a list of valid actions on a node, type '?' beside it.
Use '/' to expand or collapse tree branches.
Valid commands are: EXP SAVE REFRESH ERRSTK
-----
- ACCT1 (offline)
  - Global Settings
  - DB2 Interface
    - DSN7
  - UID Maps
  - Sequelink Service
    + MVSDB27

```

You can use the server management tree to view or change entities defined within the SequeLink Server, such as:

- Global settings
- DB2 interface
- User ID (UID) maps
- A SequeLink service and its configuration settings

Press the TAB key to navigate to the tree nodes on the server management tree.

To perform an action on a tree node, type the action code at the tree node. To find which actions each node accepts, type ? beside the node you want information about and press ENTER. For example, when you type ? beside a SequeLink service, a message appears telling you that the node will accept D (Delete), S (Select), / (Expand or Contract), + (Expand), and - (Contract).

Using the Command prompt, you can also type the following commands that affect the server management tree:

- `EXP` or `EXPAND` expands the tree so that all nodes become visible.
- `SAVE` saves the current configuration to disk.
- `REFRESH` rebuilds the tree (if the server is online, the monitor data is refreshed also).
- `ERRSTK` displays the error stack.

Using the SequeLink Manager for OS/390 Operator Interface

Some Operator Interface commands can be useful in performing administration tasks. These commands can be issued using the Operator Interface of the SequeLink Manager for OS/390. See [Appendix D “Operator Interface Commands for OS/390” on page 395](#) for a list of available Operator Interface commands.

Operator Interface Requirements

This section lists the configuration requirements that must be met before using the Operator Interface:

RACF requirements:

- The TSOAUTH and OPERCMDS RACF classes must be activated. Use the command:

```
SETROPTS CLASSACT(TSOAUTH OPERCMDS)
```

- The OPERCMDS class must be included in the RACLIST. Use the command:

```
SETROPTS RACLIST(OPERCMDS)
```

- The CONSOLE resource must be defined in the TSOAUTH class. Use the command:

```
RDEF TSOAUTH CONSOLE UACC(NONE)
```

- The OPERPARM segment of the RACF profile of each user of the Operator Interface must include either AUTH=SYS or AUTH=ALL. For example:

```
ALTUSER user-id OPERPARM(AUTH(ALL))
```

where *user-id* is the user ID of the user of the Operator Interface.

- Each user of the Operator Interface must have the following permissions granted:

- Permission to use the TSO console command. Use the command:

```
PERMIT CONSOLE CL(TSOAUTH) ID(user-id) ACCESS(READ)
```

where *user-id* is the user ID of the user for who you are granting permissions.

- Permission to issue operator commands from an MCS-console. Use the command:

```
RDEF OPERCMDS MVS.MCSOPER.user-id UACC(NONE)
PERMIT MVS.MCSOPER.user-id CL(OPERCMDS) ID(user-id)
ACCESS(UPDATE)
```

where *user-id* is the user ID of the user for whom you are granting permissions.

NOTE: Update is required because the Operator Interface issues MODIFY commands.

- Refresh the RACLIST. Use the command:

```
SETROPTS RACLIST(OPERCMDS) REFRESH
```

Other requirements:

Make sure that the TSO commands CONSOLE and CONSPROF run as APF-authorized commands. For more information, refer to the information about the IKJTSOxx parmlib member in your IBM documentation.

Starting the Operator Interface

You can start the Operator Interface from the ServerList panel. To start the Operator Interface, type 0 beside the SequeLink Server you want to perform operator commands with; then press ENTER. The SequeLink Operator Console panel appears, allowing you to type operator commands at the Operator command ===> prompt.

```

Sequelink Operator Console for ACCT1                                Row 1 to 1 of 1
                                                                    Scroll > PAGE

Enter a command to execute

Operator command ===>

Command output:
-----
Enter a command or press 'F3' to exit...
***** Bottom of data *****

```

Generating JCL

After you create and configure a SequeLink Server for the first time, you must generate JCL to complete the configuration task. The SequeLink Manager customizes JCL obtained from the *SequeLink_HLQ.SKELS* data set and saves the customized output in a server-specific data set named *SequeLink_HLQ.Servename.CNTL*, where *SequeLink_HLQ* is the high-level qualifier identifying the data set.

Generating JCL allows you to easily keep the JCL members synchronized with the actual server configuration.

The following list shows the JCL members that are generated and the tasks they perform. Also, this list notes any tasks you must perform for the JCL member.

- **BIND:** This member binds all required SequeLink packages and plans. The tailored job contains a job-step for the defined DB2 interface and bind statements for all data sources that use this interface.

NOTE: If data sources are added later, an Interface is changed, or the collection-prefixes of a data source are changed, you must regenerate and submit this member.

- **CFGPRINT:** A summary member you can use for debugging purposes that reports the content of all variables at the time of JCL generation. This member also lists the user and date and time of the last JCL generation.
- **EVLDEF:** This member creates the event trace file for the server.

- **INIT:** This member contains operator interface commands that will be executed after the successful startup of the server.

NOTE: To add or delete operator interface commands you want to execute after the successful startup of the server, edit this member.

- **RUNSMF:** A sample job that allows SMF records to be printed.
- **RUNSRVR:** This member is the started task or job that is used to start the server.

NOTE: If the DB2 interface is changed, you must regenerate this member, and restart the server.

- **RUNWHAT:** This member is a diagnostic job that prints all versions of the software components and can be used for debugging. Execute this job only on a specific request from DataDirect Technologies technical support.

To generate JCL:

- 1 Type **G** beside the SequeLink Server on the ServerList panel; then, press **ENTER**. The JCL Settings panel appears.

```

DataDirect SequeLink Manager for OS/390 - ServerList                               Row 1 to 3 of 3
-----
DataDirect SequeLink Manager for OS/390 - JCL Settings

Change the default settings used for JCL generation:

Job prefix . . . . . userid
Job Class . . . . . A
Output Class . . . . . X
Accounting Info . . (acct)
Generate server as: 1
    1. Started Task (recommended)
    2. Normal Job

Press Enter to continue, F12 to cancel dialog.

Command ==>

```

- 2** If you want to change the default settings used for JCL generation, provide the following information:

Job profile: Type the name of the site-specific job name.

Job Class: Type the name of the site-specific job class.

Output Class: Type the name of the site-specific output class.

Accounting Info: Type your site-specific jobcard account information.

- 3** Choose whether to generate the JCL for the server as a started task (highly recommended) or as a normal job:
 - Type 1 to generate the JCL for the server as a started task; then, press ENTER.
 - Type 2 to generate the JCL for the server as a normal job; then, press ENTER.

8 Configuring SequeLink Services Using the SequeLink Manager for OS/390

z/OS This chapter describes the tasks you may need to perform to configure and manage SequeLink services and server data sources locally from an OS/390 machine.

NOTES:

- The server does not have to be offline to change its configuration; however, remember that some configuration changes do not take effect until you restart the server. Also, regeneration of the JCL may be necessary, depending on the changes that are made. See [“SequeLink Service Attributes” on page 32](#) for a description of how attributes are used.
- To delete a service, the server must be offline.

Configuring SequeLink Servers

This section describes how to create and manage SequeLink Servers locally on OS/390.

To do this...	See...
Create a SequeLink Server	"Creating a SequeLink Server" on page 136
Delete a SequeLink Server	"Deleting a SequeLink Server" on page 140
Add a UID map	"Adding a UID Map (Optional)" on page 141

Creating a SequeLink Server

On OS/390, a SequeLink Server is a started task/job name that corresponds to a single data access service. You can define multiple SequeLink Servers on the same OS/390 machine. Each SequeLink Server has SequeLink Agent functionality that is included in the data access service. When you add a SequeLink Server, you are prompted to add a DB2 interface and a service.

To create a SequeLink Server:

- 1 From the ServerList panel, type A at the Command prompt to create a SequeLink Server; then press ENTER. The Add Server panel appears.

```

DataDirect SequeLink Manager for OS/390 - Add server

Complete the following fields for the new server:

Server name . . . . .
Description

Hostname/IP-address      10.25.129.07

Portnumber . . . .

Command ===>

```

- 2 Provide the following information, then press ENTER:

Server name: Type the name of the new SequeLink Server definition. The server name you choose will be the job name or started task name.

Description: Type a description for the new SequeLink Server definition.

Hostname/IP-address: Type the TCP/IP host name or the TCP/IP address of the SequeLink Server definition. The HOME address of the local TCP/IP stack or the standard 127.0.0.1 TCP/IP loopback address will be inserted. In some instances, such as when the TSO session for the SequeLink Manager is running on another IP stack than the server, you must specify the TCP/IP address of the server machine.

Portnumber: Type the port to be used by the SequeLink service.

NOTE: When you create a server, a server-specific configuration file is created. If such a file already exists, you are prompted to confirm whether you want to overwrite the existing configuration file.

3 You are prompted to supply parameters to the DB2 interface.

```

                                DataDirect SequeLink Manager for OS/390
-----
                                DataDirect SequeLink Manager for OS/390 - Add DB2 Interface

Enter the parameters for the new interface from server ACCT1 to DB2:

Interface ID . . .                DB2 Subsystem ID
DB2 Version . . .                (eg.:V710)

Description

DB2 Loadlib
DB2 Exitlib

Command ===>
```

4 Provide the following information; then, press ENTER.

Interface ID: Type a Logical ID identifying the DB2 interface for the SequeLink Server, for example, DSN7.

DB2 Subsystem Id: Type the SubsystemId of the DB2 subsystem you want to access, for example, DB7R.

DB2 Version: Type the version of DB2 to be used.

Description: Type a description of the DB2 interface.

DB2 Loadlib: Type the name of the DB2 load library.

DB2 Exitlib: Type the name of the DB2 exit library.

5 You are prompted to supply parameters to define the service.

```

DataDirect SequeLink Manager for OS/390 - Add service
Command ==>

Complete the following fields for the new service for server ACCT1:
Service name . . . . \
Description
Portnumber . . . . 3456

```

6 Provide the following information; then, press ENTER.

Service name: Type the service name.

Description: Type a description of the service.

Portnumber: The port number entered in the Server Definition panel is displayed here.

7 The ServerList panel shows the SequeLink Server you just created.

```

DataDirect SequeLink Manager for OS/390 - ServerList          Row 1 to 2 of 2
Allowed actions or commands are:
o (S)elect a server      o (D)eleate a server
o (A)dd a server         o (O)perator interface
                        o (G)enerate JCL

Name      Description
-----
ACCT1     Accounting
SALES1    Sales Department
***** Bottom of data *****
Command ==>                                          Scroll > PAGE

```

Once you have created a SequeLink Server, type **s** beside it to view the server management tree. The server management tree shows the DB2 interface, UID maps, and the SequeLink service and its configuration settings.

See [“Using the Server Management Tree” on page 127](#) for more information about using the server management tree.

Deleting a SequeLink Server

- 1 From the ServerList panel, type D beside the SequeLink Server you want to delete; then, press ENTER. The Delete Server panel appears, prompting you to confirm the deletion.

```

DataDirect SequeLink Manager for OS/390 - Delete server

You are about to delete the following server from the list of known
servers.

Server name . . . . . : ACCT1
Description
DB2 V7 SERVICE USING IBM TCP/IP
Hostname/IP-address
10.25.129.07
Portnumber . . .      : 8042
JCL output library . . : DDTEK.SL54.ACCT1.CNTL
Sequelink config. file : DDTEK.SL54.ACCT1.SWANDM.INI

Are you sure this is what you want to do ?
2  1. Yes, go ahead.
    2. No, don't delete.

Also delete any data sets used by the server ?
2  1. Yes, delete the data sets.
Command ==>
```

- 2 Confirm or cancel the deletion:
 - Type 1 to confirm the deletion; then, press ENTER.
 - Type 2 to cancel the deletion; then, press ENTER.
- The SequeLink Server is deleted, and you are returned to the list of servers.

Adding a UID Map (Optional)

UID mapping is the optional mapping of user IDs to alternate user IDs using a UID map. You can use UID mapping to prevent users from updating DB2 tables using commonly available tools, such as QMF or SPUFI, while preserving their ability to update DB2 tables using SequeLink. UID mapping is required when `ServiceAuthMethods=Anonymous` and `MVSServiceSecurity=SAFNONE`. See [“Using UID Mapping” on page 307](#) for more information about using UID maps.

To add a UID map:

- 1 From the server management tree, type **A** beside the UID Maps node to add a UID map to the SequeLink Server; then, press ENTER. The Add UID Map panel appears.

DataDirect SequeLink Manager for OS/390 - Add UID Map

Complete the following fields for the new mapping table:

UID Map Name

Default access (PERMIT / DENY)

Description

Command ==>

- 2 Provide the following information; then, press ENTER.

UID Map Name: Type the name of the UID map to add to the SequeLink Server.

Default access: Choose one of the following options for the default behavior of the UID map you are adding by typing:

- **PERMIT.** If the user ID cannot be found in the UID map, the connection request is accepted. The userid is passed to DB2 as the primary authid.

- DENY. If the user ID cannot be found in the UID map, the connection request is refused.

Description: Type a description of the UID map.

- 3 If the UID map was added successfully, a message appears to confirm it.
- 4 To add mapping entries to the UID map, type `s` beside the UID map; then, press ENTER. The AttributeList panel appears.

```
DataDirect SequeLink Manager for OS/390 - AttributeList
                                                    Row 1 to 2 of 2
                                                    MORE >>>

UID Map UIDACCT
Enter the 'ADD'-command to add an attribute or
perform one of the actions below on a specific attribute
o (S)elect    o (C)hange    o (D)elele    o (?)Help

Name                                     Value
-----
MVSUIDDefaultAccess                     PERMIT
MVSUIDMapDescription                     UID map for ACCT1
***** Bottom of data *****

COMMAND ===>                                     SCROLL > PAGE
```

- 5 Type `Add` at the command prompt; then, press ENTER. A panel appears allowing you to specify a UID mapping entry for the MVSUID attribute.

```
DataDirect SequeLink Manager for OS/390
Attribute Value

Press F1 for help, F3 to leave.

MVSUID
===>
```


- 6 Specify a value for the MVSUID attribute using the format *user=mapped_user* or **=mapped_user* where:
 - *user* is a valid user or user group for the OS/390 security system.
 - *** represents any user. This value is required when *ServiceAuthMethods=Anonymous* and *MVSServiceSecurity=SAFNONE*.
 - *mapped_user* is a valid DB2 authorization ID.Then, press ENTER.
- 7 You are returned to the AttributeList panel. Add another MVSUID entry or press F3 to return to the server management tree.
- 8 To configure a SequeLink service to use the UID map, set the *MVSServiceUIDMap* service attribute.

NOTE: You must restart the SequeLink Server before this change will take effect.

See [“Using UID Mapping” on page 307](#) for more information about using UID maps.

Configuring SequeLink Services

This section describes how to create and manage SequeLink services locally on OS/390.

To do this...	See...
Create a SequeLink service	"Creating a SequeLink Service" on page 144
Delete a SequeLink service	"Deleting a SequeLink Service" on page 145
View service attributes	"Viewing SequeLink Service Attributes" on page 146
Change a service attribute	"Changing a SequeLink Service Attribute" on page 148
Add a service attribute	"Adding a SequeLink Service Attribute" on page 150
Delete a service attribute	"Deleting a SequeLink Service Attribute" on page 152
Configure monitoring	"Configuring Monitoring" on page 153
Configure event tracing	"Configuring Event Tracing" on page 158

Creating a SequeLink Service

NOTE: You can create only one service for any SequeLink Server. Usually, you will be prompted to create a service while you are creating a SequeLink Server. You can also create or recreate a service *after* you delete an existing service.

To create a SequeLink service:

- 1 Type A beside the SequeLink Services node to add a service to the SequeLink Server; then, press ENTER.
- 2 The Add service panel or Add DB2 Interface panel appears. Complete the panel as described in [“Creating a SequeLink Server” on page 136](#).

See [“Changing a SequeLink Service Attribute” on page 148](#) for instructions on changing SequeLink service attributes.

NOTE: You must restart the SequeLink Server before this change will take effect.

Deleting a SequeLink Service

- 1 From the server management tree, type D beside the SequeLink service you want to delete; then, press ENTER. The Delete Service panel appears, prompting you to confirm the deletion of the SequeLink service.

```

Attribute Value - Read Only
DataDirect SequeLink Manager for OS/390 - Delete service
Command ==>

You are about to delete the following service from server ACCT1:::

Service name . . . : MVSDB27
Description
ACCT DB2
Portnumber . . . . : 8042

Are you sure this is what you want to do ?
2 1. Yes, go ahead.
   2. No, don't delete.
```

2 Confirm or cancel the deletion:

- Type 1 to confirm the deletion; then, press ENTER
- Type 2 to cancel the deletion; then, press ENTER.

The SequeLink service is deleted, and you are returned to the server management tree.

NOTE: Create a new service before restarting the SequeLink Server.

Viewing SequeLink Service Attributes

- 1** From the server management tree, type / beside the Service Settings node of the SequeLink service to expand it. The server management tree shows the attribute categories for the service.
- 2** Type s beside the attribute category for which you want to view attributes; then, press ENTER. The AttributeList panel appears for that category, listing all the attributes and their values.

For example, if you select the Logging category, the following AttributeList panel appears:

```

DataDirect SequeLink Manager for OS/390
DataDirect SequeLink Manager for OS/390 - AttributeList
Row 1 to 2 of 2
MORE >>>

Service ACCT1
Enter the 'ADD'-command to add an attribute or
perform one of the actions below on a specific attribute

o (S)elect      o (C)hange      o (D)elele      o (?)Help
  Name                      Value
-----
ServiceDebugLogLevel          1
ServiceDebugLogPath           /tmp
***** Bottom of data *****

COMMAND ==>                                SCROLL > PAGE

```

For information about:

- Changing the value of an attribute, see [“Changing a SequeLink Service Attribute” on page 148](#).
- Adding attributes, see [“Adding a SequeLink Service Attribute” on page 150](#).
- Deleting an attribute, see [“Deleting a SequeLink Service Attribute” on page 152](#).

NOTE: To display help about an attribute, type ? beside the attribute; then, press ENTER.

Changing a SequeLink Service Attribute

- 1 From the server management tree, type / beside the Service Settings node of a SequeLink service to expand it. The server management tree shows the attribute categories for the service.
- 2 Type s beside an attribute category to select it; then, press ENTER. The AttributeList panel appears for that category, listing all the attributes and their values.

For example, if you select the Logging attribute category, the following AttributeList panel appears:

```
DataDirect SequeLink Manager for OS/390 - AttributeList
Row 1 to 3 of 3
Dialog canceled.                                MORE >>>

Service MVSDB2
Enter the 'ADD'-command to add an attribute or
perform one of the actions below on a specific attribute
o (S)elect    o (C)hange    o (D)elele    o (?)Help

Name                                     Value
-----
ServiceDebugLogLevel                     1
ServiceDebugLogPath                      /tmp
ServiceEventTraceSize                    1000000
***** Bottom of data *****

COMMAND ===>                                SCROLL > PAGE
```

NOTE: To display help about an attribute, type ? beside the attribute; then, press ENTER.

- 3 Type c beside the attribute you want to change; then, press ENTER. The Attribute Display panel appears with the cursor positioned at the value field of the attribute.

For example, to change the value of the `ServiceDebugLogLevel` attribute to 4 (Debug), the following Attribute Display panel appears:

```

DataDirect SequeLink Manager for OS/390
Direct SequeLink Manager for OS/390
Row 1 to 7 of 7

ServiceDebugLogLevel
Bitmask currently in effect:

Use (S) or (/) to select bits to set.

Bit description
-----
/ Fatal
Errors
Warnings
Informational
Debug
SSP Packet Log
SSP Requests
COMMAND ==>          SCROLL > PAGE

```

- 4 Type the new value of the attribute; then, press ENTER. You are returned to the `AttributeList` panel, and the attribute value, if valid, is changed.
- 5 Press F3 to return to the server management tree.

Adding a SequeLink Service Attribute

- 1 From the server management tree, type / beside the Service Settings node of the SequeLink service to expand it. The server management tree shows the attribute categories for the service.
- 2 Type s beside the attribute category to select it; then, press ENTER. The AttributeList panel appears for that category, listing all the attributes and their values.

For example, if you select the Logging category, the following AttributeList panel appears:

```
DataDirect SequeLink Manager for OS/390 - AttributeList
Row 1 to 3 of 3
Dialog canceled.                                MORE >>>

Service MVSDB2
Enter the 'ADD'-command to add an attribute or
perform one of the actions below on a specific attribute
o (S)elect    o (C)hange    o (D)elele    o (?)Help

Name                                     Value
-----
ServiceDebugLogLevel                     1
ServiceDebugLogPath                      /tmp
ServiceEventTraceSize                    1000000
***** Bottom of data *****

COMMAND ===>                                SCROLL > PAGE
```

- 3 Type Add at the command prompt to add an attribute; then, press ENTER. A panel appears listing the attributes you are allowed for that category.

For example, to add an attribute to the Logging category, the following panel appears:

```

DataDirect SequeLink Manager for OS/390
                                Row 1 to 2 of 2

This is a list of attributes,
you are allowed to add:
Use (S) or (/) to select an attribute.
Use (?) for help on an attribute.

Attribute
-----
ServiceEventTraceSize
***** Bottom of data *****

COMMAND ===>                                SCROLL > PAGE

```

NOTE: To display help about an attribute, type ? beside the attribute; then, press ENTER.

- 4 Type **S** beside the attribute you want to add; then, press ENTER. The Attribute Display panel appears with the cursor positioned at the value field of the attribute.

NOTE: When you add an attribute, the Value field will display the default value, if a default exists for the attribute. To accept the default, press ENTER.

For example, to add the ServiceEventTraceSize attribute, the following Attribute Value panel appears:

```

Attribute Value

Press F1 for help, F3 to leave.

ServiceEventTraceSize
      ===> 0      ( 10000 - 20000000000)

```

- 5 Type a value for the attribute or use the default if one is available; then, press ENTER.
- 6 You are returned to the AttributeList panel. Press F3 to return to the server management tree.

Deleting a SequeLink Service Attribute

- 1 From the server management tree, type / beside the Service Settings node of the SequeLink service to expand it. The server management tree shows the attribute categories for the service.
- 2 Type s beside the attribute category to select it; then, press ENTER. The AttributeList panel appears for that category, listing all the attributes and their values.

For example, if you select the Logging category, the following AttributeList panel appears:

```
DataDirect SequeLink Manager for OS/390 - AttributeList
Row 1 to 3 of 3
Dialog canceled.                                MORE >>>

Service MVSDB2
Enter the 'ADD'-command to add an attribute or
perform one of the actions below on a specific attribute
o (S)elect    o (C)hange    o (D)elele    o (?)Help

Name                                     Value
-----
ServiceDebugLogLevel                     1
ServiceDebugLogPath                      /tmp
ServiceEventTraceSize                    1000000
***** Bottom of data *****

COMMAND ==>                                SCROLL > PAGE
```

- 3 Type D beside the attribute you want to delete; then, press ENTER. The attribute is deleted.

Configuring Monitoring

SequeLink provides the following levels of monitoring for SequeLink data access services, listed here from highest-level to lowest-level. Some of the monitoring levels are also supported for the SequeLink Agent service.

- **Service monitoring** monitors these activities by service:
 - Statistics of received packets and sent packets
 - Sessions started and statements opened
 - Active statements and sessions
 - Fetched rows and affected rows
 - Transactions
- **Session monitoring** monitors these activities by session within a service:
 - Statistics of received packets and sent packets
 - Statements opened and active statements
 - Fetched rows and affected rows
 - Transactions
 - Information about each session, such as start time, client information (network address, data source used by the client, and type of client), native database session identification, and database user
- **Statement monitoring** monitors these activities by statement within a session:
 - Fetched rows and affected rows
 - SQL statements issued

To enable monitoring at one of the listed levels, higher-level monitoring must be enabled. For example, you cannot monitor Session information unless Service monitoring is enabled. Similarly, you cannot monitor Statement information unless both Service monitoring and Session monitoring are enabled.

See [Chapter 5 “Managing Data Access Activity Using the SequeLink Manager Snap-in” on page 99](#) for information about

using the SequeLink Manager Snap-in to monitor SequeLink service activity.

To configure monitoring locally on the OS/390:

- 1** From the server management tree of the SequeLink Server, type / beside Configuration node of the SequeLink service for which you want to turn on monitoring; then, press ENTER.
- 2** Type / beside the Profiles node to expand it, if necessary; then, press ENTER.

The Profiles node lists all monitoring and event tracing profiles enabled for the SequeLink service. You can perform the following actions:

- To add a profile, see [“Creating a Monitoring Profile” on page 155](#).
- To change a profile, see [“Changing a Monitoring Profile” on page 157](#).
- To delete a profile, see [“Deleting a Monitoring Profile” on page 158](#).

Creating a Monitoring Profile

- 1 Type A beside the Profiles node to add a profile to the SequeLink service; then, press ENTER. The Add Profile panel appears prompting you to select the type of profile to add.

	Attribute	Value
		DataDirect SequeLink Manager for OS/390 - Add Profile
		Select type of profile to add:
1	1.	Monitor Profile.
	2.	Event Trace Profile.
		Press Enter to continue.
		Command ===>

- 2 Type 1 to add a monitoring profile; then, press ENTER. The Monitor Profile panel appears.

```
----- Attribute Value -----
DataDirect SequeLink Manager for OS/390 - Monitor Profile

These are the counters and events to be monitored:

/ Enable Service Monitoring:

    received packet size(avg)    statements opened    / active sessions
    sent packet size(avg)       active statements   affected rows
/ sessions started             fetched rows        transactions

/ Enable Session Monitoring:

    received packet size(avg)    active statements   transactions
    sent packet size(avg)       fetched rows        / info
    statements opened           affected rows

Enable Statement Monitoring:

    fetched rows (last)         affected rows (last)    sql
    fetched rows                affected rows

Command ==>
```

- 3 Type / beside an option to enable it or clear the / to disable an option. When you are satisfied with your settings, press F3. You are returned to the server management tree.
- 4 Restart the SequeLink Server to activate the profile you just created.

Changing a Monitoring Profile

- 1 From the server management tree, type **s** beside the profile you want to change; then, press **ENTER**. The Monitor Profile panel appears.

```
----- Attribute Value -----
DataDirect SequeLink Manager for OS/390 - Monitor Profile

These are the counters and events to be monitored:

/ Enable Service Monitoring:

    received packet size(avg)    statements opened    / active sessions
    sent packet size(avg)        active statements    affected rows
/ sessions started              fetched rows          transactions

/ Enable Session Monitoring:

    received packet size(avg)    active statements    transactions
    sent packet size(avg)        fetched rows          / info
    statements opened            affected rows

Enable Statement Monitoring:

    fetched rows (last)          affected rows (last)    sql
    fetched rows                  affected rows

Command ===>
```

- 2 Type **/** beside an option to enable it or clear the **/** to disable an option. When you are satisfied with your settings, press **ENTER**.
- 3 Restart the SequeLink Server to activate the monitoring profile you just changed.

Deleting a Monitoring Profile

- 1 From the server management tree, type **D** beside the profile you want to delete; then, press ENTER. The profile is deleted.
- 2 Restart the SequeLink Server.

Configuring Event Tracing

Events are generated when the client application accesses data and when specific server activities occur, such as when a service starts or an error occurs. Depending on which SequeLink profiles are active, the information generated by the event is displayed as it occurs in the runtime monitor and is stored persistent in the event trace file.

On OS/390, the event trace file must be created using the EVLDEF member from the server's CNTL library.

See [Chapter 5 "Managing Data Access Activity Using the SequeLink Manager Snap-in" on page 99](#) for information about using the SequeLink Manager Snap-in for event tracing.

To configure event tracing locally on the OS/390:

- 1 From the server management tree, type **/** beside Configuration node of the SequeLink service for which you want to turn on monitoring; then, press ENTER.
- 2 Type **/** beside the Profiles node to expand it, if necessary; then, press ENTER.

The Profiles node lists all monitoring and event tracing profiles enabled for the SequeLink service. You can perform the following actions:

- To add a profile, see [“Creating an Event Trace Profile” on page 159](#).
- To change a profile, see [“Changing an Event Trace Profile” on page 161](#).
- To delete a profile, see [“Deleting an Event Trace Profile” on page 162](#).

Creating an Event Trace Profile

- 1 From the server management tree, type **A** beside the Profiles node to add a profile to the SequeLink service; then, press ENTER. The Add Profile panel appears prompting you to select the type of profile you want to add.

```

Attribute Value

DataDirect SequeLink Manager for OS/390 - Add Profile

Select type of profile to add:

1  1. Monitor Profile.
   2. Event Trace Profile.

Press Enter to continue.

Command ===>
```

- 2 Type 2 to add an event tracing profile; then, press ENTER. The Event Trace Profile panel appears, listing the event tracing options available.

```

                                DataDirect SequeLink Manager for OS/390
                                Row 1 to 7 of 26
                                MORE >>>

Event Trace Profile for service ACCT1
Check which events you want to write to the Sequelink Event Trace.
Use (S) or (/) to select/unselect an event,
or use (F) to view or set an event filter.

Trace  Event
-----
___ False Event processing Starting
___ False Event processing Stopping
___ True  Cursor Closed
___ True  Cursor Opened
___ True  Debug Tracing
___ True  Error Internal
___ True  Error Occured

COMMAND ===>                                SCROLL > PAGE
```

- 3 Type / beside an option to enable it or clear the / to disable an option. When you are satisfied with your settings, press F3.

NOTE: Optionally, you can type F beside an event trace option to define a filter for the option. A panel appears allowing you to set the filter for that event trace option. Type the filter; then, press ENTER. See [“Filtering Events” on page 486](#) for more information about filtering and the syntax of filter statements.

You are returned to the server management tree.

- 4 Restart the SequeLink Server to activate the profile you just created.

Changing an Event Trace Profile

- 1 From the server management tree, type **s** beside the profile you want to change; then, press **ENTER**. The Event Trace Profile panel appears.

```

DataDirect SequeLink Manager for OS/390
Row 1 to 7 of 26
MORE >>>

Event Trace Profile for service ACCT1
Check which events you want to write to the Sequelink Event Trace.
Use (S) or (/) to select/unselect an event,
or use (F) to view or set an event filter.

Trace  Event
-----
___ False Event processing Starting
___ False Event processing Stopping
___ True  Cursor Closed
___ True  Cursor Opened
___ True  Debug Tracing
___ True  Error Internal
___ True  Error Occured

COMMAND ===>
SCROLL > PAGE

```

- 2 Type **/** beside an event trace option to enable it or disable it; then, press **ENTER**.

NOTE: Optionally, you can type **F** beside an event trace option to define a filter for the option. A panel appears allowing you to set the filter for that event trace option. Type the filter; then, press **ENTER**. See [“Filtering Events” on page 486](#) for more information about filtering and the syntax of filter statements.

You are returned to the server management tree.

- 3 Restart the SequeLink Server to activate the profile you just changed.

Deleting an Event Trace Profile

- 1 From the server management tree, type **D** beside the profile you want to delete; then, press **ENTER**. The profile is deleted.
- 2 Restart the SequeLink Server.

Configuring Server Data Sources

This section describes how to create and manage server data sources locally using the SequeLink Manager for OS/390.

To do this...	See...
Create a server data source	"Creating a Server Data Source" on page 163
Delete a server data source	"Deleting a Server Data Source" on page 165
View server data source attributes	"Viewing Server Data Source Attributes" on page 166
Add a server data source attribute	"Adding a Server Data Source Attribute" on page 168
Change a server data source attribute	"Changing a Server Data Source Attribute" on page 171
Delete a server data source attribute	"Deleting a Server Data Source Attribute" on page 173

Creating a Server Data Source

When you create a server data source, the attributes for the new server data source are copied from the default data source. Once you create a server data source, you can change any attributes of the new server data source. See [“Viewing Server Data Source Attributes” on page 166](#) for instructions on viewing server data source attributes.

To create a server data source:

- 1 Type / beside the Datasource Settings node of the SequeLink service to expand it; then, press ENTER. The expanded Datasource Settings node shows the default server data source, which is named Default, and any other server data sources defined for the SequeLink service.

```

DataDirect SequeLink Manager for OS/390

Management Tree for server ACCT1
  To see a list of valid actions on a node, type '?' beside it.
  Use '/' to expand or collapse tree branches.
  Valid commands are: EXP SAVE REFRESH ERRSTK
-----
  - Logging
  - Others
  - User Security
  - Datasource Settings
    + Default
  - Profiles
  - Monitoring
  - Event Tracing

Command ===>
Scroll > PAGE

```

- 2 Type A beside the Datasource Settings node; then, press ENTER. The Add Datasource panel appears:

DataDirect SequeLink Manager for OS/390

Attribute Value

DataDirect SequeLink Manager for OS/390 - Add datasource

Command ==>

Enter the parameters for the new datasource for service ACCT1 in server ACCT1:

Datasource name

Description

- 3 Provide the following information; then, press ENTER.
Datasource name: Type the name of the new server data source.
Description: Type a description for the server data source.
- 4 You are returned to the server management tree, and the panel reminds you to review the attribute settings for the server data source. See [“Viewing Server Data Source Attributes” on page 166](#) and [“Changing a Server Data Source Attribute” on page 171](#) for instructions on viewing and changing server data source attributes.

The server data source you created can be used immediately for incoming connections; you do not need to restart the SequeLink Server.

Deleting a Server Data Source

NOTE: You cannot delete the Default server data source.

- 1** Type / beside the Datasource Settings node of the SequeLink service to expand it; then, press ENTER. The expanded Datasource Settings node shows the default server data source, which is named Default, and any other server data sources defined for the SequeLink service.
- 2** To delete a server data source, type D beside the Datasource Settings node; then, press ENTER. The Delete Datasource panel appears prompting you to confirm the deletion.

```

                                DataDirect SequeLink Manager for OS/390
                                DataDirect SequeLink Manager for OS/390 - Delete datasource

You are about to delete the following datasource from service ACCT1 in
server ACCT1:::

Datasource name
ACCTNW
Description
Data source for accounting NW

Are you sure this is what you want to do ?
2  1. Yes, go ahead.
   2. No, don't delete.

Command ==>
```

3 Confirm or cancel the deletion:

- Type 1 to confirm the deletion; then, press ENTER.
- Type 2 to cancel the deletion; then, press ENTER.

The server data source is deleted, and you are returned to the server management tree.

Viewing Server Data Source Attributes

- 1 Type / beside the Datasource Settings node of the SequeLink service to expand it; then, press ENTER. The expanded Datasource Settings node shows the default server data source, which is named Default, and any other server data sources defined for the SequeLink service.
- 2 Type / beside the server data source you want to view attributes for; then, press ENTER. The server data source node expands to show the data source attribute categories.

```

                                DataDirect SequeLink Manager for OS/390

Management Tree for server ACCT1
  To see a list of valid actions on a node, type '?' beside it.
  Use '/' to expand or collapse tree branches.
  Valid commands are: EXP SAVE REFRESH ERRSTK
-----
    - Datasource Settings
      + Default
    - ACCTNW
      - Advanced
      - Application security
      - General
      - Others
      - User Security
      - WorkArounds
    - Profiles

Command ==>                                Scroll > PAGE

```


- 3 Type **s** beside any attribute category to view the attributes set for the server data source; then, press ENTER. The **AttributeList** panel appears, listing all the attributes and their values configured for the server data source.

For example, if you select the **Advanced** category, the following **AttributeList** panel appears:

```

DataDirect SequeLink Manager for OS/390 - AttributeList
                                                    Row 1 to 2 of 2
                                                    MORE >>>

DataSource ACCTNW
Enter the 'ADD'-command to add an attribute or
perform one of the actions below on a specific attribute
o (S)elect    o (C)hange    o (D)elele    o (?)Help

      Name                                     Value
-----
DataSourceCursorHold                         True
DataSourceTransactionIsolation               Committed
***** Bottom of data *****

COMMAND ==>                                     SCROLL > PAGE

```

Adding a Server Data Source Attribute

- 1 Type / beside the Datasource Settings node of the SequeLink service to expand it; then, press ENTER. The expanded Datasource Settings node shows the default server data source, which is named Default, and any other server data sources defined for the SequeLink service.
- 2 Type / beside the server data source you want to add an attribute for; then, press ENTER. The server data source node expands to show the data source attribute categories.

```

                                DataDirect SequeLink Manager for OS/390

Management Tree for server ACCT1
To see a list of valid actions on a node, type '?' beside it.
Use '/' to expand or collapse tree branches.
Valid commands are: EXP SAVE REFRESH ERRSTK
-----
- Datasource Settings
+ Default
- ACCTNW
  - Advanced
  - Application security
  - General
  - Others
  - User Security
  - WorkArounds
- Profiles

Command ==>                                Scroll > PAGE
```

- 3 Type s beside any attribute category to view the attributes set for the server data source; then, press ENTER. The AttributeList panel appears, listing all the attributes and their values configured for the server data source.

For example, if you select the Advanced category, the following AttributeList panel appears:

```

DataDirect SequeLink Manager for OS/390
DataDirect SequeLink Manager for OS/390 - AttributeList
Row 1 to 2 of 2
MORE >>>

DataSource ACCTNW
Enter the 'ADD'-command to add an attribute or
perform one of the actions below on a specific attribute
o (S)elect    o (C)hange    o (D)elele    o (?)Help

Name                                     Value
-----
DataSourceCursorHold                     True
DataSourceTransactionIsolation            Committed
***** Bottom of data *****

COMMAND ==>                                     SCROLL > PAGE

```

- 4 Type **Add** at the command prompt to add an attribute. A list of attributes you can add for this attribute category appear.

For example, if you wanted to add an attribute from the **Advanced** category, the following panel appears.

```

                                DataDirect SequeLink Manager for OS/390
                                DataDirect SequeLink Manager for OS/390
                                Row 1 to 4 of 4

This is a list of attributes,
you are allowed to add:

Use (S) or (/) to select an attribute,
Use (?) for help on an attribute.
Attribute
-----
DataSourceArrayFetchMaxBytes
DataSourceDisableWarnings
DataSourceSchemaFilterList
DataSourceTableTypeFilterList
***** Bottom of data *****

COMMAND ==>                                SCROLL > PAGE
```

NOTE: To display help about an attribute, type **?** beside the attribute; then, press **ENTER**.

- 5 Type **s** beside the attribute you want to add; then, press **ENTER**. The **Attribute Value** panel appears with the cursor positioned on the **Value** field.

For example, to add the **DataSourceSchemaFilterList** attribute to the server data source, the following panel appears.

```

                                Attribute Value
                                Press F1 for help, F3 to leave.

                                DataSourceSchemaFilterList

                                ==>
```

- 6 Type a value for the attribute or use the default if one is available; then, press ENTER.
- 7 You are returned to the AttributeList panel. Press F3 to return to the server management tree.

Changing a Server Data Source Attribute

- 1 Type / beside the Datasource Settings node of the SequeLink service to expand it; then, press ENTER. The expanded Datasource Settings node shows the default server data source, which is named Default, and any other server data sources defined for the SequeLink service.
- 2 Type / beside the server data source to view its attributes; then, press ENTER. The server data source node expands to show the data source attribute categories.

```

DataDirect SequeLink Manager for OS/390

Management Tree for server ACCT1
To see a list of valid actions on a node, type '?' beside it.
Use '/' to expand or collapse tree branches.
Valid commands are: EXP SAVE REFRESH ERRSTK
-----
- User Security
- Datasource Settings
+ Default
- ACCTNW
  - Advanced
  - Application security
  - General
  - Others
  - User Security
  - WorkArounds
- Profiles

Command ==>                                Scroll > PAGE

```

- 3 Type **s** beside any attribute category to view the attributes set for the data source; then, press **ENTER**. The **AttributeList** panel appears, listing all the attributes and their values configured for the server data source.

For example, if you select the **Advanced** category, the following **AttributeList** panel appears:

```

                                DataDirect SequeLink Manager for OS/390
                                DataDirect SequeLink Manager for OS/390 - AttributeList
                                Row 1 to 2 of 2
                                MORE >>>

DataSource ACCTNW
Enter the 'ADD'-command to add an attribute or
perform one of the actions below on a specific attribute
o (S)elect    o (C)hange    o (D)elete    o (?)Help

      Name                                     Value
      -----
      DataSourceCursorHold                     True
      DataSourceTransactionIsolation           Committed
***** Bottom of data *****

COMMAND ==>                                     SCROLL > PAGE
```

- 4 Type **c** beside the attribute you want to change; then, press **ENTER**. The **Attribute Display** panel appears with the cursor positioned at the value field of the attribute.

For example, to change the value of the **DataSourceCursorHold** attribute to **FALSE**, the following panel appears:

```

                                DataDirect SequeLink Manager for OS/390
                                Attribute Display - Read Only

                                Press F1 for help, F3 to leave.

                                DataSourceCursorHold
                                ==> True
```

- 5 Type the new value of the attribute; then, press ENTER. You are returned to the AttributeList panel, and the attribute value, if valid, is changed.
- 6 Press F3 to return to the server management tree.

Deleting a Server Data Source Attribute

- 1 Type / beside the Datasource Settings node of the SequeLink service to expand it; then, press ENTER. The expanded Datasource Settings node shows the default server data source, named Default, and any other server data sources defined for the SequeLink service.
- 2 Type / beside the server data source to view its attributes; then, press ENTER. The server data source node expands to show the data source attribute categories.

```

DataDirect SequeLink Manager for OS/390

Management Tree for server ACCT1
To see a list of valid actions on a node, type '?' beside it.
Use '/' to expand or collapse tree branches.
Valid commands are: EXP SAVE REFRESH ERRSTK
-----
    - User Security
    - Datasource Settings
      + Default
    - ACCTNW
      - Advanced
      - Application security
      - General
      - Others
      - User Security
      - WorkArrounds
    - Profiles

Command ==>
Scroll > PAGE

```

- 3 Type **S** beside any attribute category to view the attributes set for the data source; then, press **ENTER**. The **AttributeList** panel appears, listing all the attributes and their values configured for the server data source.

For example, if you select the **Advanced** category, the following **AttributeList** panel appears.

```
DataDirect SequeLink Manager for OS/390
DataDirect SequeLink Manager for OS/390 - AttributeList
Row 1 to 2 of 2
MORE >>>

DataSource ACCTNW
Enter the 'ADD'-command to add an attribute or
perform one of the actions below on a specific attribute
o (S)elect    o (C)hange    o (D)elete    o (?)Help

Name                                     Value
-----
DataSourceCursorHold                     True
DataSourceTransactionIsolation            Committed
***** Bottom of data *****

COMMAND ==>                                SCROLL > PAGE
```

- 4 Type **D** beside the attribute you want to delete; then, press **ENTER**. The attribute is deleted. You are returned to the server management tree.

Managing Data Access Activity Using the SequeLink Manager for OS/390

z/OS This section describes the tasks you may need to perform to manage data access activities locally from an OS/390 machine.

Managing Active Sessions Using the Server Management Tree

Before you can view active sessions, monitoring must be active on the SequeLink Server. The level of detail that is displayed depends on how monitoring is configured. See [“Configuring Monitoring” on page 153](#) for more information. See [“Using the Server Management Tree” on page 127](#) for more information about using a server management tree.

See [“Viewing Active Sessions” on page 175](#) to view the sessions that are currently active on a SequeLink Server.

See [“Killing a Session” on page 178](#) to kill an active session from the server management tree.

Viewing Active Sessions

- 1 From the ServerList panel, type **s** beside the SequeLink Server you want to monitor.
- 2 You are prompted for a user ID and password. Supply the required information; then, press ENTER.

NOTE: If you are not prompted for a user ID and password, the SequeLink Server is not active.

3 The server management tree of the active server is displayed.

```
DataDirect SequeLink Manager for OS/390

Command ==>                                     Scroll > CSR

Management Tree for server ACCT1
To see a list of valid actions on a node, type '?' beside it.
Use '/' to expand or collapse tree branches.
Valid commands are: EXP SAVE REFRESH ERRSTK
-----
- MFICTST (connected)
  - Global Settings
  - DB2 Interface
    - DSN7
  - UID Maps
  - SequeLink Service
    - MVSDB26 (active)
```

4 Type / beside the Active Service node to expand it. If session level monitoring is enabled, the Active Sessions node is displayed.

- 5** Type `/` beside the Active Sessions node to expand it and provide a list of active sessions.

```

DataDirect SequeLink Manager for OS/390

Command ==>
Management Tree for server ACCT1

To see a list of valid actions on a node, type '?' beside it.
Use '/' to expand or collapse tree branches.
Valid commands are: EXP SAVE REFRESH ERRST K
-----
- MFICTST (connected)
  - Global Settings
  -DB2 Interface
    - DSN7
  -UID Maps
    - PERMIT
  -SequeLink Service
    -MVSDB27 (active)
      + Configuration
    - Monitor
      - Active Sessions
        + Session 1 (10.25.129.07)
        + Session 2 (10.131.40.59)
          -Active Statements
            -Statement 3
        + Session 4 (10.131.40.59)

```

- 6** Type `s` beside a session to obtain more details about the current session.
- 7** If statement level monitoring is enabled, each session node can be expanded to view details about each statement.
- 8** To get an updated view of the active sessions, type `REFRESH` at the command prompt; then, press `ENTER`.

Killing a Session

NOTE: To kill a session using the server management tree, monitoring must be activated for that SequeLink Server.

To kill a session:

- 1 From the ServerList panel, type **S** beside the SequeLink Server you want to monitor.
- 2 You are prompted for a user ID and password. Supply the required information; then, press ENTER.

NOTE: If you are not prompted for a user ID and password, the SequeLink Server is not active.

- 3 The server management tree of the active server is displayed.
- 4 Type **K** beside the session you want to kill.

```
DataDirect SequeLink Manager for OS/390

Command ==>

Management Tree for server ACCT1

To see a list of valid actions on a node, type '?' beside it.
Use '/' to expand or collapse tree branches.
Valid commands are: EXP SAVE REFRESH ERRST K
-----
- MFICTST (connected)
  - Global Settings
  -DB2 Interface
    - DSN7
  -UID Maps
    - PERMIT
  -SequeLink Service
    -MVSD27 (active)
      + Configuration
    - Monitor
      -Active Sessions
        K Session 2 (10.131.40.59)
        + Session 4 (10.131.40.59)
```

- 5 A confirmation message appears. Type **1** to confirm.

Managing Active Sessions Using the Operator Interface

This section describes how to manage active sessions on OS/390 using the Operator Interface. See [“Using the SequeLink Manager for OS/390 Operator Interface” on page 129](#) for more information on using the Operator Interface.

Listing Active Sessions

- 1 From the ServerList panel, type 0 beside the SequeLink Server for which you want to list the active sessions.
- 2 Type `THPL LIST` in the Operator command prompt; then, press ENTER.

Killing a Session

- 1 From the ServerList panel, type 0 beside the SequeLink Server for which you want to kill a session.
- 2 Type `THPL KILL ID=sessionid` the command prompt, where *sessionid* is the ID of the session you want to kill; then, press ENTER. See the output of THPL LIST command.

Viewing Event Tracing Information

Event tracing must be active before events can be logged. The type of events generated depends on the events selected in the Event Trace Profile. See [“Configuring Event Tracing” on page 158](#) for more information.

To view event tracing information:

- 1 From the ServerList panel, type **S** beside the SequeLink Server you want to monitor.
- 2 You are prompted for a user ID and password. Supply the required information; then, press ENTER.

NOTE: If you are not prompted for a user ID and password, the SequeLink Server is not active.
- 3 The server management tree of the active server is displayed.
- 4 Type **/** beside the active Service node to expand it. If session level monitoring is enabled, the Active Sessions node is displayed.
- 5 Type **S** beside the Event Trace node.
- 6 The EventLog panel appears.
- 7 Select the order and categories of events to be listed; then, press ENTER.
- 8 Type **/** beside any event you want to see in more detail. If you want full details of the event, press F6.

Configuring SequeLink Server for Workload Management

If your OS/390 environment contains sysplex clusters, you must set the MVSGlobalClustername attribute to specify the clustername that will be used to register to WLM. If you want different SequeLink Servers on different sysplex clusters to appear as a single SequeLink Server to your SequeLink Clients, set the MVSGlobalClustername attribute on each SequeLink Server to use the same clustername.

By default, support for DNS/WLM is not enabled for a SequeLink Server. To enable DNS/WLM for a SequeLink Server, you must set the MVSGlobalWLMEnclaves attribute:

- MVSGlobalWLMEnclaves=CONNECTION creates a new WLM enclave for each new connection.
- MVSGlobalWLMEnclaves=RPC creates a new WLM enclave for each SequeLink RPC (each network access to the SequeLink Server).

When DNS/WLM is enabled, the Sequelink Server connects to WLM as a workmanager of type "VAI" during startup. The instance name used on the connection to WLM is the value of the MVSGlobalSubSysID attribute.

For more information about:

- How SequeLink Server for OS/390 supports sysplex clusters and DNS/WLM, see ["Using SequeLink with Workload Management in OS/390 Environments"](#) on page 43.
- How SequeLink classifies WLM enclaves as they are created, see [Appendix B "OS/390 Workload Manager \(WLM\) Classification"](#) on page 355.

- The MVSGlobalWLMEnclaves and MVSGlobalClustername attributes, see [Appendix E “SequeLink Service Attributes” on page 407](#).

Configuring SMF Accounting

When SMF accounting is enabled, records are written to the active SMF data set using the SMF record ID at the end of each client connection. SMF accounting is enabled by default and the SMF record ID is configured using the GlobalSMFRecordType attribute, which is a Global Settings attribute of the SequeLink Server. If you do not want to use the SMF accounting facility, you can turn it off by deleting the GlobalSMFRecordType attribute.

SMF records contain statistical data that can be used to track information for charge-back systems. The following data is provided for each database session:

- Job/STC name of the server
- Client logon ID
- Internal Thread ID assigned by SequeLink Server
- Session start/end times
- Number of packets and bytes received/sent
- Total CPU consumption
- Service name
- Application loadmodule name
- Network node name of the client
- Thread abend/abort information
- Abend code
- Number of SQL calls, checkpoint calls, and DB2 OPEN calls
- Accumulated CPU consumption and elapsed time for SQL calls
- WLM ServiceClass

The following example shows a typical SMF record. A sample job (RUNSMF) to print out the SMF records is provided in the SequeLink_HLQ.CNTL library.

```
*****
*                               SMF RECORD HEADER
*****
SMFRECORD  DS      0F
SMFRECLLEN DS      H      Record length
SMFDESC    DS      H      Descriptor (must be zero)
SMFSYS     DS      X      System indicator (set to zero)
SMFTYPE    DS      X      Record type (set from SYSINI)
SMFTIME    DS     AL4      Current time
SMFDATE    DS     AL4      Current date
SMFSID     DS     CL4      Host system ID
SMFSUBS    DS     CL4      Server subsystem ID (set from SYSINI)
SMFUSER    DS     0X      Start of subtype field(s)
*****
*          SUBTYPE X'0001' - SESSION ACCOUNTING RECORD
*****
@ACCTLEN   DS     XL2      Accounting record length
@ACCTTYP   DS     XL2      Accounting record subtype (X'0001')
@ACCTUID   DS     CL8      Client logon (user) ID
@ACCTTID   DS     CL8      Thread ID
@ACCTAPL   DS     CL8      Application name (or loadmodule)
@ACCTSVC   DS     CL64     Service name
@ACCTCPU   DS      F      CPU time in hundredths/second
@ACCTCNT   DS      F      Message count
@ACCTBIN   DS      F      Input packet byte count
@ACCTBOT   DS      F      Output packet byte count
@ACCTDBC   DS      F      Database calls
@ACCTBEG   DS      F      Session start time (hhmmssst)
@ACCTEND   DS      F      Session stop time (hhmmssst)
@ACCTNOD   DS     CL16     Client node name
@ACCTDBO   DS      F      DB2 reconnects (thread management)
@ACCTCKP   DS      F      DB2 checkpoints (thread management)
@ACCTSQC   DS      F      Total SQL call CPU time (in microseconds)
*
* Session Start - Time and date ( SMF format )
*
@ACCTBGT   DS      F      Time since Midnight in 100th of second
```

```

@ACCTBGD  DS      PL4      Date in 0CYYDDDDF format - C is 1 if year is 20YY,
                                is 0 if 19YY
*
* Session Ending - Time and date ( SMF format )
*
@ACCTENT  DS      F        Time since Midnight in 100th of second
@ACCTEND  DS      PL4      Date in 0CYYDDDDF format - C is 1 if year is 20YY,
                                is 0 if 19YY
@ACCTCPU  DS      F        CPU TIME used - measured in 100th of a second
@ACCTERR  DS      X
*          1              Thread abended - abend code in @ACCTABN
*          2              Aborted for Idletime reason
*          4              Aborted by Operator
*          8              Aborted for MaxCPU reason
*
@ACCTABN  DS      XL3      Left 12 bits - Systemabend code in Hex
*                                Right 12 bit - Userabend code in Hex
*
* The following fields are DB2-specific and are not used other services
*
@ACCTDBC  DS      F        Database Calls - count
@ACCTDBO  DS      F        Database Opens - count
@ACCTCKP  DS      F        Database Checkpoints - count
@ACCTSQC  DS      F        Accum SQL CPU time in 100th of seconds
@ACCTSQE  DS      F        Accum SQL Elapsed time in 100th of seconds
@ACCTWSC  DS      CL8      WLM ServiceClass or blanks
@ACCTLTH  EQU     *-@ACCTREC SUBTYPE LENGTH

```

9 Configuring Transliteration

Transliteration is the transformation of text from one character set to another. In SequeLink, transliteration is defined by a combination of factors, which include which service template and SequeLink Client are used, as well as database-specific configuration settings.

See [Appendix G "Internationalization, Localization, and Unicode" on page 489](#) for more information about internationalization.

Choosing a Service Template

When you install SequeLink Server, at least one SequeLink data access service is installed using default attributes for that service. Default service attributes are defined in the SequeLink service templates. You can create additional services based on the SequeLink service templates.

In most cases, the SequeLink service templates provide a configuration that can be used without any modification. However, some service templates provide additional transliteration capabilities. You must select the service template that meets the transliteration requirements of your application.

[Table 9-1](#) lists the transliteration environments that the service templates support.

Table 9-1. Selecting a Service Template

Transliteration Environment	Service Template Supported
For ODBC and ADO Clients, the database code page is a 7-bit or 8-bit code page and matches the code page of the client application. For JDBC and .NET Clients, the database code page is a 7-bit or 8-bit code page and has a binary-compatible transliteration to UTF-16	Use the standard service template, which automatically sets ServiceCodePage=Default (see "ServiceCodePage" on page 459).
Operating system (OS) and database code pages use a single-byte or multi-byte character set ¹	Use the default installed service template and configure the ServiceCodePage="OS" and the other necessary settings (see "ServiceCodePage" on page 459).
Database contains Unicode data ²	Use the service template with enhanced code page support which sets automatically ServiceCodePage="Database" (see "ServiceCodePage" on page 459).
NOTES:	
1 For Oracle 8.1, if NCHAR data types will be accessed, use the enhanced code page support template.	
2 Not available for the following services: Informix, Oracle8.0 and DB2 on OS/390, or when using the ADO Client.	

Choosing the Transliteration Mode

SequeLink supports three transliteration modes:

- Default mode, which can be used with all SequeLink Clients and with SequeLink Servers on Windows and UNIX
- OS mode, which can be used when the operating system (OS) and database code page is a single-byte or multi-byte character set
- Database mode, which is used to support Unicode databases

Default Mode

Default mode can be used with all SequeLink Clients and with SequeLink Servers on Windows and UNIX. To use Default transliteration mode, set `ServiceCodepage=Default`.

Use Default mode *only* when you created your service with the standard template. Do not use Default mode with the service template with enhanced code support.

- For the ODBC and ADO Clients, the administrator defines this mode when the database code page is a 7-bit or 8-bit code page and matches the code page of the client application.
- For the JDBC and .NET Clients, the administrator defines this mode when the database code page is a 7-bit or 8-bit code page and has a binary-compatible transliteration to UTF-16. In other words, it is possible to convert from the single-byte database code page to UTF-16, by setting either the higher or lower byte to zero.

OS Transliteration Mode

OS transliteration mode can be used when the operating system (OS) and database code pages use a single-byte or multi-byte character set. OS transliteration mode is useful for European and Asian languages. To use OS transliteration mode, set `ServiceCodePage=OS`.

Use OS mode *only* when you created your service with the standard template. Do not use OS mode with the service template with enhanced code support.

To configure operating system environment settings:

- On UNIX, set locale settings for the service, for example, using the `LC_ALL` environment variable. Consult your UNIX system administrator for the supported values for the `LC_ALL` environment variable, and to find out which locale settings are supported on your system.
- On Windows, set regional options on the Control Panel.
- On OS/390, use the DSNHDECP control block in the DSNEXIT library, or the SequeLink `MVSServiceCodePageNr` service attribute (see "[MVSServiceCodePageNr](#)" on page 449).

Database Transliteration Mode

Database transliteration mode is used when connecting to Unicode databases with SequeLink 5.4 ODBC, JDBC, and .NET Clients. To use the Database transliteration mode, create a service using the service template with enhanced code page support, which automatically sets the service attributes to the correct settings for database transliteration mode.

NOTE: Database transliteration mode is not supported with Oracle8.0, Informix, or DB2 on OS/390 servers, and cannot be used with SequeLink *for* ADO Client.

See [Table 9-2](#) for database-specific transliteration settings.

NOTE: Using the Database transliteration mode with DB2 UDB, SQL Server, Sybase, and ODBC Socket, incurs a performance penalty.

Table 9-2. Defining Database-specific Settings for Database Transliteration Mode

Database	Configuration Requirements
DB2	No additional configuration required.
Oracle8i, 9i	Configure the NLS_LANG environment variable to be compatible with the database code page.
SQL Server	No additional configuration required.
Sybase	No additional configuration required.
ODBC Socket	Refer to the documentation of the backend ODBC driver for settings that impact or enable the SQL-W function behavior.

Configuring Database Transliteration Settings

Table 9-3 provides the database transliteration settings to use when configuring a SequeLink service.

Table 9-3. Defining Database-specific Settings

Database	Requirements
DB2	No additional configuration required.
Informix	The code page is set through the service template to a default value: CLIENT_LOCALE.
Oracle	Setting and determining the operating system code page is operating system-dependent. The operating system code page, the database code page, and the code page configured through the NLS_LANG environment variable must be compatible.
SQL Server	No additional configuration required.
Sybase	Set the connection option of the DataSourceSybConnectOptions service attribute so that it refers to the same (or compatible) code page as the OS code page. See "DataSourceSybConnectOptions" on page 434 for details.
ODBC Socket	Refer to the documentation of the backend ODBC driver for information on passing the operating system code page to the driver as the application code page.

The following sections provide database-specific guidelines and configuration examples for determining and setting transliteration settings.

General Guidelines for Transliteration

The methods for configuring transliteration are database-specific. This section provides general guidelines for transliteration.

DB2 UDB

When transliteration is required for DB2:

- 1 Determine the code page of the DB2 database you want to connect to:

db2 get database configuration for <database name>
 - If the database code page is 1208 (database code set is UTF-8), use the service template [SequeLink 5.4]DB2 UDB service (enhanced code page support).
 - For all other database code pages, continue at [Step 2](#).
- 2 Use the service template: [SequeLink 5.4]DB2 UDB service.
- 3 If transliteration is required, set ServiceCodePage to OS. No additional configuration is required.

Oracle

See "[Setting Up a SequeLink Service for Oracle9i](#)" on page 194 for an example of configuring an Oracle service.

To configure transliteration for your Oracle8.0 database:

- 1 Create a service using the service template [SequeLink 5.4] Oracle 8.0 service
- 2 Set the value of the ServiceCodePage service attribute to OS.

NOTE: The default setting for ServiceCodePage will not invoke transliteration.

- 3 Set the ServiceEnvironmentVariable service attribute values NLS_LANG and NLS_NCHAR to the OS code page in which the SequeLink Service is running (refer to the Oracle documentation for more information).

To configure transliteration for your Oracle 8.1.x or 9.x database to support Unicode and enhanced support database and national database character sets:

- 1 Create a service using the service template [SequeLink 5.4] Oracle 9i service (enhanced code page support).
- 2 Determine the code page of your Oracle database (= select parameter, value from nls_database_parameters and look for parameter NLS_CHARACTERSET).
- 3 Set the value of the ServiceEnvironmentVariable service attribute to NLS_LANG to the codepage of the Oracle database.

Microsoft SQL Server

Choose the Service Template; this depends on the type of application you have:

For example, use the Service Template [SequeLink 5.4] SQL Server service (enhanced code page support) if you want to support National Character data types in your application.

No additional configuration is required.

Sybase

To configure transliteration in the Sybase environment, you must first identify the installed Sybase Server default character set (refer to the Sybase documentation for information about

sp_default_charset). Then select the appropriate service template:

- If the character set is Unicode (UTF-8), use [SequeLink 5.4] Sybase service (enhanced code page support). No additional configuration is required.
- If the character set is not Unicode, use [SequeLink 5.4] Sybase service.

If transliteration is required, set the ServiceCodePage=OS and set the DataSourceSYBConnectOptions service attributes (see ["DataSourceSybConnectOptions" on page 434](#)).

Transliteration Scenarios

This section provides scenarios for setting up transliteration on Unicode and non-Unicode databases:

- ["Setting Up a SequeLink Service for DB2 UDB" on page 193](#)
- ["Setting Up a SequeLink Service for Oracle9i" on page 194](#)
- ["Setting up a SequeLink Service for Microsoft SQL Server" on page 195](#)
- ["Setting Up a SequeLink Service for Oracle9i" on page 194](#)
- ["Set up a SequeLink Service for Sybase" on page 195](#)

Setting Up a SequeLink Service for DB2 UDB

In this scenario, you have installed SequeLink Server for DB2 UDB. You want to set up a SequeLink service to access a DB2 Unicode database on Windows.

- 1 Check the database code page to confirm the database code set and database type:

```
execute "get db cfg for accountdb"
```

Database territory	US
Database code page	1208
Database code set	UTF-8
Databasecountry/regioncode	1

The values for the database code set and code page indicate that you are dealing with a DB2 Unicode database.

- 2 Add a service to your SequeLink Server for DB2 UDB. Use the service template [SequeLink 5.4]DB2 UDB service (enhanced code page support).
- 3 Start up the SequeLink Service for DB2 UDB.

Setting Up a SequeLink Service for Oracle9i

In this scenario, you need to set up a SequeLink service to access an Oracle9i Unicode database on Linux (en_US).

- 1 Execute `select parameter, value from nls_database_parameters` and look for parameter `NLS_CHARACTERSET`.

`NLS_CHARACTERSET AL32UTF8`
- 2 Because this is a Unicode database, you add a service with service template [SequeLink 5.4] Oracle 9i service (enhanced code page support).
- 3 Set the `NLS_LANG` to the codepage of your Oracle database:

`ServiceEnvironmentVariable`
`NLS_LANG=ENGLISH_UNITED KINGDOM.UTF8`
- 4 Save the new settings in the SequeLink configuration file.
- 5 Start the newly-defined SequeLink service for Oracle.

Setting up a SequeLink Service for Microsoft SQL Server

In this scenario, you have installed SequeLink Server for SQL Server. You need to set up a SequeLink service for SQL Server on Windows system with English (United States). Because client and server operating systems have the same regional settings, no transliteration is required.

Add a service with service template [SequeLink 5.4] SQL Server service. The service template sets the ServiceCodePage service attribute to Default, which disables transliteration.

Set up a SequeLink Service for Sybase

In this scenario, you have installed SequeLink Server for Sybase. You set up a SequeLink service for Sybase on a Solaris (en_US) to access a Greek, non-Unicode, database.

- 1 Determine the installed Sybase Server Default character set (sp_default_charset)

```
execute "sp_default_charset"

Server default charSet: iso88597
```

- 2 Because this is not a Unicode database, add a service with service template [SequeLink 5.4]Sybase service.
- 3 Set the ServiceCodePage service attribute to OS.
- 4 Look up the Sybase default character set in the Sybase table to determine the DataSourceSYBConnectOptions values to use:

```
Sybase charset: iso88597
codepage: ISO8859-7
IANAAppCodePage: 10
```

In this scenario, you add IANAAppCodePage=10 to the DataSourceSYBConnectOptions service attribute as follows:

```
DataSourceSYBConnectOptions : IANAAppCodePage=10
```

- 5** Save the new settings in the SequeLink configuration file.
- 6** Start up the newly-defined SequeLink Service for Sybase.

Part 2: Configuring and Managing SequeLink Clients

This part contains the following chapters:

- [Chapter 10 “Configuring the ODBC Client” on page 199](#)
describes the tasks you may need to perform to configure and manage the SequeLink *for* ODBC Client.
- [Chapter 11 “Configuring the ADO Client” on page 227](#)
describes the tasks you may need to perform to configure and manage the SequeLink *for* ADO Client.
- [Chapter 12 “Configuring the JDBC Client” on page 257](#)
describes the tasks you may need to perform to configure and manage the SequeLink *for* JDBC Client.
- [Chapter 13 “Configuring the .NET Client” on page 271](#)
describes the tasks you may need to perform to configure and manage the SequeLink *for* .NET Client.

10 Configuring the ODBC Client

This chapter describes the tasks you may need to perform to configure and manage the SequeLink *for* ODBC Client (the ODBC Client).

Using the ODBC Administrator



The first step in setting up an ODBC connection is creating an ODBC data source. You use the ODBC Administrator to create and manage ODBC data sources.

To start the ODBC Administrator, click **Start / Programs**. From the Programs menu, select **DataDirect SequeLink for ODBC Client 5.4**, and then select the **ODBC Administrator** application. The ODBC Data Source Administrator window appears listing resident data sources.

NOTE: An ODBC Administrator does not exist for UNIX; you must edit the `odbc.ini` file using a text editor. See ["Configuring ODBC Client Data Sources on UNIX" on page 215](#) for instructions on creating ODBC client data sources for UNIX.

Configuring ODBC Client Data Sources on Windows

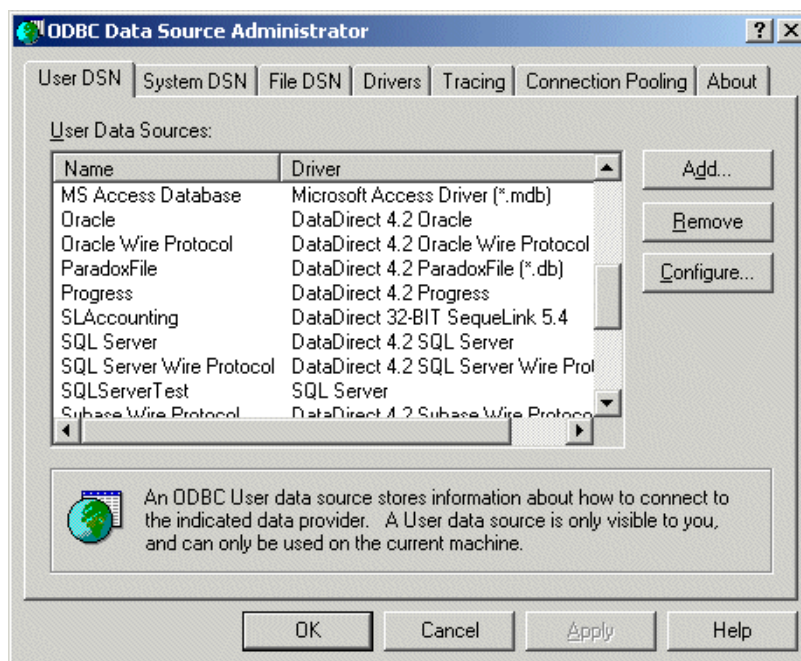


To configure client data sources for the ODBC Client on Windows platforms, you use the ODBC Administrator.

Configuring ODBC User and System Client Data Sources

- 1 Start the ODBC Administrator. To start the ODBC Administrator, select **Start / Programs**. From the Programs menu, select **DataDirect SequeLink for ODBC 5.4**, and then select the **ODBC Administrator** application.

Click the **User DSN** tab or the **System DSN** tab to list user or system data sources, respectively.



- 2 To configure a new data source, click the **Add** button. A list of installed drivers appears. Select **DataDirect 32-BIT SequeLink 5.4**; then, click **Finish**.

NOTE: To change an existing data source, select the data source you want to configure and click the **Configure** button.

The DataDirect SequeLink for ODBC Setup window appears.

- 3 Provide the following information; then, click **OK**.

Data Source Name: Type a unique name that identifies this ODBC data source configuration. Examples are "Accounting" or "SequeLink to Oracle Data".

Description: Optionally, type a description of the data source, for example, "My Accounting Database" or "Accounting Data in Oracle".

SequeLink Server Host: Type the TCP/IP host name of the SequeLink service to which the ODBC Client will connect.

SequeLink Server Port: Type the TCP/IP port the SequeLink service is listening on for connection requests. The port you specify must be the same port that was specified for the SequeLink service when the SequeLink Server was installed; the default is 19996.

Server Data Source: Type the name of a server data source configured for the SequeLink service to use for the connection, or click the ... button to select an existing server data source. This field is optional. If a server data source is not specified, the default server data source for that SequeLink service is used.

Translate: Click **Translate** only if you want to configure an ODBC translator.

NOTE: We strongly recommend that you do not configure an ODBC translator and rely on the native SequeLink transliteration between server and client code pages.

The Select Translator dialog box appears, listing translators specified in the ODBC Translators section of the system information. Select a translator. When satisfied with your choice, click **OK** to close this dialog box and perform the translation.

NOTE FOR LDAP USERS: To configure the ODBC Client to retrieve connection information from an LDAP directory, select the **Use LDAP** check box. The fields change on the lower half of the screen to accommodate the information required to query an LDAP server for connection information. Provide the following information:

LDAP Server Host: Type the TCP/IP host name of the LDAP server.

LDAP Server Port: Type the TCP/IP port the LDAP server is listening on for connection requests. If unspecified, the ODBC Client will use the default LDAP port 389.

Distinguished Name (DN): Type an identifier that uniquely identifies the LDAP entry where the connection information is stored.

See [Appendix A "Using LDAP with ODBC and ADO Clients" on page 351](#) for more information about retrieving connection information from LDAP directories.

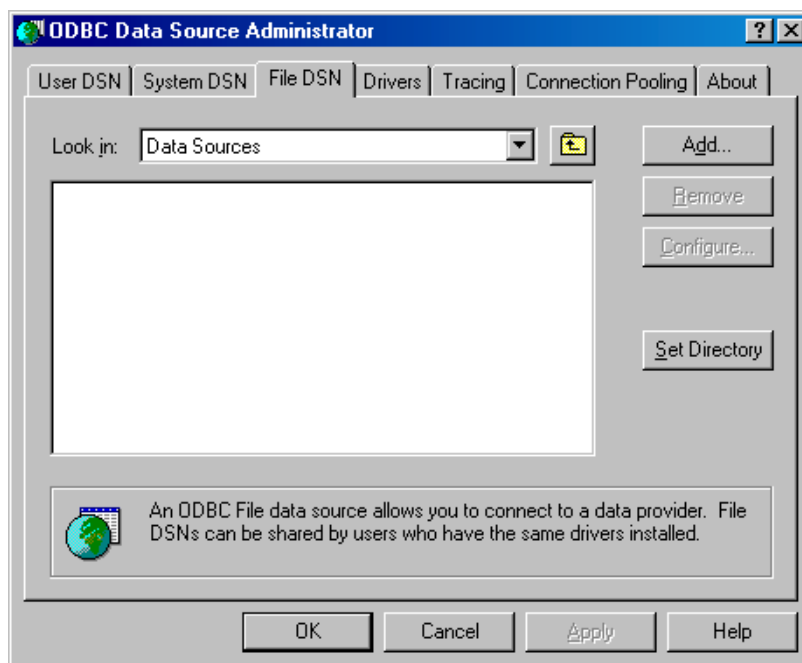
Configuring ODBC File Client Data Sources

File data sources are data source files stored on a file server. The files are available to any user who can access the server.

To configure ODBC file client data sources:

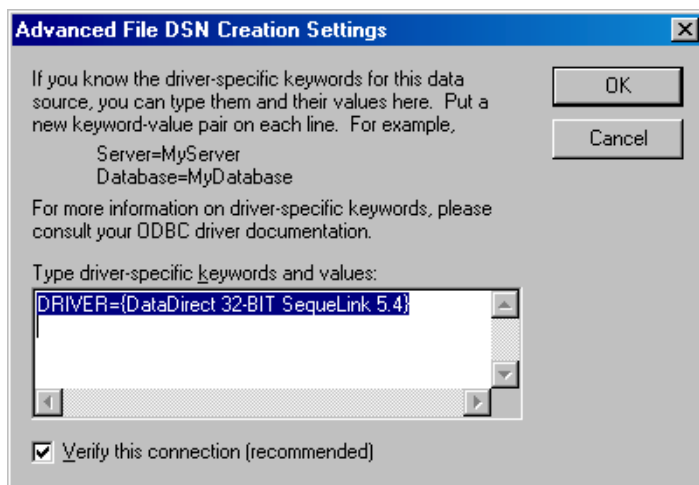
- 1 Start the ODBC Administrator by clicking **Start / Programs**. From the Programs menu, select **DataDirect SequeLink for ODBC 5.4**, and then select the **ODBC Administrator** application.

- 2 Click the **File DSN** tab. The File DSN tab lists any file data sources in the specified directory.



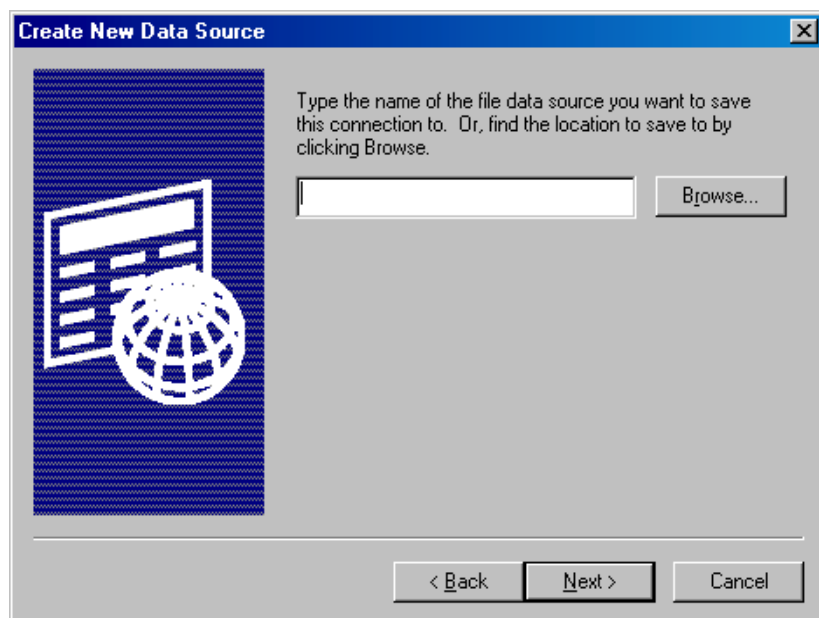
- 3 To configure a new data source, click the **Add** button. A list of installed drivers appears. Select **DataDirect 32-BIT SequeLink 5.4**; then, perform one of the following actions:
 - To configure the file data source to connect directly to a SequeLink Server without retrieving connection information from an LDAP directory, click **OK**. Then, skip to [Step 5](#).
 - To configure the file data source to retrieve connection information from an LDAP directory, continue with the next step.

- 4 Click **Advanced**. The Advanced File DSN Creation Settings window appears.



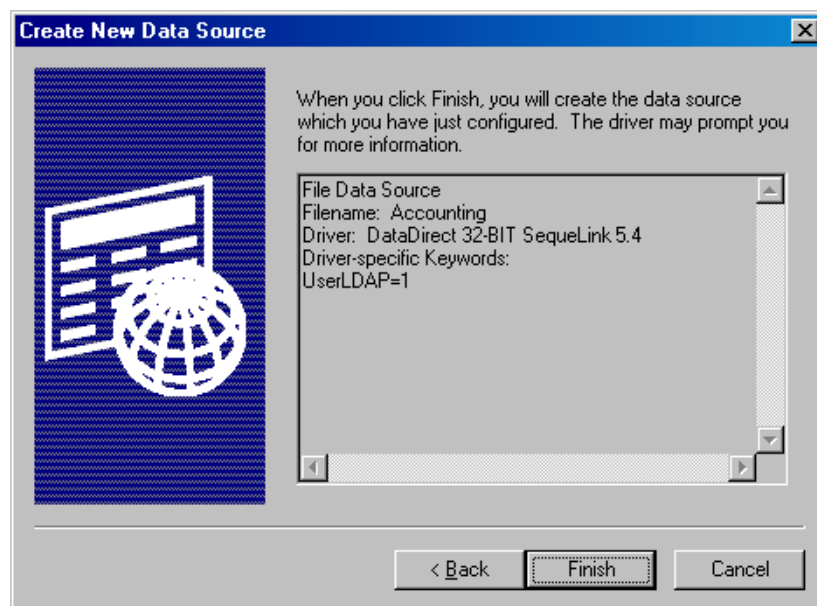
Type `UserLDAP=1` in the Type driver-specific keywords and values scrollable box; then, click **OK**. You are returned to the list of drivers. Click **Next** and continue with [Step 5](#).

- 5 The Create New Data Source dialog box appears.



Type the name of the file data source you want to create or click **Browse** to select an existing file data source; then, click **Next**.

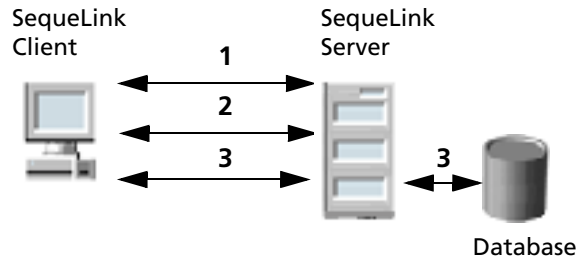
- 6 The Create New Data Source dialog box displays the settings you've configured for this data source.



- 7 Click **Finish** to create the file data source. A series of connection dialogs appear as described in "[ODBC Connection Dialogs](#)" on page 208. The file data source will be saved after you enter the correct information in the connection dialog boxes.

ODBC Connection Dialogs

A SequeLink data access connection involves the following stages:



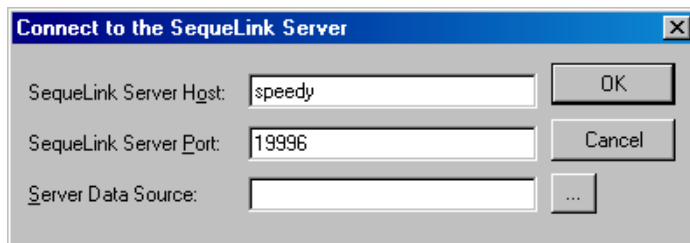
- 1 A network connection is established.
- 2 An authentication mechanism is used to establish the identity of the SequeLink Client to the SequeLink Server.
- 3 Based on information provided by the SequeLink Client application (for example, a database user name and password), a database connection is established.

Stage 1: Establishing a Network Connection

The first stage of the connection process involves establishing a network connection. The dialog box that appears depends on whether the connection has been configured to connect directly to a SequeLink service or to retrieve connection information for the SequeLink service from a centralized LDAP directory.

Connecting Directly to a SequeLink Service

If the connection has been configured to connect directly to a SequeLink service, the Connect to the SequeLink Server dialog box appears.



Provide the following information; then, click **OK**.

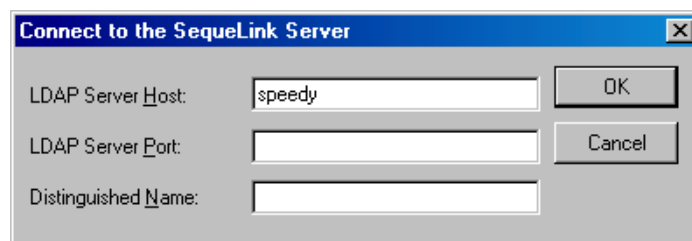
SequeLink Server Host: Type the TCP/IP host name of the SequeLink service.

SequeLink Server Port: Type the TCP/IP port on which the SequeLink service is listening. A default installation of SequeLink Server uses the port 19996.

Server Data Source: Type the name of a server data source to use for the connection, or select one from the drop-down list. This step is optional. If a server data source is not specified, the default server data source for that service will be used for the connection.

Retrieving Connection Information from an LDAP Directory

If the connection has been configured to connect to an LDAP server to retrieve connection information from an LDAP directory, the Connect to the SequeLink Server dialog box appears.

A screenshot of a Windows-style dialog box titled "Connect to the SequeLink Server". The dialog has a blue title bar with a close button (X) in the top right corner. It contains three text input fields with labels: "LDAP Server Host:" (containing the text "speedy"), "LDAP Server Port:" (empty), and "Distinguished Name:" (empty). To the right of the first field is an "OK" button, and to the right of the second field is a "Cancel" button.

Provide the following information; then, click **OK**.

LDAP Server Host: Type the TCP/IP host name of the LDAP server.

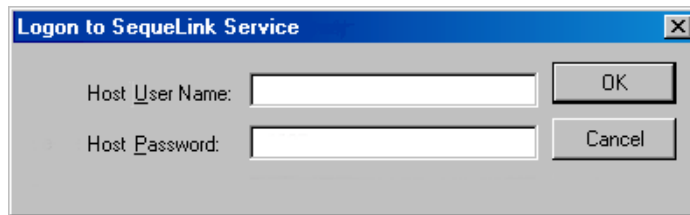
LDAP Server Port: Type the TCP/IP port on which the LDAP server is listening.

Distinguished Name: Type the Distinguished Name (DN) of the LDAP entry.

Stage 2: SequeLink Server Authentication

The second stage of the connection process involves authentication of the SequeLink Client to the SequeLink Server. The dialog boxes that appear depend on how authentication is configured for the SequeLink service.

- When ServiceAuthMethods=anonymous or ServiceAuthMethods=integrated_nt, no dialog boxes appear.
- When ServiceAuthMethods=OSLogon(HUID,HPWD) or ServiceAuthMethods=OSLogon(UID,PWD), the Logon to SequeLink Service dialog box appears.



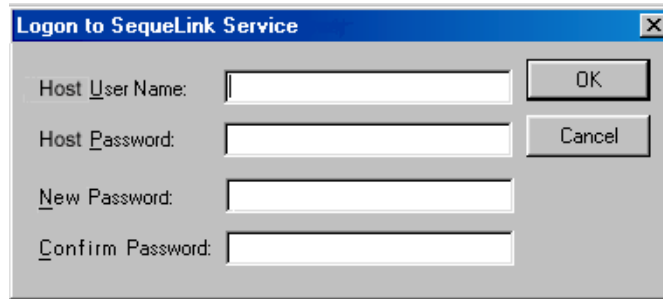
Provide the following information; then, click **OK**.

Host User Name: Type the host user name.

NOTE: When connecting to a Windows server, you must prefix the host user name with a server name, if authenticating to a local server, or a domain name (for example, SALES\DJONES). If the server name or domain name is omitted, the SequeLink Server will attempt to authenticate the user ID and password with the database account defined for the machine on which the SequeLink Server is running. If this validation fails, the SequeLink Server will attempt to authenticate the user ID and password with the database account defined for the domain of the machine on which the SequeLink Server is running.

Host Password: Type the host password.

- When ServiceAuthMethods=OSLogon(HUID,HPWD,NPWD) or ServiceAuthMethods=OSLogon(UID,PWD,NPWD) and the password is expired, the Logon to SequeLink service dialog box appears.



NOTE: If the password is not expired, the previously described dialog box appears, prompting only for the host user name and host password.

Provide the following information; then, click **OK**.

Host User Name: Type the host user name.

NOTE: When connecting to a Windows server, you must prefix the host user name with a server name, if authenticating to a local server, or a domain name (for example, SALES\DJONES). If the server name or domain name is omitted, the SequeLink Server will attempt to authenticate the user ID and password with the database account defined for the machine on which the SequeLink Server is running. If this validation fails, the SequeLink Server will attempt to authenticate the user ID and password with the database account defined for the domain of the machine on which the SequeLink Server is running.

Host Password: Type the host password.

New Password: Type the new password to be used by the SequeLink password change mechanism.

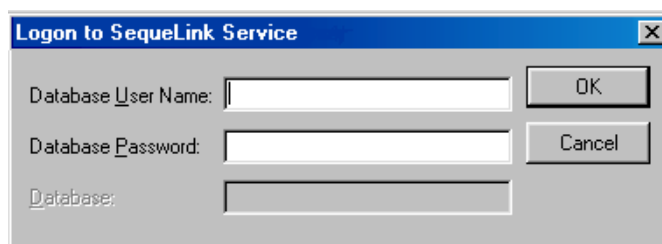
Confirm Password: Type again the new password to confirm it.

For more information about configuring authentication, see [Chapter 14, "Configuring SequeLink Security," on page 281](#).

Stage 3: Data Store Logon

The last stage of the connection process involves logging on the data store. The dialog boxes that appear depend on the data store logon method configured for the SequeLink service:

- When `DataSourceLogonMethod=OSIntegrated`, no dialog boxes appear.
- When `DataSourceLogonMethod=DBMSLogon(UID,PWD)` or `DataSourceLogonMethod=DBMSLogon(DBUID,DBPWD)`, a data store-specific user name and password are required and the Logon to SequeLink Service dialog box appears.



Provide the following information; then, click **OK**.

Database User Name: Type the database logon ID.

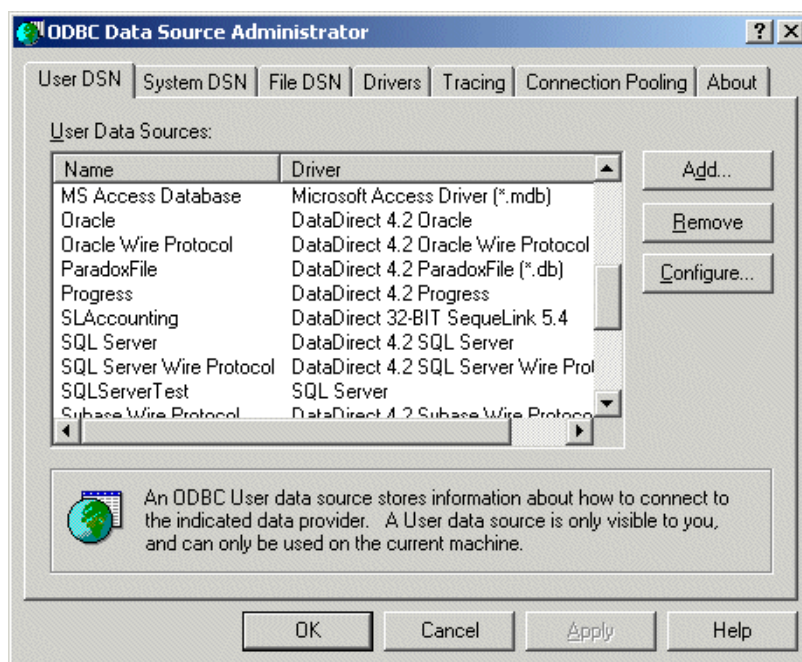
Database Password: Type the database password.

Database: Type the name of the database to which you want to connect. This field is disabled when the data store does not recognize the concept of databases.

See [Chapter 14, "Configuring SequeLink Security," on page 281](#) for more information about configuring data store logon methods.

Testing ODBC Connections on Windows

- 1 On the SequeLink Client, start the ODBC Administrator. To start the ODBC Administrator, select **Start / Programs**. From the Programs menu, select **DataDirect SequeLink for ODBC 5.4**, and then select the **ODBC Administrator** application. The ODBC Data Source Administrator window appears listing resident data sources.



- 2 Create an ODBC data source as described in ["Configuring ODBC User and System Client Data Sources"](#) on page 200 specifying the TCP/IP address and TCP/IP port of the SequeLink service.
- 3 Click the **Test Connect** button to test the connection. If successful, a dialog appears telling you the connection was successful. You are now ready to start using your ODBC applications with SequeLink.

Configuring ODBC Client Data Sources on UNIX

For UNIX, an ODBC Administrator does not exist. This section describes how to configure the `odbc.ini` file and how to set some required environment variables to use the ODBC Client on UNIX.

Configuring System Information Files

To configure an ODBC data source for UNIX, you must edit the system information file, that is, the `odbc.ini` file (32-bit ODBC Client) or `odbc64.ini` file (64-bit ODBC Client) using the attributes in [Table 10-1](#). The system information file accepts only long names for attributes.

ODBC Data Source Attributes for UNIX

NOTE: To configure an ODBC data source for UNIX, you must edit the system information file using the attributes in [Table 10-1](#).

Table 10-1. ODBC Attributes for `odbc.ini`

Attribute	Description
DistinguishedName	The distinguished name identifying the LDAP entry from which connection information is retrieved. This attribute is required when <code>UseLDAP=1</code> .

Table 10-1. ODBC Attributes for *odbc.ini* (cont.)

Attribute	Description
Host	<p>The TCP/IP address of the SequeLink Server, specified in dotted format or as a host name.</p> <p>LDAP: If LDAP is enabled, this identifies the TCP/IP address of the LDAP server. This can also be a list of LDAP servers separated by a blank space (for example, "ld1.foo.com ld2.foo.com ld3.foo.com"). If the first LDAP server in the list does not respond, the ODBC Client will try to connect to the next LDAP server in the list.</p>
LogonID	The host or data store user name, which may be required depending on the server configuration.
Password	The host or data store password, which may be required depending on the server configuration.
Port	<p>The TCP/IP port on which the SequeLink Server is listening.</p> <p>LDAP: If LDAP is enabled, this identifies the TCP/IP port on which the LDAP server is listening. If you do not specify a port, the default port for LDAP (389) will be used.</p>
ServerDataSource	A string that optionally identifies the server data source to be used for the connection. If not specified, the configuration of the default server data source will be used for the connection.
UseLDAP	<p>UseLDAP={0 1}. Determines whether the parameters to establish a connection to the SequeLink Server should be retrieved from LDAP.</p> <p>When set to 0 (the initial default), the SequeLink Client will connect directly to the specified SequeLink Server.</p> <p>When set to 1, the ODBC Client will retrieve the TCP/IP host, TCP/IP port, and SequeLink data source (optional) from an LDAP entry identified by a Distinguished Name (DN). Once the connection information is retrieved, the SequeLink Client will connect directly to the specified SequeLink Server. The DistinguishedName (DN) attribute is required.</p>

Example: odbc.ini for Solaris

The following code shows an example of an odbc.ini file for a 32-bit ODBC Client installed on a Solaris machine:

```
[ODBC Data Sources]
SALESDB=DataDirect 32-BIT SequeLink 5.4

[SALESDB]
Driver=SALES/lib/ivslk19.so
Description=DataDirect 32-BIT SequeLink 5.4
Host=
Port=
UseLDAP=0
DistinguishedName=

[ODBC]
Trace=0
TraceFile=odbctrace.out
TraceDll=path_of_installdir/lib/odbc trac.so
InstallDir=path_of_installdir
```

where *path_of_installdir* is the path to the ODBC Client installation directory.

Example: odbc64.ini for Solaris

The following code shows an example of the odbc64.ini file for a 64-bit ODBC Client installed on a Solaris machine:

```
[ODBC Data Sources]
SALESDB=DataDirect 64-BIT SequeLink 5.4

[AccountingDB]
Driver=Accounting/lib64/ivslk19.so
Description=DataDirect 64-BIT SequeLink 5.4
Host=
Port=
UseLDAP=0
```

```
DistinguishedName=
```

```
[ODBC]
```

```
Trace=0
```

```
TraceFile=odbctrace.out
```

```
TraceDll=path_of_installdir/lib64/odbcdrac.so
```

```
InstallDir=path_of_installdir
```

where *path_of_installdir* is the path to the ODBC Client installation directory.

Setting Environment Variables

You must set several environment variables for the ODBC Client on UNIX by executing a shell script located in the installation directory.

To execute the shell script:

■ If you are using the Bourne or Korn shell, type:

- `. .sqlnk.sh` (for 32-bit client)
- `. .sqlnk64.sh` (for 64-bit client)

■ If you are using the C shell, type:

- `source .sqlnk.csh` (for 32-bit client)
- `source .sqlnk64.csh` (for 64-bit client)

Executing this shell script sets the following environment variables:

ODBCINI	Specifies where the centralized odbc.ini or odbc64.ini file is located.
SQLNK_ODBC_HOME	Specifies the full path of the directory containing the ODBC Client shared libraries.

Executing this shell script also sets the appropriate library search environment variable (LD_LIBRARY_PATH on Solaris and Linux, SHLIB_PATH on HP-UX, or LIBPATH on AIX).

Using a Centralized System Information File

Because UNIX is a multi-user environment, you may want to use a single centralized odbc.ini file controlled by a system administrator. To do this, set the ODBCINI environment variable to point to the fully qualified pathname of the centralized file.

For example:

- In the Bourne or Korn shell, type:

```
ODBCINI=/opt/odbc/system_odbc.ini;export ODBCINI
```

- In the C shell, type:

```
setenv ODBCINI /opt/odbc/system_odbc.ini
```

The odbc.ini file also require a [ODBC] section that includes the InstallDir keyword. The value of the InstallDir keyword must be the path to the directory that contains the /lib and /messages directories.

For example, if you choose the default installation directory for the 32-bit ODBC Client, the following line must be in the [ODBC] section of the `odbc.ini` file:

```
InstallDir=/usr/slodbc54
```

Connecting Using a Connection String

If your application requires a connection string to connect to a data source, you must specify the data source name that tells the driver which data source to use for the default connection information. Optionally, you may specify *attribute=value* pairs in the connection string to override the default values stored in the data source.

You can specify long or short names in the connection string, which has the format:

```
DSN=data_source_name[;attribute=value[;attribute=value]...]
```

For example, a connection string for SequeLink may look like this:

```
DSN=Accounting;DB=EMP;UID=JOHN;PWD=XYZZY
```

or

```
DSN=Accounting;DB="X:IV;EMP";UID=JOHN;PWD=XYZZY
```

NOTE: If the database name (DB) contains a semicolon (;), you must place the name in quotes, as shown in the example above.

For a list of ODBC connection attributes and their valid values, refer to the *SequeLink Developer's Reference*.

Importing and Exporting ODBC Client Data Sources



The SequeLink Data Source SyncTool allows you to export ODBC client data source definitions to data source files and distribute them to multiple end users. The SequeLink Data Source SyncTool provides two user implementations, one for the SequeLink administrator and another for the end user:

- The SequeLink *for* ODBC Data Source SyncTool Administrator is used by the SequeLink administrator to create data source files. It can import and export data sources. This tool should be made available to the SequeLink administrator only.
- The SequeLink *for* ODBC Data Source SyncTool is used by the end user and can import data sources only. It should be installed on every SequeLink *for* ODBC Client.

In addition, you can create a customized, installable image of SequeLink *for* ODBC Client with predefined, site-specific settings, including data source files created with the SequeLink Data Source SyncTool. This customized, installable image is called a *Quick Install image*. For more information about creating Quick Install images, refer to the *SequeLink Installation Guide*.

The window title bar of the SequeLink Data Source SyncTool indicates whether you, or the end user, is performing an export or an import operation. Also, context-sensitive online help is available by clicking ? on the title bar; then, click the area about which you want more information.





Exporting ODBC Client Data Sources

- 1 From the SequeLink program manager group, double-click the **ODBC Data Source SyncTool Administrator** icon. The SequeLink *for* ODBC Data Source SyncTool Administrator Welcome window appears.
- 2 Select the **Manage Data Sources Files** option; then, click **Next**.
- 3 Select a data source file from the Filename list box, or click **Browse** to find a data source file not listed. The default extension for a data source file is .DSF.

To create a new data source file, Click **New**.

- 4 Select whether you want to export User or System data sources to the data source file you selected; then click **Next**.
- 5 Select the data sources you want to export to the data source file.

NOTE: You cannot export grayed-out data sources, which are data sources that are configured for a previous incompatible version of the ODBC driver.

- 6 Using the following symbols, verify that the appropriate actions will be performed on the data sources in the data source file; then, click **Next**.
 -  The data source will remain unchanged.
 -  The data source will be added to the data source file.
 -  The data source will be deleted from the data source file.
 -  The data source will be updated in the data source file.
- 7 Type a description for the data source file; then, click **Next**. This description will appear when the end user selects this file for importing.

- 8 Select the mode the end user will use to import these data sources; then, click **Next**.
 - *Interactive mode* allows the user to select which data sources will be imported. This mode is not supported by the Quick Install feature; the Quick Install feature supports only data source files created with the Merge or Overwrite options. For instructions on creating Quick Install images, refer to the *SequeLink Installation Guide*.
 - *Merge mode* adds or updates all the data sources in the data source file without deleting other data sources.
 - *Overwrite mode* adds or updates the data sources in the data source file and deletes any other data sources configured for the ODBC driver.
- 9 Select the option that will determine how the end user will be able to import the data sources you exported to the data source file; then, click **Next**.
 - *Suggest SequeLink User DSN*. When imported, the SequeLink for ODBC Data Source SyncTool will suggest to the end user that these data sources be imported as User data sources, but will allow them to be imported as User or System data sources.
 - *Suggest SequeLink System DSN*. When imported, the SequeLink for ODBC Data Source SyncTool will suggest to the end user that these data sources be imported as System data sources, but will allow them to be imported as User or System data sources.
 - *Force SequeLink User DSN*. When imported, the SequeLink for ODBC Data Source SyncTool will allow these data sources to be imported as User data sources only.
 - *Force SequeLink System DSN*. When imported, the SequeLink for ODBC Data Source SyncTool will allow these data sources to be imported as System data sources only.
- 10 Click **Finish** to quit.

Importing ODBC Client Data Sources

The SequeLink administrator and end user use a different implementation of the SequeLink *for* ODBC Data Source SyncTool to import ODBC data source definitions.

To import ODBC client data sources:





- 1 From the SequeLink program manager group, double-click the appropriate ODBC SyncTool icon. The Welcome window appears.

- 2 Select the **Import** option, and click **Next**.

NOTE: If using the SequeLink *for* ODBC Data Source SyncTool Administrator, select the **Import Data Sources** option; then, click **Next**.

- 3 Select a data source file from the Filename list box, or click **Browse** to find a data source file not listed. The default extension for data source files is .DSF.
- 4 Indicate whether you want to import the data sources in the data source file you just selected as User or System data sources; then, click **Next**.

- 5 Verify that the appropriate actions will be performed on the data sources on your local machine; then, click **Next**. Depending on the import mode that was set when the data source file was exported, you may see the following symbols:

-  The data source will remain unchanged.
-  The data source will be added to your local machine.
-  The data source will be deleted from your local machine.
-  The data source will be updated to your local machine.

NOTE: Grayed-out data sources are data sources that are configured for a previous incompatible version of the ODBC driver; these data sources will remain unchanged unless you

update them in Interactive mode with a data source configured for the current version of the ODBC driver.

- 6 Click **Finish** to quit.

Unicode and Code Page Support

The ODBC driver fully supports the SQL-W functions that take Unicode arguments, for example, SQLConnectW. This support enables faster processing of wide-characters and allows binding of the SQL_C_WCHAR output type.

On Windows, SQL-W routines map to UTF-16. On UNIX, SQL-W routines map to UTF-8. How the database data types are mapped depends on the database and a number of configuration options.

See [Appendix E "SequeLink Service Attributes" on page 407](#) for information about the SequeLink service attributes that affect configuration. For information about data type mappings, refer to the *SequeLink Developer's Reference*.

11 Configuring the ADO Client

This chapter describes the tasks you may need to perform to configure and manage the SequeLink *for* ADO Client (the ADO Client).

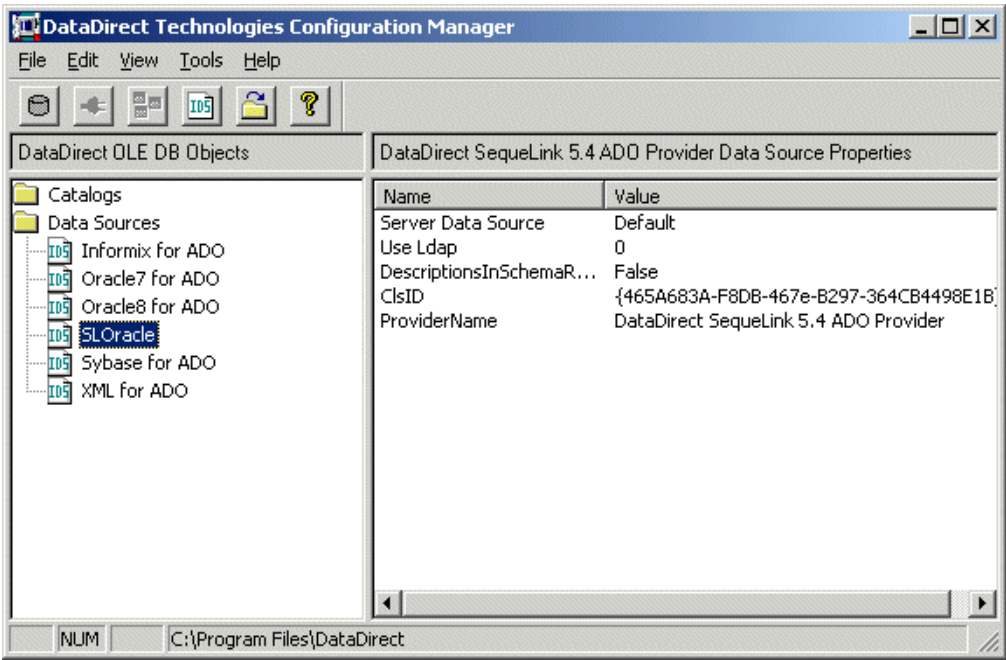
Using the DataDirect Technologies Configuration Manager

To create and configure data sources for the ADO Client, you use the DataDirect Technologies Configuration Manager.

To start the Configuration Manager, select **Start / Programs**, and select **DataDirect SequeLink for ADO 5.4**. Then, select the **DataDirect Configuration Manager** application.

The Configuration Manager window is divided into two panes. As [Figure 11-2 on page 232](#) shows, the left pane displays a folder containing defined ADO data sources. When you select a data source, the right pane displays the properties for the selected data source.

Figure 11-1. DataDirect Technologies Configuration Manager






Double-click the **Data Sources** folder to display any existing ADO data sources. The Configuration Manager displays the ADO data sources contained in the current directory, which is shown in the status bar at the bottom of the Configuration Manager. The first time you start the Configuration Manager, the current directory defaults to the \Program Files\DataDirect\slado54 directory.

Working with the DataDirect Technologies Configuration Manager

Table 11-1 summarizes the parts and functions of the Configuration Manager that you use with ADO data sources.

NOTE: Options that are not supported by the ADO provider are disabled in the toolbar and are omitted from this description.

Table 11-1. DataDirect Technologies Configuration Manager: Parts and Functions for ADO Data Sources

Use this element...	To do this...	
Toolbar		Create new data sources
		Change the current directory
		View online help
Menu Bar	File	■ Create a new data source
		■ Exit from the DataDirect Configuration Manager
	Edit	■ Delete a data source
		■ Rename a data source
		■ Modify a data source
	View	■ View or hide the toolbar and status bar
		■ Refresh the Configuration Manager

Shortcut Tip: Right-clicking an item in the left pane displays a pop-up menu that allows you to perform the same actions that are available from the toolbar and menu bar.

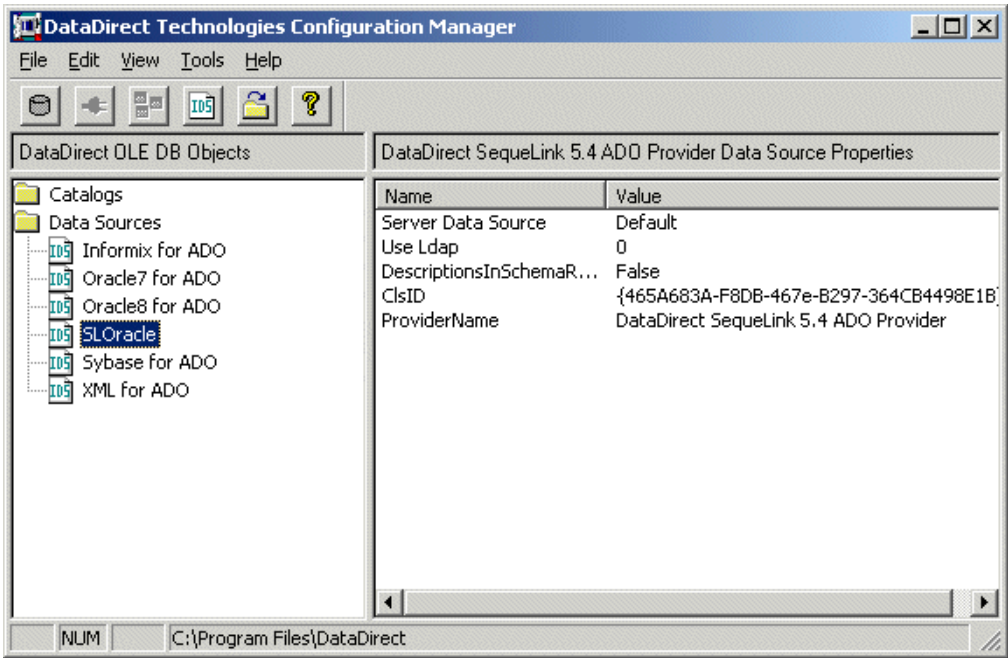
Table 11-1. DataDirect Technologies Configuration Manager: Parts and Functions for ADO Data Sources *(cont.)*

Use this element...	To do this...
Tools	<ul style="list-style-type: none">■ Change the directory in which to look for data sources■ Define a Template data source directory■ Define a Master data source directory
Help	View online help.
Vertical splitter bar	Adjust the size of the left and right panes.
Status bar	<ul style="list-style-type: none">■ Show the current keyboard state, including when Num Lock, Scroll Lock, and Caps Lock are turned on■ Show the current directory
Shortcut Tip: Right-clicking an item in the left pane displays a pop-up menu that allows you to perform the same actions that are available from the toolbar and menu bar.	

Displaying Data Source Properties

- 1 Start the Configuration Manager. To start the Configuration Manager, select **Start / Programs**, and select **DataDirect SequeLink for ADO 5.4**. Then, select the **DataDirect Configuration Manager** application.
- 2 Double-click the **Data Sources** folder to display any existing ADO data sources.
- 3 Highlight a data source in the list. The properties of the data source display in the right pane. For example, the following figure shows the properties of an ADO data source named SequeLink displayed in the right pane.

Figure 11-2. DataDirect Technologies Configuration Manager: Displaying Data Source Properties



You can right-click a data source in the left pane to display a pop-up menu. The pop-up menu offers the same actions for the item that are available from the Edit menu.

To display a setup window for an existing data source, double-click an ADO data source in the Data Sources folder.

To create a new data source, highlight the **Data Sources** folder; then, select **File / New / Data Source** from the menu bar.

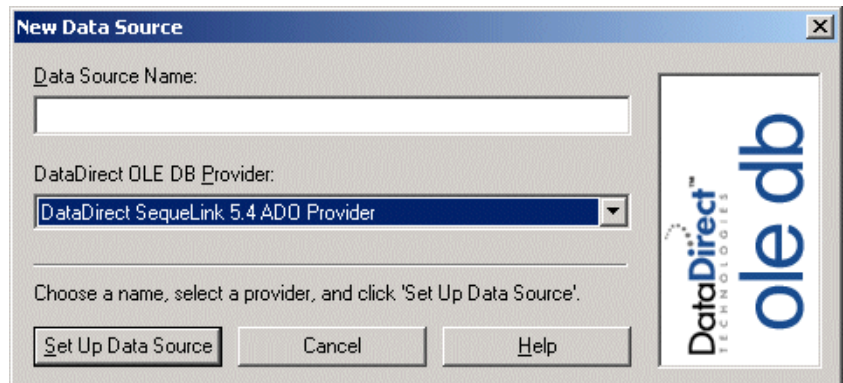
Configuring ADO Client Data Sources

The following sections provide instructions for configuring ADO client data sources:

- ["Creating an ADO Client Data Source" on page 233](#)
- ["Modifying an ADO Client Data Source" on page 236](#)
- ["Renaming an ADO Client Data Source" on page 236](#)
- ["Deleting an ADO Client Data Source" on page 237](#)
- ["Copying an ADO Client Data Source" on page 237](#)
- ["Changing Data Source Directories" on page 239](#)
- ["Defining Default Setup Options" on page 239](#)

Creating an ADO Client Data Source

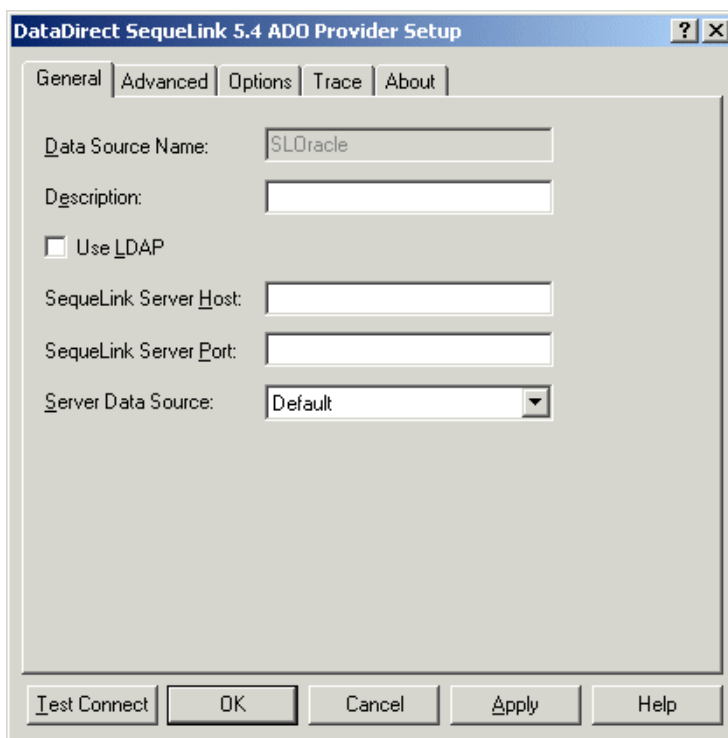
- 1 Start the DataDirect Configuration Manager. To start the Configuration Manager, select **Start / Programs**, and select **DataDirect SequeLink for ADO 5.4**. Then, select the **DataDirect Configuration Manager** application.
- 2 Select **File / New / Data Source** from the menu bar. The New Data Source window appears.



- 3 Type a name for the data source. All data sources located in the same directory must have unique names. If the name has

already been used for another data source, you are prompted to enter a different name.

- 4 In the DataDirect OLE DB Providers drop-down list, select **DataDirect SequeLink 5.4 ADO Provider**.
- 5 Click the **Set Up Data Source** button. The DataDirect SequeLink 5.4 ADO Provider Setup window appears.



NOTE: The General tab displays only fields that are required for creating a data source. The fields on all other tabs are optional, unless noted otherwise.

- 6 Provide the following information.

Data Source Name: This is a read-only field that uniquely identifies this ADO data source configuration. Examples include "Accounting" or "SequeLink to Oracle Data".

Description: Optionally, type a description of the data source. For example, "My Accounting Database" or "Accounting Data in Oracle".

SequeLink Server Host: Type the TCP/IP host name of the SequeLink service to which you want the ADO Client to connect. This field is available only if the Use LDAP check box is **not** selected.

SequeLink Server Port: Type the TCP/IP port the SequeLink service is listening on for incoming connection requests. The port you specify must be the same as the one that was specified for the SequeLink service when the SequeLink Server was installed; the default is 19996. This field is available only if the Use LDAP check box is **not** selected.

Server Data Source: Type the name of a server data source configured for the SequeLink service to use for the connection, or select one from the drop-down list. This field is optional. If a server data source is not specified, the default server data source for that SequeLink service will be used for the connection. This field is available only if the Use LDAP check box is **not** selected.

NOTE FOR LDAP USERS: To configure the ADO Client to retrieve connection information from an LDAP directory, select the **Use LDAP** check box. The fields change on the lower half of the screen to accommodate the information that is required to query an LDAP server for connection information. Provide the following information:

LDAP Server Host: Type the TCP/IP host name of the LDAP server.

LDAP Server Port: Type the TCP/IP port on which the LDAP server is listening for incoming connection requests. If unspecified, the ADO Client will use the default LDAP port 389.

Distinguished Name (DN): Type an identifier that uniquely identifies the LDAP entry where connection information is stored.

See [Appendix A "Using LDAP with ODBC and ADO Clients" on page 351](#) for more information about retrieving connection information from LDAP directories.

NOTE: All data sources are saved to the current directory displayed in the Configuration Manager. See ["Changing Data Source Directories" on page 239](#) for instructions on changing the current directory.

Modifying an ADO Client Data Source

To modify the properties of a data source, double-click the data source in the Data Sources folder of the Configuration Manager to display the SequeLink for ADO Provider Setup window. See ["Creating an ADO Client Data Source" on page 233](#) for a description of the fields you can change.

Renaming an ADO Client Data Source

You can rename data sources. You cannot rename or delete the Data Sources folder.

To rename an ADO provider data source:

- 1 Start the Configuration Manager. To start the Configuration Manager, select **Start / Programs**, and select **DataDirect SequeLink for ADO 5.4**. Then, select the **DataDirect Configuration Manager** application.
- 2 Select the data source you want to rename.

- 3 Select **Edit / Rename**. The data source name becomes an editable field.
- 4 Type the new name of the data source and press ENTER.

Deleting an ADO Client Data Source

- 1 Start the Configuration Manager. To start the Configuration Manager, select **Start / Programs**, and select **DataDirect SequeLink for ADO 5.4**. Then, select the **DataDirect Configuration Manager** application.
- 2 Select the data source you want to delete.
- 3 Select **Edit / Delete**.
- 4 A window appears prompting you to confirm the deletion. Click **Yes** to delete the selected data source.

After you change the current directory, the left pane of the Configuration Manager is automatically refreshed to display the data sources in the new directory. The current directory remains active until you change it again. Any data sources you create are saved to the current directory.

Copying an ADO Client Data Source

Copying a data source can make it easier for you to configure new data sources that use the same properties as existing data sources. When you copy a data source, the copied data source retains all the properties of the original data source. After copying, you can modify the properties of the data source as needed.

To copy a data source:

- 1 In Windows Explorer, navigate to the directory that contains the data source you want to copy. All ADO provider data sources use .IDS as their file extension. For example, if the data source name appears as TEST in the Configuration Manager, the name of the data source file is TEST.IDS.

NOTE: The directory location of a data source displayed in the Configuration Manager appears in the status bar at the bottom of the Configuration Manager.

- 2 Copy the data source to the Windows Explorer clipboard; then, perform one of the following actions:
 - To copy to a different directory, navigate to the directory you want to copy to and paste the data source in that new directory. You can use the same data source name.
 - To copy to the same directory, paste the data source; then, rename the data source to a *unique* name.
- 3 To display the new data source in the Configuration Manager, perform one of the following actions:
 - If you copied the data source to a different directory, make that directory the current directory in the Configuration Manager by selecting **Tools / Options / Main Data Source Directory**. The new data source appears in the Data Sources folder.
 - If you copied the data source to the same directory and renamed the data source, select **View / Refresh** in the Configuration Manager. The new data source appears in the Data Sources folder.

Changing Data Source Directories

The Configuration Manager displays the ADO data sources contained in the current directory, which is displayed in the status bar at the bottom of the Configuration Manager. The first time you start the Configuration Manager, the current directory defaults to the ADO Client installation directory.

To change the current directory:



- 1 Click the **Change main Data Source directory** button on the tool bar.
- 2 Type the name of the new directory in the Current Directory field, or, click the **Browse** button to select a different directory.
- 3 Click **OK**.

After you change the current directory, the left pane of the Configuration Manager is automatically refreshed to display the data sources in the new directory. The current directory remains active until you change it again. Any data sources you create are saved to the current directory.

Defining Default Setup Options

The Configuration Manager supports configurable default setup options and override options through the use of a template data source file and a master data source file, respectively.

A template data source file is used by the Configuration Manager to populate values in the fields of the Setup dialog box when a user creates a new data source. By creating a template data source file, you can define the default setup options (default values for newly created data sources). The user can change these default values when setting up a new data source.

A master data source file is used to provide global connection options. The options set in the master data source file override connection options set any other way (for example, by the data source specified by an application or a connection string) when an application is connecting to the database.

Creating a Template Data Source File

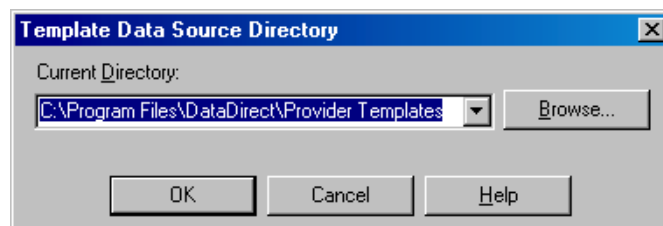
You can define template data source files to simplify the creation of data source files. A template data source file allows you to define the default setup options for SequeLink data providers. The Configuration Manager supplies these values in the Setup dialog box when a user creates a new data source. The user can change these default values when setting up a new data source.

To create a template data source file:

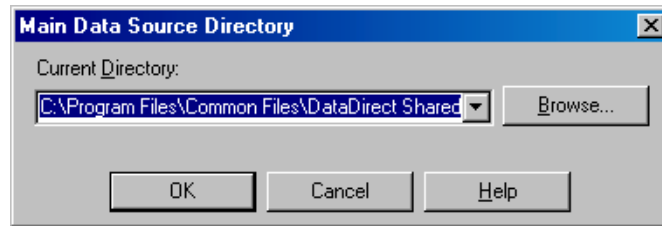
- 1 Create a directory in which to store the template data source file.

IMPORTANT: The template data source directory cannot be the same as the directory for other data sources.

- 2 In the Configuration Manager window, select **Tools / Options / Template Data Source Directory**. Specify the directory that you created in Step 1; then, click **OK**.



- 3 Select **Tools / Options / Main Data Source Directory**. Specify the template directory; then, click **OK**. This sets the template directory as the location in which to create the template data source file.



- 4 Create a data source, defining the values that will be most commonly used. This will be your template data source file for the specified data provider.
- 5 Select **Tools / Options / Main Data Source Directory**. Specify the directory that contains your data sources; then, click **OK**.

Creating a Master Data Source File

You can define a master data source file that overrides connection options set any other way. This allows you to control the way that users connect to the database.

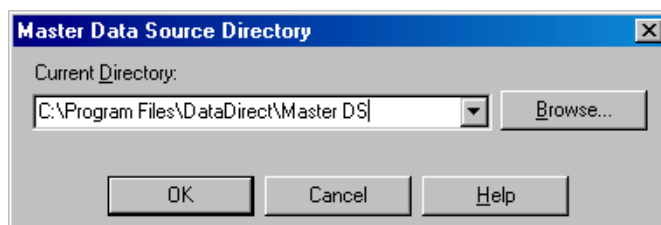
During connection, the Main data source directory is checked for a data source, and connection values are retrieved. If a Master data source directory exists, it is then checked for the same data source. The connection settings for user data sources will be overridden by the master data source file.

To create a master data source file:

- 1 Create a directory in which to store the master data source file.

IMPORTANT: The master data source directory cannot be the same as the directory for template data sources or any other data provider data sources.

- 2 In the Configuration Manager window, select **Tools / Options / Master Data Source Directory** and specify the directory that you created in Step 1. The master data source file will be used at connection time.



- 3 Select **Tools / Options / Main Data Source Directory**. Specify the master data source directory; then, click **OK**. This sets the master data source directory as the location in which to create the master data source file.
- 4 Create one or more data sources. The data sources in this directory will be your master data source files for the specified data providers.
- 5 Select **Tools / Options / Main Data Source Directory**. Specify the directory that contains your data sources; then, click **OK**.

Connecting to an ADO Data Source

You can connect to a data source using a Connection window, or using a provider string. For information about connecting using an ADO provider string, refer to the *SequeLink Developer's Reference*.

Testing ADO Connections

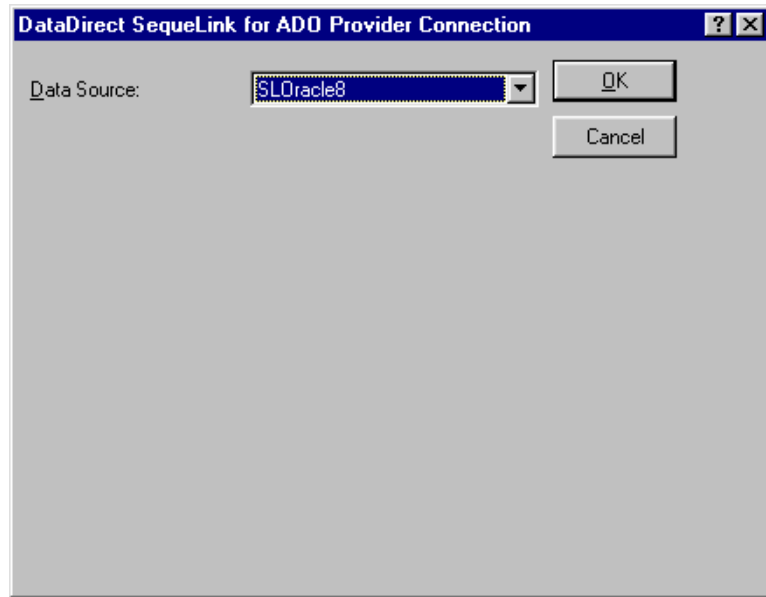
The ADO provider opens a Connection window when you perform either of the following actions:

- You request a connection to an ADO provider from within your data consumer, and your data consumer requests the ADO provider to prompt for missing connection parameters.
- You click **Test Connect** in an ADO provider setup window to test the connection to a data source you have set up.

See "[ADO Connection Dialogs](#)" on page 244 for more information about ADO connection dialogs that may appear.

ADO Connection Dialogs

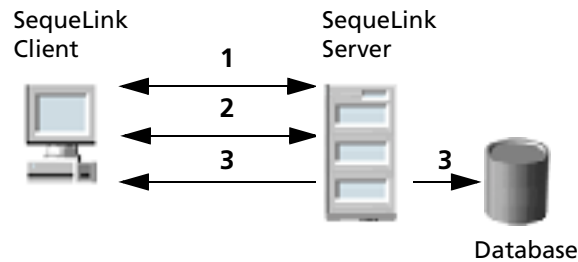
When your data consumer requests the ADO provider to prompt for missing connection parameters and an ADO data source has not been specified, the DataDirect SequeLink for ADO Provider Connection window appears.



Select the data source that you want to use from the drop-down list. If you do not want to specify a data source name, select **None** from the drop-down list. In some cases, the data source name may be supplied automatically. Then, click **OK**.

The other connection dialogs that may appear involve prompting for information required to make a SequeLink data access connection.

A SequeLink data access connection involves the following stages:



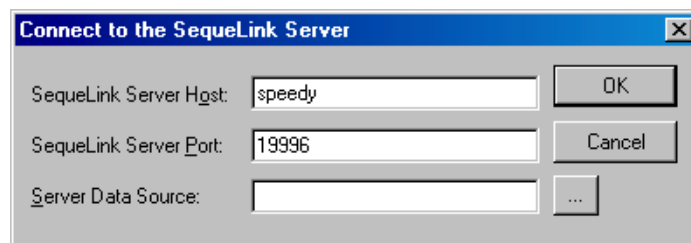
- 1 A network connection is established.
- 2 An authentication mechanism is used to establish the identity of the SequeLink Client to the SequeLink Server.
- 3 Based on information provided by the SequeLink Client application (for example, a database user name and password), a database connection is established.

Stage 1: Establishing a Network Connection

The first stage of the connection process involves establishing a network connection. The dialog that appears depends on whether the connection has been configured to connect directly to a SequeLink service or to retrieve connection information for the SequeLink service from a centralized LDAP directory.

Connecting Directly to a SequeLink Service

If the connection has been configured to connect directly to a SequeLink service, the Connect to the SequeLink Server dialog box appears.



Provide the following information; then, click **OK**.

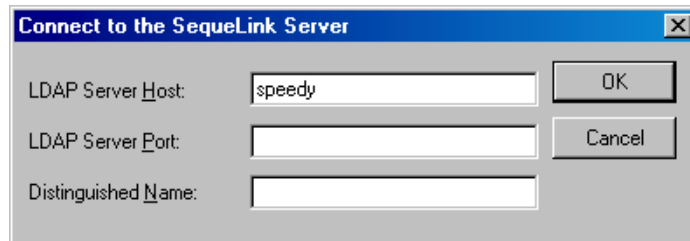
SequeLink Server Host: Type the TCP/IP host name of the SequeLink service.

SequeLink Server Port: Type the TCP/IP port on which the SequeLink service is listening. A default installation of SequeLink Server uses the port 19996.

Server Data Source: Type the name of a server data source to use for the connection or click the ... button to select an existing data source. This step is optional. If a server data source is not specified, the default server data source for that service will be used for the connection.

Retrieving Connection Information from an LDAP Directory

If the connection has been configured to connect to an LDAP server to retrieve connection information from an LDAP directory, the Connect to the SequeLink Server dialog box appears.

A screenshot of a Windows-style dialog box titled "Connect to the SequeLink Server". It contains three text input fields: "LDAP Server Host:" with the text "speedy" entered, "LDAP Server Port:" which is empty, and "Distinguished Name:" which is empty. To the right of the fields are two buttons: "OK" and "Cancel".

Provide the following information; then, click **OK**.

LDAP Server Host: Type the TCP/IP host name of the LDAP server.

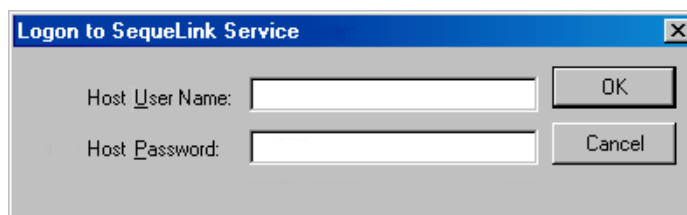
LDAP Server Port: Type the TCP/IP port on which the LDAP server is listening.

Distinguished Name: Type the Distinguished Name (DN) of the LDAP entry.

Stage 2: SequeLink Server Authentication

The second stage of the connection process involves authentication of the SequeLink Client to the SequeLink Server. The dialog boxes that appear depend on how authentication is configured for the SequeLink service.

- When ServiceAuthMethods=anonymous or ServiceAuthMethods=integrated_nt, no dialogs appear.
- When ServiceAuthMethods=OSLogon(HUID,HPWD) or ServiceAuthMethods=OSLogon(UID,PWD), the Logon to SequeLink Service dialog box appears.



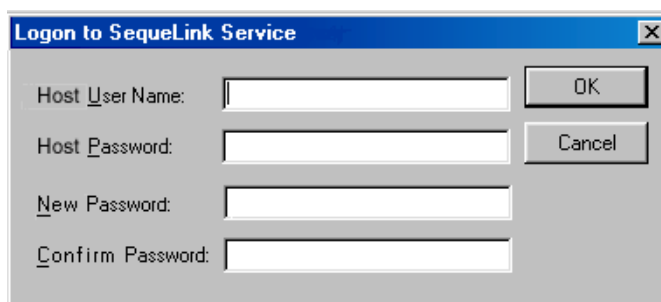
Provide the following information; then, click **OK**.

Host User Name: Type the host user name.

NOTE: When connecting to a Windows server, you must prefix the host user name with a server name, if authenticating to a local server, or a domain name (for example, SALES\DJONES). If the server name or domain name is omitted, the SequeLink Server will attempt to authenticate the user ID and password with the database account defined for the machine on which the SequeLink Server is running. If this validation fails, the SequeLink Server will attempt to authenticate the user ID and password with the database account defined for the domain of the machine on which the SequeLink Server is running.

Host Password: Type the host password.

- When `ServiceAuthMethods=OSLogon(HUID,HPWD,NPWD)` or `ServiceAuthMethods=OSLogon(UID,PWD,NPWD)` and the password is expired, the Logon to SequeLink Service dialog box appears.



NOTE: If the password is not expired, the previous dialog appears. You are only prompted for the Host User Name and Host Password.

Provide the following information; then, click **OK**.

Host User Name: Type the host user name.

NOTE: When connecting to a Windows server, you must prefix the host user name with a server name, if authenticating to a local server, or a domain name (for example, SALES\DJONES). If the server name or domain name is omitted, the SequeLink Server will attempt to authenticate the user ID and password with the database account defined for the machine on which the SequeLink Server is running. If this validation fails, the SequeLink Server will attempt to authenticate the user ID and password with the database account defined for the domain of the machine on which the SequeLink Server is running.

Host Password: Type the host password.

New Password: Type the new password to be used by the SequeLink password change mechanism.

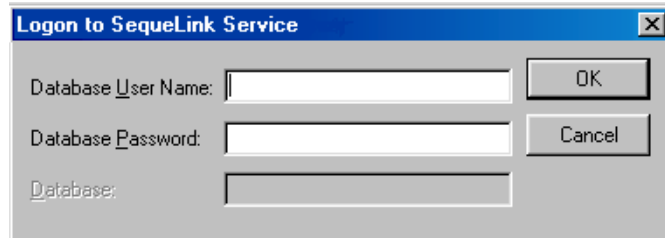
Confirm Password: Type again the new password to confirm it.

See [Chapter 14, "Configuring SequeLink Security,"](#) on page 281 for more information about configuring authentication.

Stage 3: Data Store Logon

The last stage of the connection process involves logging on the data store. The dialogs that appear depend on the data store logon method configured for the SequeLink service:

- When `DataSourceLogonMethod=OSIntegrated`, no dialogs appear.
- When `DataSourceLogonMethod=DBMSLogon(UID,PWD)` or `DataSourceLogonMethod=DBMSLogon(DBUID,DBPWD)`, a data store-specific user name and password are required and the Logon to SequeLink Service dialog box appears.



Provide the following information; then, click OK.

Database User Name: Type the database logon ID.

Database Password: Type the database password.

Database: Type the name of the database to which you want to connect. This field is disabled when the data store does not recognize the concept of databases.

See [Chapter 14, "Configuring SequeLink Security," on page 281](#) for more information about configuring data store logon methods.

Connecting with a Provider String

Once a data source is defined through the DataDirect Configuration Manager and the SequeLink *for* ADO Provider Setup Assistant, your application can connect directly to that data source. You can override the current settings for the data source when you connect using a *provider string*.

A provider string contains *attribute=value* pairs that control various aspects of the data provider's connection and interaction with the database. When an application names a specific data source to connect to, the application can also pass the data provider a provider string of *attribute=value* pairs. The data provider uses the values in the provider string instead of the default values defined for the data source in the system information.

Using provider strings allows application developers to configure connections for users programmatically and ensures that users have the optimum settings for working with the provider and database. Any values a user has set for a data source through the DataDirect Configuration Manager are overridden by corresponding values in the provider string for the current session only.

The provider string sets the DBPROP_INIT_PROVIDERSTRING initialization property and has the form:

```
"attribute=value;attribute=value;"
```

For a list of ADO connection attributes, refer to the *SequeLink Developer's Reference*.

Importing and Exporting ADO Client Data Sources



The SequeLink Data Source SyncTool allows you to export ADO client data source definitions to data source files and distribute them to multiple end users. The SequeLink Data Source SyncTool provides two user implementations, one for the SequeLink administrator and another for the end user:

- The SequeLink *for* ADO Data Source SyncTool Administrator is used by the SequeLink administrator to create data source files. It can import and export data sources. This tool should be made available to the SequeLink administrator only.
- The SequeLink *for* ADO Data Source SyncTool is used by the end user and can import data sources only. It should be installed on every SequeLink *for* ADO Client.

In addition, you can create a customized, installable image of SequeLink *for* ADO Client with predefined, site-specific settings, including data source files created with the SequeLink Data Source SyncTool. This customized, installable image is called a *Quick Install image*. For more information about creating Quick Install images, refer to the *SequeLink Installation Guide*.

The window title bar of the SequeLink Data Source SyncTool indicates whether you, or the end user, is performing an export or an import operation. Also, context-sensitive online help is available by clicking ? on the title bar; then, clicking the area about which you want more information.

Exporting ADO Client Data Sources

- 1 From the SequeLink program manager group, double-click the **ADO Data Source SyncTool Administrator** icon. The SequeLink *for* ADO Data Source SyncTool Administrator Welcome window appears.

- 2 Select the **Manage Data Sources Files** option; then, click **Next**.

- 3 Select a data source file from the Filename list box, or click **Browse** to find a data source file not listed. The default extension for data source files is .OSF.





To create a new data source file, click **New**.

- 4 Select whether you want to export User or System data sources to the data source file you selected; then click **Next**.

- 5 Select the data sources you want to export to the data source file.

NOTE: You cannot export grayed-out data sources, which are data sources that are configured for a previous incompatible version of the ADO provider.

- 6 Using the following symbols, verify that the appropriate actions will be performed on the data sources in the data source file:

-  The data source will remain unchanged.
-  The data source will be added to the data source file.
-  The data source will be deleted from the data source file.
-  The data source will be updated in the data source file.

- 7 Type a description for the data source file; then, click **Next**. This description will appear when the end user selects this file for importing.

- 8 Select the mode the end user will use to import these data sources; then, click **Next**.
 - *Interactive mode* allows the user to select which data sources will be imported. This mode is not supported by the Quick Install feature; the Quick Install feature supports only data source files created with the Merge or Overwrite options. For instructions on creating Quick Install images, refer to the *SequeLink Installation Guide*.
 - *Merge mode* adds or updates all the data sources in the data source file without deleting other data sources.
 - *Overwrite mode* adds or updates the data sources in the data source file and deletes any other data sources configured for the ADO provider.
- 9 Select the option that will determine how the end user will be able to import the data sources you exported to the data source file; then, click **Next**.
 - *Suggest SequeLink User DSN*. When imported, the SequeLink for ADO Data Source SyncTool will suggest to the end user that these data sources be imported as User data sources, but will allow them to be imported as User or System data sources.
 - *Suggest SequeLink System DSN*. When imported, the SequeLink for ADO Data Source SyncTool will suggest to the end user that these data sources be imported as System data sources, but will allow them to be imported as User or System data sources.
 - *Force SequeLink User DSN*. When imported, the SequeLink for ADO Data Source SyncTool will allow these data sources to be imported as User data sources only.
 - *Force SequeLink System DSN*. When imported, the SequeLink for ADO Data Source SyncTool will allow these data sources to be imported as System data sources only.
- 10 Click **Finish** to quit.

Importing ADO Client Data Sources

The SequeLink administrator and end user use a slightly different implementation of the SequeLink *for* ADO Data Source SyncTool to import ADO data source definitions.





To import ADO client data sources:

- 1 From the SequeLink program manager group, double-click the appropriate ADO SyncTool icon. The Welcome window appears.

- 2 Select the **Import** option; then, click **Next**.

NOTE: If using the SequeLink *for* ADO Data Source SyncTool Administrator, select the **Import Data Sources** option, and click **Next**.

- 3 Select a data source file from the Filename list box, or click **Browse** to find a data source file not listed. The default extension for data source files is .OSF.
- 4 Verify that the appropriate actions will be performed on the data sources on your local machine; then, click **Next**. Depending on the import mode that was set when the data source file was exported, you may see the following symbols:

-  The data source will remain unchanged.
-  The data source will be added to your local machine.
-  The data source will be deleted from your local machine.
-  The data source will be updated to your local machine.

NOTE: Grayed-out data sources are data sources that are configured for a previous incompatible version of the ADO provider; these data sources will remain unchanged unless you update them in Interactive mode with a data source configured for the current version of the ADO provider.

- 5 Click **Finish** to quit.

Code Page Support

Using the standard service template and the OS setting for ServiceCodePage, the ADO Client transliterates character data from the code page the SequeLink service is using to the code page of the client application/system. This option enables support for single-byte character sets (SBCS) and multi-byte character sets (MBCS).

See [Appendix E "SequeLink Service Attributes" on page 407](#) for information about the SequeLink service attributes that affect configuration. For information about data type mappings, refer to the *SequeLink Developer's Reference*.

12 Configuring the JDBC Client

This chapter describes the tasks you perform to configure and manage the SequeLink *for* JDBC Client (the JDBC Client).

About JDBC Connections

You can open a JDBC connection to a SequeLink service by specifying a JDBC connection URL or configuring a JDBC client data source. This section explains how to connect to a SequeLink service using connection URLs. For information about configuring JDBC client data sources, refer to the *SequeLink Developer's Reference*.

Specifying JDBC Driver Connection URLs

The connection URL format depends on whether you are using SSL encryption. See [Chapter 15, "Configuring the SequeLink Proxy Server," on page 319](#) for more information about SSL encryption.

If not using SSL encryption, the connection URL format is:

```
jdbc:sequelink://hostname:port[;key=value]...
```

If using SSL encryption, the connection URL format is:

```
jdbc:sequelink:ssl://hostname:port[;key=value]...
```

where:

<i>hostname</i>	is the TCP/IP address or TCP/IP host name of the SequeLink server to which you are connecting. NOTE: Untrusted applets cannot open a socket to a machine other than the originating host. See "Using the SequeLink Proxy Server" on page 319 for more information about untrusted applets.
<i>port</i>	is the TCP/IP port on which the SequeLink server is listening. A default installation of SequeLink Server uses the port 19996.
<i>key=value</i>	specifies connection properties. For a list of connection properties and their valid values, see "JDBC Connection Properties" on page 260 .

Connection URL Examples

The following examples show some typical JDBC driver connection URLs:

```
jdbc:sequelink://sequelinkhost:19996;

jdbc:sequelink://189.23.5.25:19996;user=john;
password=whatever

jdbc:sequelink://189.23.5.132:19996;databaseName=stores7

jdbc:sequelink://189.23.5.68:19996;databaseName=pubs;
HUser=john;HPassword=whatever

jdbc:sequelink://sequelinkhost:4006;
databaseName=pubs;DBUser=john;DBPassword=whatever

jdbc:sequelink:ssl://mysecurehost:9500;
cipherSuites=SSL_DH_anon_WITH_RC4_128_MD5
```

```
jdbc:sequelink:ssl://mysecurehost:9502;
cipherSuites=SSL_DHE_RSA_WITH_DES_CBC_SHA;
certificateChecker=CheckAgainstCertificateFromJar
```

The preceding examples do not show the user and password connection properties. Typically, these properties are specified in the connection properties stored in the `java.util.Properties` object, which is supplied as a parameter to the `getConnection` method.

Specifying Connection Properties

You can specify connection properties using a connection URL, the JDBC Driver Manager, or JDBC data sources. This section describes how to specify connection properties using connection URLs or the JDBC Driver Manager. For information about specifying connection properties using JDBC data sources, refer to the *SequeLink Developer's Reference*.

To specify connection properties using a connection URL or the JDBC Driver Manager:

In order of precedence, you can specify connection properties using:

- `getConnection(url, user, password)`, where *user* and *password* are specified using the `getConnection` method defined in `java.sql.DriverManager`.
- `java.util.properties` object.
- Connection URL specified using the URL parameter of the `getConnection` method defined in `java.sql.DriverManager`
- Server data sources specified using the SequeLink Manager

For a list of the connection properties, see ["JDBC Connection Properties" on page 260](#).

JDBC Connection Properties

Table 12-1 lists the JDBC connection properties supported by the JDBC driver, describes each property, and specifies the methods with which it can be specified.

Table 12-1. JDBC Properties

Property	Description
allowPrefetch	<p>allowPrefetch={0 1}. Enables the prefetch feature. When enabled, the JDBC driver requests a next set of rows from the server while the client application is processing the previous set of rows.</p> <p>The initial default value is 0.</p> <p>When set to 1, the prefetch feature is enabled. Overall throughput increases, if the application always fetches all rows from a result set. When this feature is enabled and the application does not fetch all data from result sets, performance can be significantly degraded.</p> <p>When set to 0, the prefetch feature is disabled.</p> <p>This property can be specified using:</p> <ul style="list-style-type: none">■ JDBC data source■ URL■ java.util.properties■ server data source
ApplicationName	<p>Identifies the application that is establishing the connections. When the application does not provide a value, the initial default value is SequeLink for JDBC Application.</p> <p>This property can be specified using:</p> <ul style="list-style-type: none">■ JDBC data source■ URL■ java.util.properties

Table 12-1. JDBC Properties (cont.)

Property	Description
blockFetchForUpdate	<p>blockFetchForUpdate={0 1}. Specifies a workaround connection attribute. When the isolation level is Read Committed and a SELECT FOR UPDATE statement is issued against some data stores, the JDBC Client does not lock the expected row.</p> <p>The initial default value is 1.</p> <p>When set to 0, the appropriate row is locked.</p> <p>When set to 1, the appropriate row is not locked.</p> <p>IMPORTANT: Specifying 0 will degrade performance for SELECT FOR UPDATE statements because rows will be fetched one at a time.</p> <p>This property can be specified using:</p> <ul style="list-style-type: none"> ■ JDBC data source ■ URL ■ java.util.properties ■ server data source
certificateChecker	<p>The fully qualified class name of a user-defined server certificate checker class. When the SequeLink Client and SequeLink Server have agreed on an SSL cipher suite that requires a server certificate, this class is used to verify the server certificate on behalf of the client. The class must be an implementation of the <code>com.ddtek.sequelink.cert.CertificateCheckerInterface</code> interface.</p> <p>This property can be specified using:</p> <ul style="list-style-type: none"> ■ JDBC data source ■ URL ■ java.util.properties <p>See "Verifying the SequeLink Proxy Server Certificate" on page 339 for more information about certificate checker classes.</p>

Table 12-1. JDBC Properties (cont.)

Property	Description
cipherSuites	<p>The Secure Socket Layer (SSL) cipher suites with which the JDBC Client can use to connect. This property is required when networkProtocol=ssl.</p> <p>See "SSL Cipher Suites" on page 330 for a list of supported cipher suites.</p> <p>This property can be specified using:</p> <ul style="list-style-type: none">■ JDBC data source■ URL■ java.util.properties
databaseName	<p>The name of the data store to which you want to connect.</p> <p>This property can be specified using:</p> <ul style="list-style-type: none">■ JDBC data source■ URL■ java.util.properties■ server data source
DBPassword	<p>The data store password, which may be required depending on the server configuration.</p> <p>This property can be specified using:</p> <ul style="list-style-type: none">■ JDBC data source■ URL■ java.util.properties
DBUser	<p>The data store user name, which may be required depending on the server configuration.</p> <p>This property can be specified using:</p> <ul style="list-style-type: none">■ JDBC data source■ URL■ java.util.properties
description	<p>A description of the connection or data source.</p> <p>This property can be specified using:</p> <ul style="list-style-type: none">■ JDBC data source

Table 12-1. JDBC Properties (cont.)

Property	Description
HPassword	<p>The host password, which may be required depending on the server configuration.</p> <p>This property can be specified using:</p> <ul style="list-style-type: none"> ■ JDBC data source ■ URL ■ java.util.properties
HUser	<p>The host user name, which may be required depending on the server configuration.</p> <p>This property can be specified using:</p> <ul style="list-style-type: none"> ■ JDBC data source ■ URL ■ java.util.properties
insensitiveResultSetBuffer	<p>The memory caching scheme for scroll-insensitive cursors.</p> <p>The initial default value is 2058 KB.</p> <p>When set to 0, the driver uses a memory caching mechanism that does not use disk overflow.</p> <p>When set to a value greater than 0, data overflows to disk when the size of cached data exceeds the specified amount, specified in kilobytes.</p> <p>When set to a value less than 0, the data provider provides better performance. However, memory use may be affected.</p> <p>This property can be specified using:</p> <ul style="list-style-type: none"> ■ JDBC data source ■ URL ■ java.util.properties

Table 12-1. JDBC Properties (cont.)

Property	Description
MSSMapLongtoDecimal	<p>Turns on client-side workarounds that allow you to take full advantage of the JDBC driver with JDBC applications that require non-standard or extended behavior. See Appendix E "SequeLink Service Attributes" on page 407 for more information.</p> <p>This property can be specified using:</p> <ul style="list-style-type: none">■ JDBC data source■ URL■ java.util.properties■ server data source
networkProtocol	<p>networkProtocol={socket ssl}. Specifies the protocol to be used.</p> <p>The initial default value is socket.</p> <p>When set to socket, SSL encryption is not used.</p> <p>When set to ssl, SSL encryption is used.</p> <p>This property can be specified using:</p> <ul style="list-style-type: none">■ JDBC data source■ URL■ java.util.properties
newPassword	<p>The new host password to be used. If specified and applicable to the connection, the SequeLink password change mechanism is invoked. When the password has been changed successfully, the following warning is returned:</p> <pre>[DataDirect] [SequeLink JDBC driver] [SequeLink Server] The user password was changed successfully</pre> <p>This property can be specified using:</p> <ul style="list-style-type: none">■ JDBC data source■ URL■ java.util.properties <p>See Chapter 14, "Configuring SequeLink Security," on page 281 for more information about the SequeLink password change mechanism.</p>

Table 12-1. JDBC Properties (cont.)

Property	Description
ORANumberOfIsNumeric	<p>Turns on client-side workarounds that allow you to take full advantage of the JDBC driver with JDBC applications that require non-standard or extended behavior. See Appendix E "SequeLink Service Attributes" on page 407 for more information.</p> <p>This property can be specified using:</p> <ul style="list-style-type: none"> ■ JDBC data source ■ URL ■ java.util.properties ■ server data source
password	<p>The host or data store password, which may be required depending on the server configuration.</p> <p>This property can be specified using:</p> <ul style="list-style-type: none"> ■ getConnection ■ JDBC data source ■ URL ■ java.util.properties
portNumber	<p>The TCP/IP port on which the SequeLink service is listening.</p> <p>This property can be specified using:</p> <ul style="list-style-type: none"> ■ JDBC data source ■ URL
serverDataSource	<p>A property that specifies a string to identify the server data source to be used for the connection. If unspecified, the configuration of the default server data source will be used for the connection.</p> <p>This property can be specified using:</p> <ul style="list-style-type: none"> ■ JDBC data source ■ URL ■ java.util.properties

Table 12-1. JDBC Properties (cont.)

Property	Description
serverName	<p>The TCP/IP address of the SequeLink server in dotted format or host name format.</p> <p>This property can be specified using:</p> <ul style="list-style-type: none">■ JDBC data source■ URL
SLKStaticCursorLongColBuffLen	<p>The amount of data (in KB) that is buffered for SQL_LONGVARCHAR and SQL_LONGVARBINARY columns with an insensitive result set.</p> <p>The initial default value is 4.</p> <p>This property can be specified using:</p> <ul style="list-style-type: none">■ JDBC data source■ URL■ java.util.properties■ server data source
spyAttributes	<p>A property that enables Spy when making connections with a JDBC data source.</p> <p>This property only can be specified using a JDBC data source.</p>
user	<p>The host or data store user name, which may be required depending on the server configuration.</p> <p>This property can be specified using:</p> <ul style="list-style-type: none">■ getConnection■ JDBC data source■ URL■ java.util.properties

Testing JDBC Connections

This section describes how to test your connection with DataDirect Test for JDBC. For more information about using DataDirect Test, refer to the *SequeLink Developer's Reference*.

To connect with the JDBC Client using DataDirect Test for JDBC:

- 1 Start DataDirect Test as a Java application or applet.



- *As a Java application on Windows:* Run the TestForJDBC.bat file located in the testforjdbc directory.

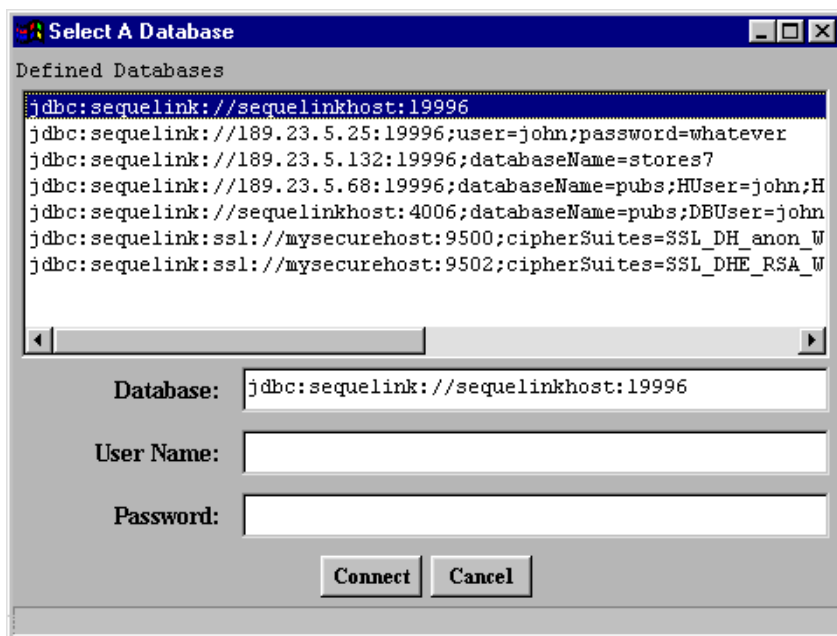


- *As a Java application on UNIX:* Run the TestForJDBC.sh shell script located in the testforjdbc directory.

- 2 From the DataDirect Test Welcome window, click the **Press Here To Continue** button. The DataDirect Test window appears.
- 3 Select **Driver / Register Driver**. DataDirect Test prompts you for the JDBC driver you want to load.
- 4 In the Please Supply a Driver URL field, make sure that the following driver is specified; then, click **OK**.

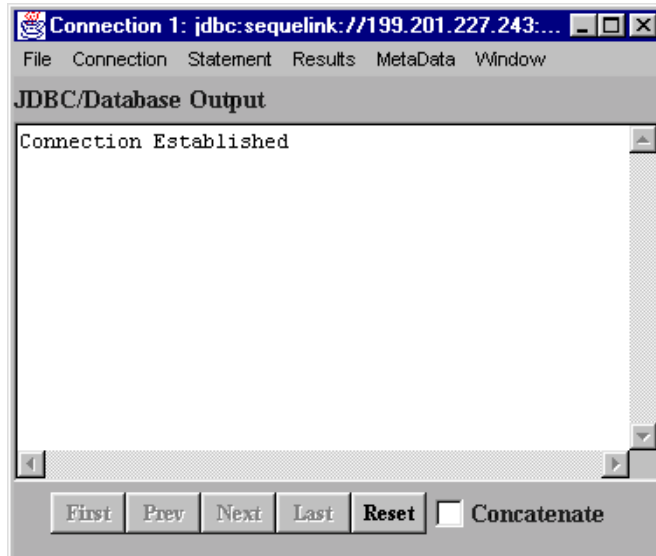
`com.ddtek.jdbc.sequelink.SequeLinkDriver`

- 5 Select **Connection / Connect To DB**. The Select A Database window appears with a list of default JDBC driver connection URLs.



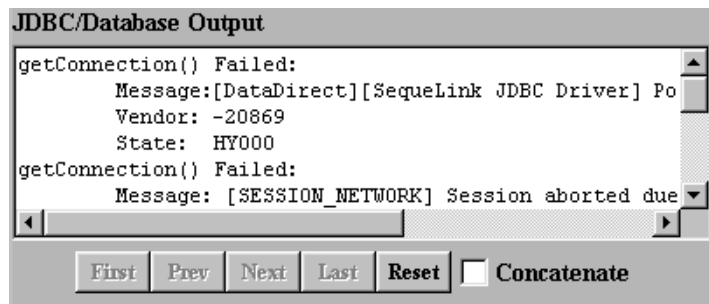
- 6 Select one of the default JDBC driver connection URLs. In the Database field, modify the default values of the connection URL appropriately for your environment.
- 7 In the User Name and Password fields, type the required user and password connection properties; then, click the **Connect** button. For information about JDBC connection properties, see ["JDBC Connection Properties" on page 260](#).

- 8 If the connection was successful, the Connection window shows the Connection Established message in the JDBC/Database Output scroll box.



If the connection was successful, you can start using your JDBC applications with SequeLink.

If the connection was unsuccessful, you are returned to the DataDirect Test window. The `getConnection()` Failed: message appears in the JDBC/Database Output scroll box. If your connection failed, refer to the *SequeLink Troubleshooting Guide and Reference*.



Code Page Support

All code pages supported by the database server are now available from the SequeLink *for* JDBC Client.

See [Appendix E "SequeLink Service Attributes" on page 407](#) for information about the SequeLink service attributes that affect configuration. For information about data type mappings, refer to the *SequeLink Developer's Reference*.

13 Configuring the .NET Client

This chapter describes the tasks you perform to configure and manage the SequeLink *for* .NET Client (the .NET Client).

Specifying Connection Properties

You can modify a connection by specifying connection attributes. Refer to the *SequeLink Developer's Reference* for information about specifying attributes through the .NET Client's Connection object.

[Table 13-1](#) lists the connection attributes supported by the .NET Client, and describes each attribute. The connection strings have the form:

```
"attribute=value;attribute=value;attribute=value"
```

For example, in the following example, the connection string can be used to connect to the DB2 host hal.

```
"Host=hal;Port=19998;User Id=test01;Password=test01;Database=test;"
```

NOTE: All connection string attribute names are case-insensitive. For example, Password is the same as password. However, the values of some attributes, such as User ID and Password, may be case-sensitive.

[Table 13-1](#) gives the names for each attribute, as well as a description. The defaults listed are initial defaults that apply when no value is specified in the connection string.

Table 13-1. Connection String Attributes for the .NET Client

Attribute	Description
Connection Lifetime	<p>Specifies the number of seconds to keep connections in a connection pool. The pool manager periodically checks all pools, and closes and removes any connection that exceeds its lifetime. The Min Pool Size attribute can cause some connections to ignore this value.</p> <p>Valid values are 0 to 65335.</p> <p>The initial default value is 0. The lifetime is never limited by time.</p>
Connection Reset	<p>Connection Reset={True False}. Specifies whether a connection that is removed from the connection pool for reuse will have its state reset to the state of the new Connection object. For example, during its original use, the connection could have had its database changed by the application. Resetting the state impacts performance of the reused connections because the new connection must issue additional commands to the server.</p> <p>The initial default value is False.</p>
Database Enlist	<p>Specifies the name of the database to which you want to connect.</p> <p>Enlist={True False}. Specifies whether the Client automatically attempts to enlist the connection in creating the thread's current transaction context. This attribute is enabled only when the .NET Client is installed with a Server license and the optional MS DTC Support components were selected.</p> <p>The initial default value is False.</p>
Host	<p>Specifies either the IP address or the name of the server to which you want to connect. For example, if your network supports named servers, you can specify a server name such as <i>SequeLinkAppServer</i>. Or, you can specify an IP address such as <i>122.23.15.12</i>.</p> <p>The initial default value is localhost.</p>

Table 13-1. Connection String Attributes for the .NET Client (cont.)

Attribute	Description
License Path	<p>Specifies the fully-qualified path to the DDTek.lic license file.</p> <p>If you do not provide this option, the .NET Client looks for the license file in the application's current directory. If the license file is not found, the .NET Client checks for keys placed in the registry during the installation process; then, the .NET Client looks for the license key in the installation directory. If the license key is still not found, the .NET Client fails to connect.</p> <p>The initial default value is an empty string.</p>
Max Number Of Pools	<p>Specifies the maximum number of connection pools that can be in use at a time during the life of the process.</p> <p>Valid values are from 1 to 65335.</p> <p>The initial default value is 100.</p>
Max Pool Size	<p>Specifies the maximum number of connections within a single pool at any time.</p> <p>Valid values are from 1 to 65335.</p> <p>The initial default value is 100.</p>
Min Pool Size	<p>Specifies the minimum number of connections left open in a connection pool. This option allows you to keep a minimum number of database connections open even though some connections have exceeded their Connection Lifetime value. A connection pool may contain fewer connections than the specified value until the value is reached.</p> <p>Valid values are 0 to 65335.</p> <p>The initial default value is 0.</p>
Password	<p>Specifies the host or data store password, which may be required depending on the server configuration.</p>
Pooling	<p>Pooling={True False}. Specifies whether connections are pooled.</p> <p>When set to True, connection pooling is enabled.</p> <p>The initial default value is True.</p>
Port	<p>Specifies the TCP/IP port on which the SequeLink Server is listening.</p> <p>The initial default value is 19996.</p>

Table 13-1. Connection String Attributes for the .NET Client *(cont.)*

Attribute	Description
ServerDatasource	Specifies server data source to be used by the connection. If not specified, the configuration of the default server data source are used.
User ID	Specifies the SequeLink User ID for this connection, which may be required depending on the server configuration.

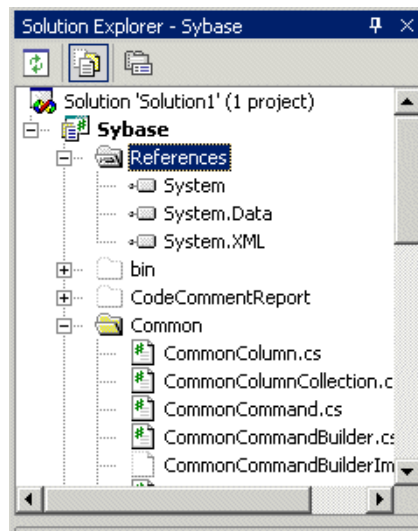
Testing .NET Connections

Once the .NET Client is installed, you can connect from your application to your database with a connection string.

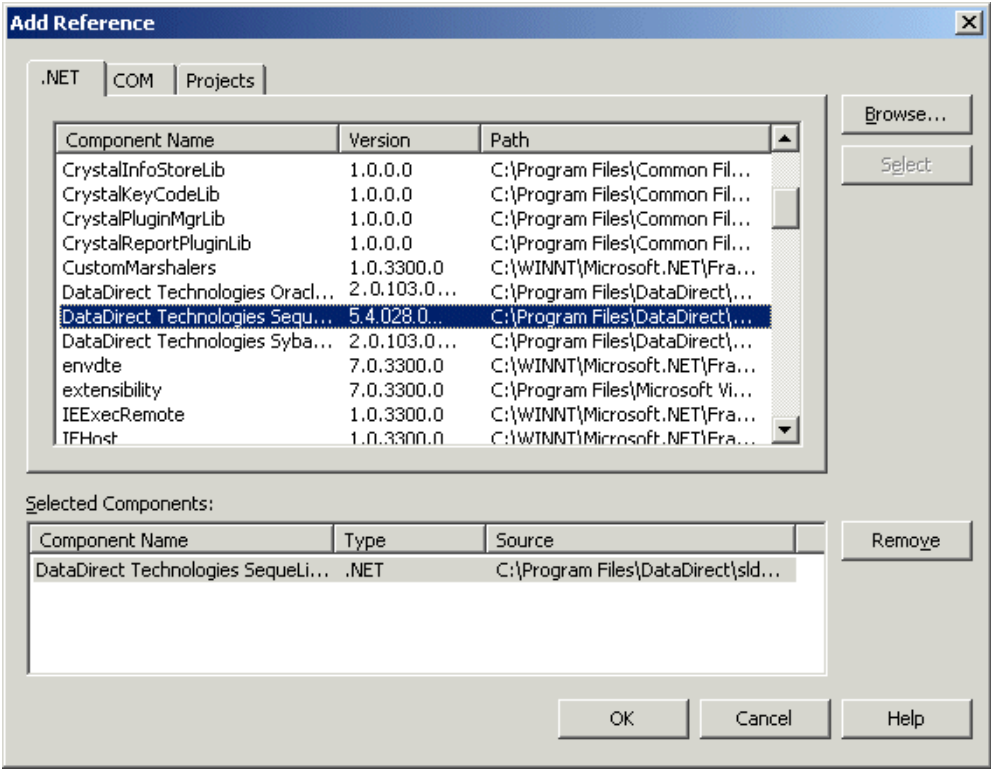
The following example illustrates connecting to the database using the SequeLink .NET Client from an application developed in Visual Studio.NET, using C#. If you are connecting using a different .NET data provider or connecting from the command line, the specific details vary.

If you are using Visual Studio.NET:

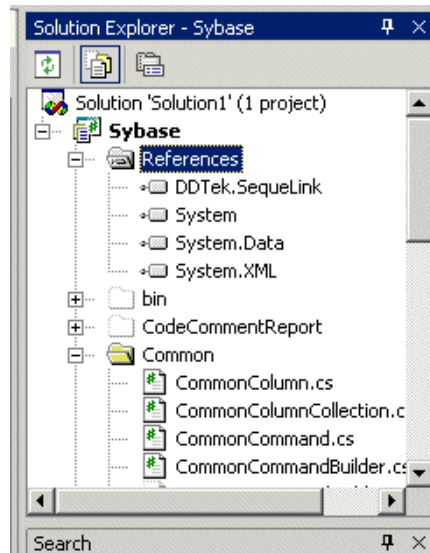
- 1 In the Solution Explorer, right-click **References**; then, click **Add Reference**.



2 Select the SequeLink .NET Client in the component list.



- 3 Click **OK**. The Solution Explorer now includes the SequeLink .NET Client.



- 4 If you are using C#, make sure that the SequeLink namespace appears at the beginning of your application, as shown in the following code fragment:

```
// Access SequeLink Server
using System.Data;
using DDTek.SequeLink;
```

- 5 Add the connection information for your server and exception handling code, as shown in the following C# code fragment. (Refer to the *SequeLink Developer's Reference* for the connection attributes.)

```
try
{
    DBConn = new SequeLinkConnection("Host=sydney;
                                     Port=19998;User ID=test01;
                                     Password=test01;Database=test");
    DBConn.Open();
}
```

```
catch (Exception ex)
{
    MessageBox.Show(ex.Message);
}
```

Code Page Support

The .NET Client supports Unicode as specified in the .NET Framework SDK. Effectively, this means that the .NET Client uses Unicode UTF-16 encoding to represent characters.

All code pages supported by the database server are available from the SequeLink *for* .NET Client.

See [Appendix E "SequeLink Service Attributes" on page 407](#) for information about the SequeLink service attributes that affect configuration. For information about data type mappings, refer to the *SequeLink Developer's Reference*.

Part 3: Using SequeLink Security

This part contains the following chapters:

- [Chapter 14 “Configuring SequeLink Security” on page 281](#) provides an overview of SequeLink security options and describes how to configure SequeLink security for Windows, UNIX, and z/OS platforms.
- [Chapter 15 “Configuring the SequeLink Proxy Server” on page 319](#) describes how to configure SequeLink security for Java environments.

14 Configuring SequeLink Security

This chapter offers an overview of the security options provided by SequeLink and describes how to configure SequeLink security for Windows, UNIX, and OS/390 platforms. See [Chapter 15 “Configuring the SequeLink Proxy Server” on page 319](#) for information about configuring SequeLink Proxy Server.

About SequeLink Security

SequeLink supports security mechanisms for the following purposes:

- Verification of a user by the SequeLink Server. The **Authentication** security mechanism allows the SequeLink Server to verify the identity of the user.
- Defining the types of requests that are accepted by the server. The **Authorization** security mechanism controls whether the user can send data access requests and administrative (SequeLink Manager) requests. Server configuration settings determine whether the server can accept the requests.
- Connection to a data store using the following security mechanisms:
 - **Data Store Logon** controls whether a user who is connected to the SequeLink Server can connect to the data store.

- **Application IDs** control whether a client application can connect to the data store. This mechanism adds a layer of security on top of Data Store Logon.
 - **TCP/IP Location Filters** control whether a client application can connect to the data store based on the TCP/IP network identifier from which the connection request originates.
- z/OS
- **Terminal Security** is supported for connections to SequeLink Servers on OS/390. It controls whether the client application requesting access to the SequeLink data access service has permission to access it based on the TCP/IP address (terminal ID) originating the request.
- Defining the types of SQL statements accepted by the data store. The **ReadOnly** security mechanism controls whether the data store connection is read-only.
 - The privacy of the data being transmitted. The **data privacy** security mechanism ensures that data transmitted between the client and server is kept private using data scrambling methods and encryption through Secure Socket Layer (SSL) (SSL is supported for Java environments only).

Authentication

Authentication allows the SequeLink Server to verify the identity of the SequeLink Client when the client connects to the SequeLink Server. If authentication fails, the SequeLink Client will disconnect from the server. Authentication must be set separately for users (people who send data access requests) and administrators (people who send SequeLink Manager requests).

Even though a user may be able to connect to the SequeLink Server, this does not mean that the user automatically has access to the database that the SequeLink Server services. Depending on the combination of client and server platforms involved in the connection, SequeLink supports the following authentication mechanisms:

- **Anonymous.** The SequeLink Server accepts connections from any SequeLink Client without verifying the client's identity. (ServiceAuthMethods=anonymous)



- **Integrated NT.** This option is supported for connections between SequeLink Server for Windows servers and ODBC Clients, ADO Clients, and .NET Clients on Windows only. The SequeLink Server verifies the identity of the SequeLink Client using the client's Windows network logon credentials instead of a Windows user ID and password. (ServiceAdminAuthMethods=integrated_nt)

- **Operating system user ID and password.** The SequeLink Server verifies the identity of the SequeLink Client using a user ID and password that must be valid for the platform on which the SequeLink Server is running. If verified, the server accepts the user ID as the identity of the client and permits the connection. (ServiceAdminAuthMethods=OSlogon(UID,PWD))

For instructions on configuring authentication:

- On Windows and UNIX, see ["Configuring SequeLink Security on Windows and UNIX" on page 289.](#)
- On z/OS and OS/390, see ["Configuring SequeLink Security for OS/390" on page 299.](#)

Authorization

After the SequeLink Server has authenticated the client, SequeLink verifies that the client is authorized to perform data access activities or SequeLink Manager activities. SequeLink supports authorization for data access requests and for SequeLink Manager requests. You configure the authorization for the two types of requests separately. Authorization options depend on your SequeLink Server platform.

For instructions on configuring authorization:

- On Windows and UNIX, see [“Configuring SequeLink Security on Windows and UNIX” on page 289](#).
- On z/OS and OS/390, see [“Configuring SequeLink Security for OS/390” on page 299](#).

Data Store Logon

Once a connection is established, authentication is complete, and the type of requests the server will accept has been established, a connection from the SequeLink Server to the data store can be established using either of the following methods:

- Specifying data store logon information (a valid DBMS user ID and password). This is the default for Windows and UNIX.
(DataSourceLogonMethod=DBMSLogon(UID,PWD))
- Allowing the database to inherit the logon user ID that was established during the authentication process. This method must be used for z/OS and OS/390, but can be used for Windows and UNIX also.
(DataSourceLogonMethod=OSIntegrated)

Application IDs

Application IDs are alphanumeric strings passed by a SequeLink Client that identify the client application to a SequeLink service that has been configured to accept connections only from specific application IDs.

Application IDs add another layer of security for the connection to the data store beyond that provided by the Data Store Logon security mechanism. Data Store Logon allows all users of client applications to access the data store if they meet the qualifications set by Data Store Logon. Using application IDs, you can restrict connections to the data store to only those client applications that identify themselves to the SequeLink Server through an application ID.



On Windows platforms, application IDs can be specified explicitly by the client application or they can be automatically generated by the ODBC Client or the ADO Client. The advantage of using application IDs generated by the ODBC Client or ADO Client is the application itself does not need to contain the application ID; however, you must specify in the client application that you want to turn on the automatic generation of application IDs. The application ID is generated using the sha-1 hashing algorithm, resulting in a 160-bit hash value.

TCP/IP Location Filters

Using TCP/IP network identifiers, such as TCP/IP host names (for example, burner.ddtek.com) or a range of TCP/IP addresses (for example, 192.16.*.*), TCP/IP location filters allow you to specify which clients can access a SequeLink data access service or SequeLink agent service.

For more information about configuring TCP/IP location filters, see [“Configuring TCP/IP Location Filters” on page 317](#).

z/OS Terminal Security

When terminal security is enabled, through activating the RACF `TERMINAL` security class, the SequeLink Server verifies that the client application requesting access to the SequeLink data access service has permission to access it based on the TCP/IP address (terminal ID) originating the request. You can use terminal security to make sure that:

- Only specific TCP/IP addresses can be used by specific users to connect to the SequeLink Server.
- Only specific groups of users can use specific TCP/IP addresses to connect to the SequeLink Server. For example, you may want to make sure that a user ID associated with an application running on an application server can only log on to the SequeLink Server from a specific TCP/IP address.

See [“Activating Terminal Security” on page 303](#) for more information about activating terminal security.

ReadOnly

SequeLink allows you to configure the types of SQL statements the data store connection will accept:

- Select statements only (makes the connection read-only)
- Select statements and Stored Procedures
- All SQL statements
- Readonly settings of the database

The service attribute that controls this functionality is `DataSourceReadOnly`.

Data Privacy

To ensure privacy of data, SequeLink provides data scrambling and "real" encryption through using SSL (Java environments only).

Data Scrambling

Data scrambling ensures that no cleartext messages are transmitted between the client and server over the network. SequeLink provides the following implementations of data scrambling:

- **Fixed-key DES** operates using a 56-bit key.
- **Fixed-key 3DES** operates using a 168-bit key.
- **Byte swapping** means that bytes of data are randomly swapped to scramble data. Different encoded mappings are used for different sessions.

Data scrambling does not offer the same level of security as SSL and its use may degrade performance. Data scrambling is not enabled by default.

NOTE: Even if you choose not to use a data scrambling method, user IDs and passwords are *never* sent as cleartext.

See ["Configuring Data Privacy" on page 294](#) for more information about configuring data scrambling.

SSL (Java Environments Only)

Secure Socket Layer (SSL) encryption provides data encryption, server authentication, and message integrity for TCP/IP connections using the following methods:

- **Asymmetric cryptographic algorithms** protect the exchange of symmetric encryption keys. SequeLink supports the following SSL features:
 - **Anonymous.** The exchange of the symmetric key for the data transfer is protected by an asymmetric key agreement protocol, but the client does not verify the identity of the server. The anonymous mechanism provides protection against passive eavesdropping on communication lines, preventing someone who is monitoring network traffic from deciphering the exchanged data. It does not provide protection from “man-in-the-middle” security infiltrations, in which intruders position themselves between the client and the server, pretending to the client to be the server and vice versa, and allowing the intruders to intercept, inspect, and possibly alter the data exchanged between the client and the server.
 - **Server authentication.** When communication begins, the server identifies itself to the client, using a digital certificate as proof of identity. The client verifies this certificate to ensure that the server is really the party with whom it wants to communicate.
- **Symmetric cryptographic algorithms** encrypt and decrypt the actual data.
- **Message digest algorithms** ensure message integrity.

The combination of all these algorithms is called a *cipher suite*. The SSL standard defines the cipher suites that can be specified. The actual availability of a cipher suite is determined by the underlying implementation. See [Chapter 15 “Configuring the](#)

[SequeLink Proxy Server” on page 319](#) for more information about configuring SSL and specifying cipher suites.




NOTE: SequeLink supports Netscape’s Transport Layer Security (TLS) 1.0 through its SSL implementation.

Configuring SequeLink Security on Windows and UNIX

This section describes how to configure SequeLink authentication, authorization, and data store logon for Windows and UNIX.

Configuring Authentication for Data Access Activities

Set the ServiceAuthMethods service attribute to one or more of the following values:

- ServiceAuthMethods=anonymous
-  ■ ServiceAuthMethods=integrated_nt (Windows only)
- ServiceAuthMethods=OSLogon(HUID,HPWD)
- ServiceAuthMethods=OSLogon(UID,PWD)
-  ■ ServiceAuthMethods=OSLogon(UID,PWD,NPWD) (Windows only)
-  ■ ServiceAuthMethods=OSLogon(HUID,HPWD,NPWD) (Windows only)

NOTE: The NPWD parameter of OSLogon allows you to change the password.



For SequeLink services on Windows, you can configure multiple authentication mechanisms. For example, if you configured `ServiceAuthMethods=integrated_nt` and `ServiceAuthMethods=OSLogon(UID,PWD)`, the SequeLink Server will use the Integrated NT authentication mechanism and will not require an ODBC or ADO Client connecting from a Windows workstation to provide user ID and password information. SequeLink Clients on UNIX or a JDBC application still must provide a valid Windows user ID and password.

Configuring Authentication for Administrative Activities

To configure authentication for a SequeLink agent service, set the `ServiceAdminAuthMethods` service attribute to one or more of the following values:

- `ServiceAdminAuthMethods=anonymous`
- `ServiceAdminAuthMethods=integrated_nt`
- `ServiceAdminAuthMethods=OSLogon(UID,PWD)`



For SequeLink services on Windows, you can configure multiple authentication mechanisms. For example, if you configured `ServiceAdminAuthMethods=integrated_nt` and `ServiceAdminAuthMethods=OSLogon(UID,PWD)`, the SequeLink Server will use the Integrated NT authentication mechanism and will not require a SequeLink Manager running on a Windows workstation to provide user ID and password information. SequeLink Clients on UNIX still must provide a valid Windows user ID and password.

Configuring Authorization for a SequeLink Data Access Service

To configure user authorization for a SequeLink data access service, set the `ServiceUser` attribute, or, if you want to configure user authorization for user groups defined on Windows or UNIX, set the `ServiceUserGroup` attribute.

Configuring ServiceUser

To configure user authorization, set the `ServiceUser` attribute:

- `ServiceUser=user_ID`, where *user_ID* is the user ID of each user who is allowed to access data using this service. To configure authorization for multiple users, you must set this attribute multiple times, one instance for each user. For example:

```
ServiceUser=RSMITH
ServiceUser=DJONES
ServiceUser=TCONRAD
```



NOTE: On Windows servers, you must prefix the user ID with the Windows server name or the Windows domain name, for example, `SALES\DJONES`. When connecting, the user must also prefix the user ID with the Windows server name, if connecting to a local server, or the Windows domain name.

- `ServiceUser=authenticated`. Any user who can provide a valid host user ID and password or who uses the Integrated NT authentication process will be allowed to send data access requests to the data access service.
- `ServiceUser=everyone`. All connections will receive the user authorization level, regardless of how they are authenticated. If `ServiceAuthMethods=anonymous`, `ServiceUser=everyone` **must** be specified.

Configuring ServiceUserGroup

To configure user authorization for user groups defined on Windows NT/Windows 2000/Windows XP or UNIX, set the ServiceUserGroup attribute. Specify ServiceUserGroup=*user_group*, where *user_group* is a valid user group defined on Windows or UNIX. To configure user authorization for multiple user groups, you must set this attribute multiple times, one instance for each user. For example:

```
ServiceUserGroup=SLUSERG1
ServiceUserGroup=SLUSERG2
ServiceUserGroup=SLUSERG3
```



Server

NOTE: On Windows servers, you must prefix the user group ID with the Windows server name or the Windows domain name where the user group is defined, for example, SALES\SLUSERG1. When connecting, the user must also prefix the administrator ID with the Windows server name, if connecting to a local server, or the Windows domain name.

Configuring Authorization for a SequeLink Agent Service

To configure administration authorization, set the ServiceAdministrator service attribute, or, if you want to configure authorization for user groups defined on Windows or UNIX, set the ServiceAdministratorGroup service attribute.



Server

NOTE: On Windows, each user who is allowed to make SequeLink Manager requests must have administrator rights.

Configuring ServiceAdministrator

To configure administration authorization, set the ServiceAdministrator attribute:

- ServiceAdministrator=*user_ID*, where *user_ID* is the user ID of each user who is allowed to make SequeLink Manager requests. To configure administration authorization for multiple users, you must set this attribute multiple times, one instance for each user. For example:

```
ServiceAdministrator=RSMITH
ServiceAdministrator=DJONES
ServiceAdministrator=TCONRAD
```



NOTE: On Windows servers, you must prefix the user ID with the Windows server name or the Windows domain name, for example, SALES\DJONES. When connecting, the user must also prefix the user ID with the Windows server name, if connecting to a local server, or the Windows domain name.

- ServiceAdministrator=authenticated. Any user who can provide a valid host user ID and password or who uses the Integrated NT authentication process will receive the same administration authorization.
- ServiceAdministrator=everyone. All connections will receive the same administration authorization, regardless of how they are authenticated. If ServiceAdminAuthMethods=anonymous, you must specify ServiceAdministrator=everyone.

Configuring ServiceAdministratorGroup

To configure authorization for user groups defined on Windows and UNIX, set the ServiceAdministratorGroup attribute. Specify ServiceAdministratorGroup=*user_group*, where *user_group* is a valid user group defined on Windows or UNIX. To configure administration authorization for multiple user groups, you must

set this attribute multiple times, one instance for each user. For example:

```
ServiceAdministratorGroup=SLUSERG1
ServiceAdministratorGroup=SLUSERG2
ServiceAdministratorGroup=SLUSERG3
```



NOTE: On Windows servers, you must prefix the user group ID with the Windows server name or the Windows domain name where the group is defined, for example, SALES\SLUSERG1. When connecting, the user must also prefix the user group with the Windows server name, if connecting to a local server, or the Windows domain name.

Configuring Data Privacy

To ensure privacy of data, SequeLink provides data scrambling (all SequeLink environments) and "real" encryption through the use of SSL (SequeLink Java environments only).

Data scrambling ensures that no cleartext messages are transmitted between the client and server over the network. SequeLink provides the following implementations of data scrambling:

- **Fixed-key DES** operates using a 56-bit key.
- **Fixed-key 3DES** operates using a 168-bit key.
- **Byte swapping** means that bytes of data are randomly swapped to scramble data. Different encoded mappings are used for different sessions.

Data scrambling does not offer the same level of security as SSL and its use may degrade performance. Data scrambling is not enabled by default.

NOTE: Even if you choose not to use a data scrambling method, user IDs and passwords are *never* sent as cleartext.

To configure SequeLink to use DES, 3DES, or byteswap, you must set the `ServiceEncryptionAlgorithm` service attribute, for example, `ServiceEncryptionAlgorithm=DES`. Data scrambling is not enabled by default, which means that if you do not configure data scrambling, cleartext messages are transmitted between the client and server over the network.

SSL is provided by the SequeLink Proxy Server component. See [Chapter 15 “Configuring the SequeLink Proxy Server” on page 319](#) for information about configuring SSL.

Configuring Data Store Logon

A client application establishing a connection to the database must provide a valid DBMS user ID and password when `DataSourceLogonMethod=DBMSLogon(UID,PWD)` or `DataSourceLogonMethod=DBMSLogon(DBUID,DBPWD)`.

Depending on how the SequeLink service is configured, the SequeLink Server may require the SequeLink Client to provide two user IDs and passwords. SequeLink Clients typically provide user ID and password information using the UID and PWD attributes in a connection string (ODBC and ADO) or a connection URL (JDBC).

To avoid possible conflict with a standard keyword pair (UID,PWD) with two sets of values, make sure that you set non-conflicting values for the `ServiceAuthMethods` and `DataSourceLogonMethod` attributes. For example, when `ServiceAuthMethods=OSLogon(UID,PWD)` and `DataSourceLogonMethod=DBMSLogon(DBUID,DBPWD)`, the SequeLink Client must provide the operating system user and password using the keywords UID and PWD and the database user and password must be specified using the DBUID and DBPWD keywords.

To allow the DBMS to inherit the operating system (or network) user ID and password for data store authorization, specify `DataSourceLogonMethod=OSIntegrated`.

NOTE: Do not use this method when `ServiceAuthMethods=anonymous`.

Configuring Single Sign-On Security

The combination of security features provided by SequeLink and the security provisions offered by the DBMS and the Windows operating system allows you to configure a single sign-on environment for ODBC and ADO applications. The user logs on to the Windows network and can connect to the DBMS using their Windows identity (if allowed by the DBMS security configuration).

To configure single sign-on security for ODBC:

- 1 Configure your DBMS security:
 - For Microsoft SQL Server, configure the DBMS security for mixed or integrated security.
 - For Oracle, configure the DBMS security to allow external authentication (formerly OPS\$ functionality).

For instructions on how to configure your DBMS security, refer to your data store documentation.
- 2 Grant the required database access rights to Windows users using the appropriate data store provided by your DBMS. For instructions on how to grant database access rights, refer to your DBMS documentation.
- 3 Specify `ServiceAuthMethods=integrated_nt`.
- 4 Specify `DataSourceLogonMethod=OSIntegrated`.
- 5 Restart the SequeLink Server.

- 6 If SequeLink Clients on UNIX or SequeLink *for* JDBC Clients will be connecting to this service, add another ServiceAuthMethods attribute, and specify ServiceAuthMethods=OSLogon (HUID, HPWD) or ServiceAuthMethods=OSLogon (UID, PWD) . These SequeLink Clients must provide a valid Windows server user ID and password.

SequeLink Manager Security Attribute Defaults for Windows and UNIX

This section lists the installation defaults for SequeLink's security attributes for Windows and UNIX and describes the effect each combination of settings has on security.

Defaults for a SequeLink Agent Service

```
ServiceAdminAuthMethods=OSlogon (UID, PWD)
ServiceAdministrator=SequeLink_administrator
```

The combination of defaults for these attributes means that only the person who logs on using the user ID that was entered when the SequeLink Server software was installed is allowed to manage the SequeLink environment. The SequeLink Server installer prompts for a user ID for the SequeLink administrator when you install the SequeLink Server. On Windows, the SequeLink administrator must have administrator rights.

```
ServiceEncryptionAlgorithm=none
```

The default for this attribute means that cleartext messages are transmitted between the client and server. Note that user IDs and passwords are *never* sent as cleartext.

Defaults for a Data Access Service

```
ServiceAuthMethods=anonymous  
ServiceUser=everyone  
DataSourceLogonMethod=DBMSLogon (UID, PWD)  
DataSourceReadOnly=No
```

The combination of defaults for these attributes means that anyone who can provide a valid DBMS user name and password will be allowed to access the database using this service. The database connection accepts all types of SQL statements. Once connected to the DBMS, the database security system will guarantee that the user can only perform actions that are allowed by the database administrator.

```
ServiceEncryptionAlgorithm=none
```

The default for this attribute means that cleartext messages are transmitted between the client and server. Note that user IDs and passwords are never sent as cleartext.

Configuring SequeLink Security for OS/390

z/OS This section describes how to configure SequeLink authentication, authorization, data store logon, and how to activate terminal security for OS/390. The security of the SequeLink Server for OS/390 is integrated with the OS/390 security system using the SAF interface.

Configuring Authentication

On z/OS and OS/390, SequeLink supports both the anonymous and user ID and password authentication mechanisms. For the user ID and password authentication mechanism, the client application must provide a valid user ID and password for the platform on which the SequeLink Server is running. The server verifies the user ID and password. If verified, the server accepts the user ID as the identity of the client. When a password change is required (for example, when a password expires), the client application must also provide a new password.

To configure authentication without additional authorization for a SequeLink data access service, set the `MVSServiceSecurity` attribute to one of the following options:

- `MVSServiceSecurity=SAFBASIC`. The SequeLink Server validates the SequeLink Client's identity using the client's user ID and password. This is the default.
- `MVSServiceSecurity=SAFNONE`. The SequeLink Server accepts connections from any SequeLink Client without verifying the client's identity. When `ServiceAuthMethods=anonymous`, you must specify `MVSServiceSecurity=SAFNONE`.

Configuring Authentication for Data Access Activities on OS/390

To configure authentication for data access activities, set the ServiceAuthMethods and MVSServiceSecurity attributes to one of the following combinations:

```
ServiceAuthMethods=anonymous  
MVSServiceSecurity=SAFNONE
```

or

```
ServiceAuthMethods=OSLogon (UID, PWD, NPWD)  
MVSServiceSecurity=SAFBASIC
```

Configuring Authentication for Administrative Activities on OS/390

To configure authentication of administrative activities, set the ServiceAdminAuthMethods and MVSServiceSecurity attributes to the following values:

```
ServiceAdminAuthMethods=OSLogon (UID, PWD)  
MVSServiceSecurity=SAFBASIC
```

Configuring Authorization for Data Access Activities on OS/390

To configure authentication and resource-based authorization for OS/390, set MVSServiceSecurity=SAFRESOURCE. The SequeLink Server validates the SequeLink Client's identity using the client's user ID and password and the client's authority to access the service. If this option is used, you may specify a security resource and a security class. The SequeLink service name must be defined in the security system's general resource class profile. Also, any user that requires access to this SequeLink service must

be granted READ access to the specified resource defined in this class.

Configuring Authorization of Administrative Activities on OS/390

To configure authentication and resource-based authorization for OS/390, set `MVSServiceAdminSecurity=SAFRESOURCE`. The SequeLink Server validates the SequeLink Client's identity using the client's user ID and password, and the client's authority to access the service. If this option is used, you also may specify a security resource and security class. The SequeLink service name must be defined in your security system's general resource class profile. Also, any user that requires access to this SequeLink service must be granted READ access to the specified resource defined in this class.

Configuring Resource-Based Authorization

To configure resource-based authorization for SequeLink, specify a security class and a security resource within this security class.

How you configure authorization depends on whether you are configuring it for data access activities or administrative activities.

Configuring Resource-Based Authorization for Data Access Activities

To configure resource-based authorization for data access activities, set the following attributes to the following values:

- **MVSServiceSecurityResource**=*sec_resource_name*, where *sec_resource_name* is the name of the security resource where access is defined for your users. The default value is the name of the service name of the data access service.
- **MVSServiceSecurityClass**=*sec_class_name*, where *sec_class_name* is the name of the security class where the **MVSServiceSecurityResource** is defined. The default value is FACILITY.

Configuring Resource-Based Authorization for Administrative Activities

To configure resource-based authorization for administrative activities, set the following attributes to the following values:

- **MVSServiceAdminSecurityResource**=*server_name*, where *server_name* is the name of the SequeLink Server, or, on z/OS, the service name of the SequeLink agent.
- **MVSServiceAdminSecurityClass**=*sec_class_name*, where *sec_class_name* is the name of the security class where the **MVSServiceAdminSecurityResource** is defined. The default value is FACILITY.

Configuring Data Store Logon

To allow the DBMS to inherit the operating system (or network) user identification to use for database authorization, set the `DataSourceLogonMethod` attribute to the following value:

```
DataSourceLogonMethod=OSIntegrated
```

Activating Terminal Security

When `MVSServiceSecurity=SAFBASIC` and the RACF `TERMINAL` security class is activated, SequeLink Server verifies that the TCP/IP address (terminal ID) requesting the connection has permission to connect to the SequeLink Server. Even when the `TERMINAL` security class is not activated, a RACF (or equivalent) message informs you of the TCP/IP address of each user or application requesting a connection to the SequeLink Server.

Each TCP/IP address originating the client connection to SequeLink Server has an equivalent terminal ID used by the SAF security interface. SequeLink encodes each part of a TCP/IP address into its hexadecimal equivalent, and then, concatenates the four groups of two hexadecimal digits. For example, the TCP/IP address 10.131.40.59 would use the terminal ID 0A83283B as shown in the following example:

```
RDEFINE TERMINAL(0A83283B) UACC(NONE)
PERMIT ZORGR CLASS TERMINAL ID(0A83283B) ACCESS(READ)
```

An asterisk (*) can be used as a wildcard in a terminal ID to specify a range of TCP/IP addresses associated with a specific network. For example:

```
RDEFINE TERMINAL(0A8328*) UACC(NONE)
PERMIT GROP1 CLASS TERMINAL ID( 0A8328*) ACCESS(READ)
```

allows all users from group GROP1 to use the 10.131.40.xx network when connecting to the Sequelink Server. Any other users connecting from this network are denied access.

Before activating the RACF TERMINAL class:

- Review the information on terminal security in your Security Manager documentation.
- Remember that other applications, such as TSO, use the RACF TERMINAL class.
- Define several terminals that have access to TSO to avoid creating a situation in which no one can log on.

The following examples show how to configure terminal security for SequeLink. Example A shows how to restrict specific TCP/IP addresses to specific users; example B shows how to restrict groups of users to specific TCP/IP addresses.

Prerequisite tasks for the following examples include:

- 1 Create the RACF GROUP named ZORGR with option NOTERMUACC.
- 2 Create the RACF userid ZORRO, making sure that the group ZORGR is the default group.
- 3 Connect user ZORRO to ZORGR.

Example A: Restricting TCP/IP Addresses to Specific Users

- 1 Grant read access to all terminals by setting `UACC(READ)`. This ensures that no one can log on to TSO when you activate the TERMINAL class. For example:

```
SETROPTS    TERMINAL(READ)
```

- 2 Set the terminal address so that it is not generally accessible. For example, to limit access to Terminal 0A83283B = TCPIP address 10.131.40.59:

```
RDEFINE    TERMINAL(0A83283B) UACC(NONE)
PERMIT    ZORGR CLASS TERMINAL ID(0A83283B) ACCESS(READ)
```

Group ZORGR users are allowed to access System from Terminal 0A83283B = TCPIP address 10.131.40.59.

3 Activate the TERMINAL class and load it in storage.

```
SETROPTS CLASSACT(TERMINAL) RACLIST(TERMINAL)
```

Example B: Restricting Groups of Users to Specific TCP/IP Addresses

This example shows how to restrict groups of users to specific TCP/IP addresses. For example, you may want to make sure that a user ID associated with an application running on an application server, such as IBM WebSphere, can only log on the SequeLink Server from a specific TCP/IP address.

- 1 Ensure that the NOTERMUACC option, which enforces UACC(NONE) on the TERMINAL class, is in effect for the Group WEBSPHR, even if you specified SETROPTS TERMINAL(READ). Ensure that this is the default and only group.

```
ALTGROUP WEBSPHR NOTERMUACC
```

- 2 Grant UACC(READ) for all terminals to avoid a situation in which no one can log on to TSO once you activate the TERMINAL class. This will not apply to group WEBSPHR because of the NOTERMUACC option.

```
SETROPTS TERMINAL(READ)
RDEFINE TERMINAL(0A83283B) UACC(NONE)
```

- 3 Define Terminal 0A83283B = TCPIP address 10.131.40.59 as not accessible.

```
PERMIT WEBSHPR CLASS TERMINAL ID(0A83283B)
ACCESS(READ)
```

Group WEBSHPR users are allowed to access the system from Terminal 0A83283B = TCPIP address 10.131.40.59, in combination with the NOTERMUACC option on GROUP WEBSPHR. This effectively restricts users of this Group to Terminal 10.131.40.59.

- 4 Activate class TERMINAL and load it in storage.

```
SETROPTS CLASSACT(TERMINAL) RACLIST(TERMINAL)
```

SequeLink Manager Security Attribute Defaults for OS/390

This section lists the installation defaults for SequeLink's security attributes for OS/390 and describes the effect each combination of settings has on security.

Defaults for Administrative Activities

```
MVSServiceAdminSecurity=SAFBASIC  
ServiceAdminAuthMethods=OSLogon (UID, PWD)
```

The combination of defaults for these attributes means that everyone who can provide a valid host user name and password will be allowed to administer and monitor the SequeLink Server.

Defaults for a Data Access Activities

```
MVSServiceSecurity=SAFBASIC  
ServiceAuthMethods=OSLogon (UID, PWD)  
DataSourceLogonMethod=OSIntegrated  
DataSourceReadOnly=No
```

The combination of defaults for these attributes means that everyone who can provide a valid host user name and password will be allowed to access the database using this service. The database connection accepts all types of SQL statements. Once connected to the database, the database security system will guarantee that the user can only perform actions that are allowed by the database administrator.

```
ServiceEncryptionAlgorithm=none
```

The default for this attribute means that cleartext messages are transmitted between the client and server. Note that user IDs and passwords are never sent as cleartext.

Using UID Mapping

UID mapping is the mapping of user IDs to alternate user IDs using a UID map. You can use UID mapping to prevent users from updating DB2 tables using commonly available tools, such as QMF or SPUFI, while preserving their ability to update DB2 tables using SequeLink. For example, suppose a user, SMITH, has privileges defined in a UID map as shown:

User ID	DB2 Table Privilege	SequeLink Plan Privilege	Application
SMITH	UPDATE	EXECUTE	SequeLink service
SMITH	UPDATE	EXECUTE	SPUFI

In this example, SMITH can update DB2 tables using SPUFI and the SequeLink service.

To prevent SMITH from updating DB2 tables using SPUFI, you can map the logon ID to an alternate user ID (for example, SMITH=SMITHB). Once the logon ID SMITH has been mapped to the alternate user ID SMITHB, you can specify DB2 table privileges as shown:

User ID	DB2 Table Privilege	SequeLink Plan Privilege	Application
SMITHB	UPDATE	EXECUTE	SequeLink service
SMITH	SELECT	EXECUTE	SPUFI

The UPDATE privilege set for SMITHB allows SMITH to update DB2 tables using a SequeLink service. The SELECT privilege set for SMITH allows read-only access to the DB2 tables using SPUFI.

NOTE: Alternate UID's are used internally for UID mapping only. If a SequeLink Client attempts to log on with an alternate UID, the logon will be rejected. You can also map an RACF group to a single alternate user, simplifying the administrative task of managing multiple users.

When a UID map is specified for a service, the Sequelink Client's user ID is mapped to an alternate UID as specified in the UID map. If a UID map has been specified for the SequeLink service, that service will use the alternate UID in the UID map as the DB2 authorization ID when logging on to DB2. If an alternate UID cannot be found in the UID map, the SequeLink Client's logon ID will be used as the DB2 authorization ID when MVSUIDDefaultAccess=PERMIT. All status displays will continue to show the SequeLink Client's logon ID.

To configure UID mapping for a SequeLink service, set the following attributes:

MVSServiceUIDMap	Specify the name of the UID map you want the service to use.
MVSUIDDefaultAccess	Controls UID mapping behavior for a service. Valid values include: <ul style="list-style-type: none">■ PERMIT=If user ID mapping is set for the service and the user ID cannot be found in the UID map, the connection is accepted.■ DENY=If user ID mapping is set for the service and the user ID cannot be found in the UID map, the connection is refused.

To configure UID map entries, set the following attribute:

MVSUID

Specify an entry in the UID map using the format *user=mapped_user* or **=mapped_user*, where:

- *user* is a valid user or user group for the OS/390 security system.
- *** is a wildcard for any user.
- *mapped_user* is a valid DB2 authorization ID.

**=mapped_user* is required when the service attributes *ServiceAuthMethods=Anonymous* and *MVSServiceSecurity=SAFNONE*.

For example, suppose you wanted to configure UID maps for the following services and users as shown:

SequeLink Service	UID Service Settings	UID Map Definitions
SLDB2A	MVSServiceUIDMap=UIDMap1 MVSUIDDefaultAccess=DENY	SMITH=SMITHA ERICK=ERICKA
SLDB2B	MVSServiceUIDMap=UIDMap2 MVSUIDDefaultAccess=DENY	SMITH=APPDB2B EDWARDS=APPDB2B
SLDB2C	MVSServiceUIDMap=UIDMap3 MVSUIDDefaultAccess=PERMIT	SMITH=SMITHC ERICK=ERICKC
SLDB2D	A UID map was not specified for this SequeLink service.	
SLDB2E	MVSServiceUIDMap=UIDMap5 MVSUIDDefaultAccess=DENY	SMITH=APPDB2B *=APPDB2Z

Using this example, the following scenarios could occur:

User ID	Service	Map ID	Action	Explanation of Action
ALBERT	SLDB2A	n/a	Denied	Connection denied because ALBERT was not in UIDMAP1
ALBERT	SLDB2C	n/a	Permit	Connection permitted to SLDB2C as ALBERT
SMITH	SLDB2B	APPDB2B	Connect	Connection to SLDB2B as APPDB2B
EDWARDS	SLDB2B	APPDB2B	Connect	Connection to SLDB2B as APPDB2B
ERICK	SLDB2B	n/a	Denied	Connection denied because ERICK was not in UIDMAP2
ERICK	SLDB2C	ERICKC	Connect	Connection to SLDB2C as ERICKC
SMITH	SLDB2D	n/a	Connect	No UID mapping for SLDB2D
Anonymous	SLDB2B	n/a	Denied	Connection denied because no *=mapped_user entry in UID map
Anonymous	SLDB2E	APPDDB2Z	Connect	Connection to SLDB2E as APPDB2Z

Using Application IDs to Restrict User Access

Application IDs are alphanumeric strings passed by a SequeLink Client that identify the client application to a SequeLink service that has been configured to accept connections only from specific application IDs.

Application IDs add another layer of security for the connection to the data store beyond that provided by the Data Store Logon security mechanism. Data Store Logon allows all users of client applications to access the data store if they meet the qualifications set by Data Store Logon. Using application IDs, you can restrict connections to the data store to only those client applications that identify themselves to the SequeLink Server through an application ID.



On Windows platforms, application IDs can be specified explicitly by the client application or they can be automatically generated by the ODBC Client or the ADO Client. The advantage of using application IDs generated by the ODBC Client or ADO Client is the application itself does not need to contain the application ID; however, you must specify in the client application that you want to turn on the automatic generation of application IDs. The application ID is generated using the sha-1 hashing algorithm, resulting in a 160-bit hash value.

Specifying Application IDs Using ODBC Client Applications

This section describes how to specify application IDs explicitly using ODBC client applications and by turning on the automatic generation of application IDs.

Specifying Application IDs Explicitly

ODBC client applications can identify themselves explicitly to the SequeLink service in any of the following ways:

- **Specifying the application ID in the ODBC connection string that is passed to SQLDriverConnect.** For example:

```
....;APPID=MyAppID;
```

or

```
....;ApplicationID=MyAppID;
```

where *MyAppID* is the application ID.

- **Specifying the application ID using SQLSetConnectAttr.** Immediately after each call to SQLConnect or SQLDriverConnect connecting to the ODBC Client, call SQLSetConnectAttr as shown:

```
SQLSetConnectAttr(hdbc, 1053, "myAppId", SQL_NTS)
```

where *myAppId* is the application ID.

The SQLSetConnectAttr is defined in sql.h. If an incorrect application ID is specified, the SQLSetConnectAttr fails and all subsequent SQL statements fail.

Generating Application IDs Automatically

ODBC client applications can turn on automatic application ID generation in any of the following ways:

- **Specifying the automatic application ID method in the ODBC connection string that is passed to SQLDriverConnect.** For example:

```
...;AutomaticApplicationID=x;
```

where *x* is either 1, 2, or 3.

- **Specifying SQLSetConnectAttr.** Immediately after each call to SQLConnect or SQLDriverConnect connecting to the ODBC Client, call SQLSetConnectAttr as shown:

```
SQLSetConnectAttr(hdbc, 1054, x, SQL_IS_INTEGER)
```

where *x* is either 1, 2, or 3.

Specifying Application IDs Using ADO Client Applications

This section describes how to specify application IDs explicitly using ADO client applications and by turning on the automatic generation of application IDs.

Specifying Application IDs Explicitly

Using the ADO Client, the client application specifies the following *key-value* pair in the DBPROP_INIT_PROVIDERSTRING property of the DBPROPSET_DBINITALL property set:

```
ApplicationID=MyAppID;
```

where *myAppID* is the application ID.

Generating Application IDs Automatically

Using the ADO Client, the client application specifies the following *key-value* pairs in the DBPROP_INIT_PROVIDERSTRING property of the DBPROPSET_DBINITALL property set:

Automatic Application ID=*x*

where *x* is either 1, 2, or 3.

Specifying Application IDs

After establishing a connection with the SequeLink *for* JDBC driver, immediately invoke `setApplicationId`. The `setApplicationId` method is defined on the interface `com.ddtek.jdbc.extensions.SIExtensionInterface`, and uses the following method prototype:

`public void setApplicationId(String s) throws SQLException`

You can set the application ID as shown in the following example:

```
import java.sql.*;
import com.ddtek.jdbc.extensions.SIExtensionInterface;

...
Connection con = DriverManager.getConnection(...);

String appId = "myAppID";
if (con instanceof SIExtensionInterface)
{
    SIExtensionInterface slCon = (SIExtensionInterface)con;
    slCon.setApplicationId(myAppID);
}
```

where *myAppID* is the application ID.

Configuring the List of Authorized Application IDs

How you configure the list of authorized application IDs depends on whether the SequeLink Client specifies the application ID explicitly or allows the ODBC Client or ADO Client to automatically generate an application ID:

- When the application explicitly specifies an application ID, set the `DataSourceApplID` service attribute to the application ID string.
- When the application generates an automatic application ID (ODBC Clients and ADO Clients only), set the `DataSourceAutoApplID` service attribute to the value of the automatically generated application ID. Optionally, you can add a description of the attribute, for example:

```
DataSourceAutoAppId=InventoryControl=  
aaf7798c8c66e6b3a6b7be6946
```

Continue to [“Obtaining the Value of Automatically Generated Application IDs” on page 316](#) for instructions on obtaining the value of automatically generated application IDs.

NOTE: The `DataSourceApplID` and `DataSourceAutoApplID` service attributes are not, by default, included in a data access service template; therefore, you must explicitly add them. See [“Adding a Service Attribute” on page 81](#) for instructions on adding service attributes.

Obtaining the Value of Automatically Generated Application IDs

- 1 Turn on the debug log level for the SequeLink service the client application will be using. For example, set `ServiceDebugLogLevel=4` (Debug).
- 2 Connect to the SequeLink service with your ODBC or ADO application using the values 1, 2, or 3 to turn on automatic application ID generation:
 - If 1 is specified, the full path of the application executable is used as input for the hash function.
 - If 2 is specified, the executable binary file is used as input for the hash function.
 - If 3 is specified, both the full path of the application executable and the executable binary file are used as input for the hash function.

The connection request will fail and the following message will be generated:

```
[DataDirect][ODBC SequeLink driver][SequeLink Server]The
application specified an invalid application identifier
```

- 3 Open the log file and look for the following entry:

```
CHAIN
  PROVIDE
    refNum      :0
    refNumType   :connect
    direction    :set
    000) Id      :kSSP PID CLOSEDID
    Type         :binary
    Info         :0xGAppID
```

where the set of 40 characters following `Info :0x` is the generated application ID.

- 4 Configure the SequeLink service to accept the generated application ID by setting the DataSourceAutoApplID service attribute to the list of IDs you generated in [Step 3](#).

NOTE: Remember to turn off the debug log level for the SequeLink service. (Set ServiceDebugLogLevel=3 (Error))

Configuring TCP/IP Location Filters

TCP/IP location filters allow you to control which clients have access to a SequeLink service based on the network address of the client originating the request. To configure TCP/IP location filters for:

- A SequeLink data access service, set the ServiceAuthorizedClient service attribute.
- A SequeLink agent service, set the ServiceAuthorizedAdminClient service attribute.

You can specify one or multiple location filters in either address or name formats as shown in the following examples:

Client TCP/IP host name	<code>burner.ddtek.com</code>
Client TCP/IP domain names (using a wildcard)	<code>192.16.2.*</code> or <code>*.ddtek.com</code>
Client TCP/IP address	<code>127.0.0.1</code>
Client TCP/IP address range (using a wildcard)	<code>192.16.*.*</code>

NOTE: When using host names, the ServiceResolveHostNames service attribute must be set to TRUE, and only primary domain names can be used.

To configure multiple TCP/IP location filters, you must set the `ServiceAuthorizedClient` or `ServiceAuthorizedAdminClient` attribute multiple times, one instance for each location filter. For example:

```
ServiceAuthorizedClient=192.16.*.*  
ServiceAuthorizedClient=192.17.*.*  
ServiceAuthorizedClient=192.18.*.*
```


15 Configuring the SequeLink Proxy Server

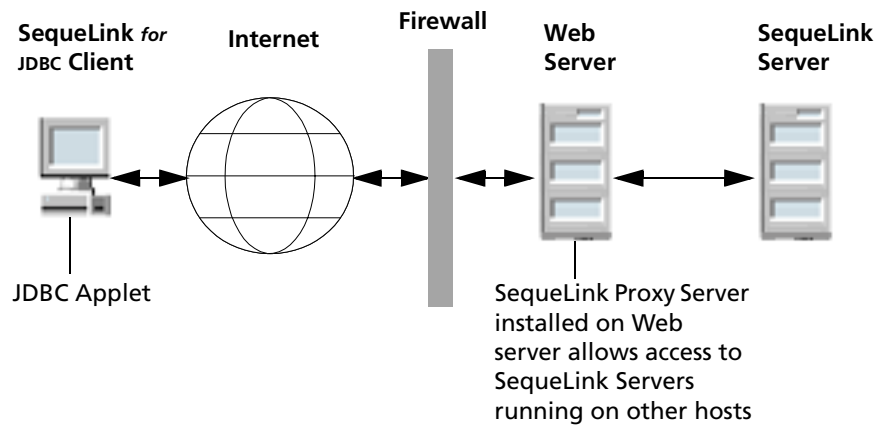
This chapter describes how to configure the SequeLink Proxy Server.

Using the SequeLink Proxy Server

Untrusted applets cannot open a connection to a machine other than the originating host. Therefore, if any SequeLink Java Client will be used by an untrusted applet, your SequeLink Server software must be installed on the same machine as your Web server software. This is a Java restriction. To circumvent this restriction, SequeLink provides a component written in Java that you can install on your Web server host called the *SequeLink Proxy Server*.

Installing the SequeLink Proxy Server on the Web server from which your JDBC applets are downloaded allows untrusted applets to connect to SequeLink Servers on hosts other than the Web server, as shown in [Figure 15-1](#).

Figure 15-1. SequeLink Proxy Server Installed on a Web Server



The SequeLink Proxy Server maps incoming TCP/IP connection requests from the JDBC Client to outgoing TCP connections to other hosts. When the SequeLink Proxy Server receives a connection request on a particular TCP/IP port, the SequeLink Proxy Server establishes a TCP/IP connection to a remote host and transfers data packets between the SequeLink Java Client and the remote host.

In addition, you can use Secure Socket Layer (SSL) encryption with the proxy server to encrypt data between the SequeLink Proxy Server and the JDBC Client. You can also use SSL with a Java application running on your Intranet to secure data over your entire network by installing the SequeLink Proxy Server on the same machine as the SequeLink Server. For example, you may want to use SSL to encrypt the data sent between an application server and the data store serviced by a SequeLink Server on another machine. See [“Using SSL Encryption” on page 328](#) for more information about SSL.

Configuring the SequeLink Proxy Server

Each SequeLink service serviced by the SequeLink Proxy Server must be described in a configuration file, *service_name.cfg*, where *service_name* is the name of the service. We recommend that the service name be the same as the SequeLink service it is servicing. Configuration files are stored in the proxy server directory and use the following *keyword=value* pairs:

Port	The incoming TCP/IP port. The JDBC applet or application must specify this TCP/IP port (and the IP address of the Proxy Server host) in the JDBC connection string.
ServerPort	The TCP/IP port of the service to which the final connection is made. This port must be the same port defined in the service configuration on the remote host. A default SequeLink service installation uses the port 19996.
Host	The IP address of the remote host or a symbolic host name.
AdminPort	The TCP/IP port on which the SequeLink Proxy Server listens for administration requests (for example, requests to stop the SequeLink Proxy Server).

NOTE: If you do not want the SequeLink Proxy Server to listen for administration requests, omit this keyword from the configuration file. For example, if the SequeLink Proxy Server is installed on a Web server that is accessible by the Internet, your firewall may be configured to block requests from the Internet to the proxy server administration port.

You can find a configuration file template (*proxyserver.cfg*) in the proxy server directory. The configuration file must be located

in the directory from which you start or stop the SequeLink Proxy Server.

Configuration File Example:

```
Port=4000
ServerPort=4003
Host=189.23.5.132
AdminPort=5000
```

NOTES:

- Keywords in the configuration file are case-sensitive.
- Make sure that you use different port numbers for the Port and AdminPort keywords. Also, the port numbers for the Port and AdminPort keywords must be unique (cannot be used by another TCP/IP service).



- **On Windows**, you can use the SequeLink Manager to obtain the TCP/IP ports used by SequeLink services. In addition, you can verify the TCP/IP ports in the system32\etc\drivers\services file.



- **On UNIX**, you can verify the TCP/IP ports in /etc/services.

Starting and Stopping the SequeLink Proxy Server

This section provides instructions for starting and stopping the SequeLink Proxy Server.

Starting the SequeLink Proxy Server



On Windows NT/Windows 2000/Windows XP:

Open a command-line window and change the working directory to the proxy server directory. Start the SequeLink Proxy Server by running the command:

```
proxyserver -s [-v jview] configfile
```

where *configfile* is the name of the proxy server configuration file without the .CFG extension. By default, this batch file uses the JDK JVM. If you want to use the Microsoft Java Virtual Machine (JVM), specify the optional parameter *-v jview* as shown in the preceding example.

NOTE: If using JDK 1.4, make sure the batch file sets the classpath to include *slproxy.jar*, *sssl14.jar*, and *iak_jce_full.jar*.



On UNIX:

Start the SequeLink Proxy Server by running the shell script:

```
sh proxyserver.sh -s configfile
```

where *configfile* is the name of the proxy server configuration file without the .CFG extension. The configuration file must be located in the directory from which you start or stop the SequeLink Proxy Server.

NOTE: If using JDK 1.4, make sure that the shell script sets the classpath to include *slproxy.jar*, *sssl14.jar*, and *iak_jce_full.jar*.

Stopping the SequeLink Proxy Server



On Windows NT/Windows 200x/Windows XP:

Open a command-line window and change the working directory to the proxy server directory. Stop the SequeLink Proxy Server by running the command:

```
proxyserver -q [-v jview] configfile
```

where *configfile* is the name of the proxy server configuration file without the .CFG extension. By default, this BAT file uses the JDK JVM. If you want to use the Microsoft JVM, specify the optional parameter *-v jview* as shown in the preceding example.



On UNIX:

Stop the SequeLink Proxy Server by running the shell script:

```
proxyserver.sh -q configfile
```

where *configfile* is the name of the proxy server configuration file without the .CFG extension. The configuration file must be located in the directory from which you start or stop the SequeLink Proxy Server.

SequeLink Proxy Server Logging

All messages generated by the SequeLink Proxy Server are written to a log file in the *installdir/proxy/log/* directory, where *installdir* is your installation directory. The log file name has the format:

```
proxy_server_name.log
```

where *proxy_server_name* is the name of the SequeLink Proxy Server. Severe errors and information, such as `server started` or `server stopped` messages display on the screen also.

Using the SequeLink Proxy Server as a Windows Service

Before you install the SequeLink Proxy Server as a Windows service, check the following requirements:

- Make sure that you have administrator rights. Installing and un-installing the SequeLink Proxy Server as a Windows service requires making changes to the HKEY_LOCAL_MACHINE key in the Windows Registry.
- Make sure that the directory your JVM is installed and is specified in the correct sequence in the system definition of the PATH environment variable. Because the SequeLink Proxy Server Windows service is configured to run under the local system account, access to network resources is not available. If the system definition of the PATH environment variable contains a network directory before the directory in which the JVM is installed, you will not be able to start the SequeLink Proxy Server. If you cannot start the SequeLink Proxy Server, either:
 - Redefine the system definition of the PATH environment variable so that the network directory appears in the system definition after the directory in which the JVM is installed. Then, reboot to make your changes effective for the local system account.
 - Change the definition of the SequeLink Proxy Server Windows service to run under an account that has access to the specific network drive.
- Make sure the CLASSPATH environment variable is defined correctly for your JVM and that the SequeLink Proxy Server .jar files are added to the CLASSPATH.

Installing the SequeLink Proxy Server as a Windows Service

- 1 Create a proxy server configuration file.
- 2 Open a Windows command window and change the working directory to the proxy subdirectory of the SequeLink *for* JDBC Client directory.
- 3 Issue the following command:

```
cmdsrvc -s service_name -c -r [-v jview]
```

where *service_name* is the name of the proxy server configuration file. This command creates a Windows service for the SequeLink Proxy Server. Use the Windows Event Viewer to verify that the service was created successfully (in the Application log for the source cmdsrvc). By default, the JDK JVM is used. If you want to use the Microsoft JVM, specify the optional parameter `-v jview` as shown in the preceding example.

The Windows service you created should have the following attributes:

- Automatic startup
- Log on as System Account
- Allow service to interact with the desktop

In addition, a Windows Event Viewer source is defined with the name of the SequeLink Proxy Server. The SequeLink Proxy Server logs start and stop messages to this source.

- 4 Start the Windows service using the Windows Services control panel. Because the service is configured for automatic startup, it will also start when the Windows machine is initialized.

NOTE: Make sure that the following files located in the proxy/lib directory are added to the CLASSPATH definition of your JVM:

For a SequeLink Proxy Server running in...	Add this file to the CLASSPATH of your JVM...
Java 2 Platform JVM without SSL	slproxy.jar
Java 2 Platform JVM with SSL or data scrambling enabled (JDK 1.2 or 1.3)	slproxy.jar and sslsl.jar
Java 2 Platform JVM with SSL or data scrambling enabled (JDK 1.4)	slproxy.jar, sslsl14.jar, and iaik_jce_full.jar

Un-Installing the SequeLink Proxy Server as a Window Service

Before you un-install the SequeLink Proxy Server as a Windows service, make sure that you have administrator rights.

To un-install the SequeLink Proxy Server:

- 1** Stop the SequeLink Proxy Server Windows service using the Windows Services control panel.
- 2** Open a Windows command-line window.
- 3** Change the working directory to the proxy server subdirectory in the SequeLink *for* JDBC Client directory.
- 4** Issue the following command:

```
cmdsrvc -s service_name -d
```

Using SSL Encryption

If your SequeLink environment requires greater data privacy than that provided by fixed-key DES, fixed-key 3DES, or byteswap, you can use the Secure Socket Layer (SSL) to encrypt data exchanged between the SequeLink *for* JDBC Client and the SequeLink Proxy Server. This assumes that the communication between the SequeLink Proxy Server machine (for applets, the Web server from which the applets are downloaded) and the SequeLink Server machine is secure, meaning that:

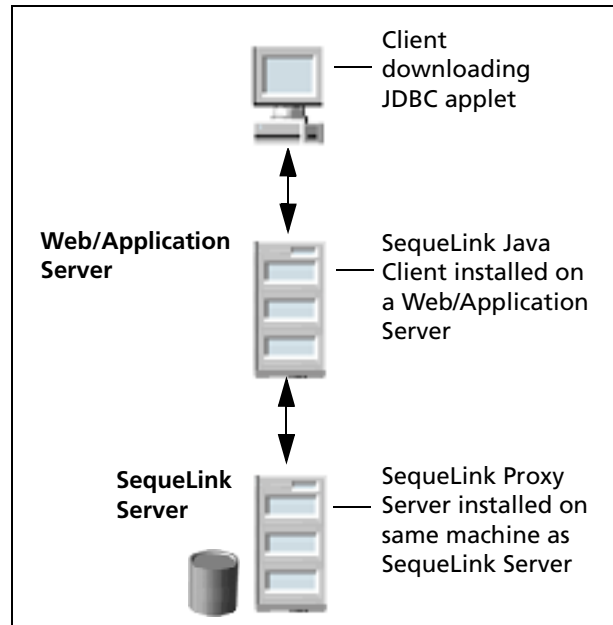
- Only authorized persons can obtain login access to the Web server machine.
- Only authorized persons can eavesdrop on (or monitor) the communication (physical communication lines and any intermediate routers) between the Web server host and the database server host. Because the data on your Intranet is not encrypted, you also must ensure that only authorized access to internal communication lines and internal routers is permitted.

NOTE: SequeLink data scrambling (fixed-key DES, fixed-key 3DES, and byteswap) can work with SSL, resulting in a completely secure combination between the SequeLink *for* JDBC Client and the SequeLink Proxy Server and between the SequeLink Proxy Server and the SequeLink Server.

Using SSL with a Java application running on your Intranet, you can secure data over your entire network by installing the SequeLink Proxy Server on the same machine as the SequeLink Server (as shown in [Figure 15-2](#)) and specifying `localhost` as the host name of the SequeLink Server in the proxy server configuration file. The cleartext messages that are sent between the SequeLink Proxy Server and the SequeLink Server do not leave the machine.

Figure 15-2. Using SSL with the SequeLink Proxy Server Installed on the SequeLink Server

Intranet



NOTE: SequeLink uses the IETF TLS (Transport Layer Security) 1.0 standard, the successor to the SSL 3.0 protocol.

SSL Cipher Suites

SSL cipher suite definitions have the format:

SSL_KeyExchangeMethod_WITH_DataTranserCipher_DigestFunction

Table 15-1 lists the cryptographic strong SSL cipher suites supported by SequeLink.

Table 15-1. Strong SSL Cipher Suites Supported by SequeLink

Cipher Suite

- SSL_DH_anon_WITH_RC4_128_MD5
 - SSL_DH_anon_WITH_3DES_EDE_CBC_SHA
 - SSL_DH_anon_WITH_DES_CBC_SHA
 - SSL_DHE_DSS_WITH_3DES_EDE_CBC_SHA
 - SSL_DHE_DSS_WITH_DES_CBC_SHA
 - SSL_DHE_DSS_WITH_RC4_128_SHA
 - SSL_DHE_RSA_WITH_3DES_EDE_CBC_SHA
 - SSL_DHE_RSA_WITH_DES_CBC_SHA
 - SSL_RSA_WITH_3DES_EDE_CBC_SHA
 - SSL_RSA_WITH_DES_CBC_SHA
 - SSL_RSA_WITH_RC4_128_MD5
 - SSL_RSA_WITH_RC4_128_SHA
-

Cryptographic Characteristics of Key Exchange Algorithms

Table 15-2 lists the cryptographic characteristics of SSL key exchange algorithms, including a description, the key-size limit, and the type of situation for which specific algorithms are most appropriate.

Table 15-2. Cryptographic Characteristics of Key Exchange Algorithms

Key Exchange Algorithm	Description	When to Use
DH_anon	The Diffie-Hellman parameters are generated during session establishment.	When there is no risk of man-in-the-middle attacks.
DHE_DSS	The Diffie-Hellman parameters are generated during session establishment. They are signed by the DSS certificate.	When the DSS certificate of the server is used for signing only and not used for key exchange.
DHE_RSA	The Diffie-Hellman parameters are generated during session establishment. They are signed by the RSA certificate.	When the RSA certificate of the server is used for signing only and not used for key exchange.
RSA	The public key from the RSA certificate is used for key exchange.	When the server uses an RSA certificate.

Cryptographic Characteristics of Data Transfer Ciphers

Table 15-3 lists the cryptographic characteristics of data transfer ciphers, including the algorithm used and the effective key size.

Table 15-3. Cryptographic Characteristics of Data Transfer Ciphers

Data Transfer Cipher	Algorithm	Effective Key size
DES_CBC	DES in cipher block chaining mode	56
3DES_EDE_CBC	Triple DES in cipher block chaining mode	168
RC4	RC4 from RSA	128

Configuring SSL Encryption for the SequeLink Proxy Server

You configure SSL encryption in the proxy server configuration file by adding the *keyword=value* pairs:

```
Network=ssl
CipherSuites=value
```

NOTES:

- 1 The Network and CipherSuites keywords in the proxy server configuration file are case-sensitive.
- 2 If you do not want to use SSL, specify `Network=socket` in the proxy server configuration file or omit the Network keyword from the configuration file.

- 3 The value of the CipherSuites keyword is a list of cipher suites to use, in order of preference. The listed cipher suites are separated by commas with no blank spaces allowed. You must specify cipher suites that use the same type of certificate. For example, you cannot specify a combination of RSA cipher suites and DSS cipher suites. See [“SSL Cipher Suites” on page 330](#) for a list of supported cipher suites.
- 4 For cipher suites that require a DSS or RSA certificate, you must specify the X.509 certificate (with the public key) and the corresponding private key in the proxy server configuration file. See [Table 15-4](#) for a list of the keyword=value pairs you can specify in the proxy server configuration file for each key exchange algorithm.
- 5 When the SequeLink *for* JDBC Client and the SequeLink Proxy Server agree on a cipher suite that requires a certificate, the SequeLink *for* JDBC Client must specify the certificate checker class that will be used to verify the certificate chain the SequeLink Proxy Server sends to the SequeLink *for* JDBC Client. See [“Verifying the SequeLink Proxy Server Certificate” on page 339](#) for more information on certificate checker classes.

[Table 15-4](#) lists the key exchange algorithms you can use and the keyword=value pairs you can specify in the proxy server configuration file when using a particular key exchange algorithm.

Table 15-4. Key Exchange Algorithms and Keyword/Value Pairs for the SequeLink Proxy Server

Key Exchange Algorithm	Keyword	Value
DHE_DSS	DSSCertificate	Name of the file with the DSS certificate in DER format or a PKCS #7 certificate chain.
	DSSPrivateKey	Name of the file with the DSS private key in PKCS #8 encrypted format.

Table 15-4. Key Exchange Algorithms and Keyword/Value Pairs for the SequeLink Proxy Server (cont.)

Key Exchange Algorithm	Keyword	Value
	PassPhrase	Pass phrase with which the private key file is encrypted. If this keyword is unspecified, the Proxy Server will prompt for the pass phrase.
	UsePassPhraseDialog	To be prompted for the pass phrase using the standard input/output instead of a dialog box, set this keyword to No. Remember that the pass phrase will be shown on the screen as you type.
DHE_RSA	RSACertificate	Name of the file with the RSA certificate in DER format or a PKCS #7 certificate chain.
	RSAPrivateKey	Name of the file with the RSA private key in PKCS #8 encrypted format.
	PassPhrase	Pass phrase with which the private key file is encrypted. If this keyword is unspecified, the Proxy Server will prompt for the pass phrase.
	UsePassPhraseDialog	To be prompted for the pass phrase using the standard input/output instead of a dialog box, set this keyword to No. Remember that the pass phrase will be shown on the screen as you type.
RSA	RSACertificate	Name of the file with the RSA certificate in DER format or a PKCS #7 certificate chain.
	RSAPrivateKey	Name of the file with the RSA private key in PKCS #8 encrypted format.
	PassPhrase	Pass phrase with which the private key file is encrypted. If this keyword is unspecified, the Proxy Server will prompt for the pass phrase.
	UsePassPhraseDialog	To be prompted for the pass phrase using the standard input/output instead of a dialog box, set this keyword to No. Remember that the pass phrase will be shown on the screen as you type.

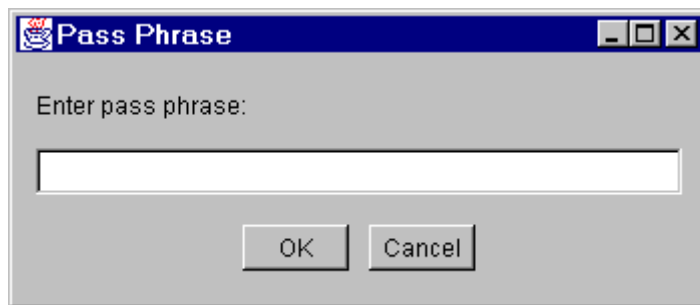
Using Private Keys with the SequeLink Proxy Server

The SSL cipher suites that use server authentication require a valid server certificate and associated private key. The SequeLink Proxy Server must access the private key from a private key file. Because it is not safe to store the private key as cleartext in a file, the SequeLink Proxy Server expects the private key to be stored in PKCS #8 format, which is a standard method of storing encrypted private keys when the encryption key is derived from a pass phrase.

Providing the Pass Phrase for the SequeLink Proxy Server

The SequeLink Proxy Server requires the pass phrase to start. The private key can be retrieved in either of the following ways:

- *When the SequeLink Proxy Server starts, it prompts for the private key. In graphical user interface (GUI) environments, a dialog box may appear. For example:*



Type the pass phrase in the appropriate field of the dialog box and click **OK**.

In situations without a GUI, such as when the SequeLink Proxy Server is running in a terminal session on a UNIX machine, specify `UsePassPhraseDialog=No` in the proxy server configuration file. The SequeLink Proxy Server will use the standard input/output of your environment to prompt for the private key. When you type the pass phrase and press ENTER, the pass phrase displays on your standard output. When you are finished, make sure to scroll the output window so that unauthorized persons cannot see the pass phrase on your screen.

- *You can code the pass phrase in the proxy server configuration file. Add the keyword=value pair:*

```
PassPhrase=pass_phrase
```

where *pass_phrase* is the pass phrase required to access the private key. Leading and trailing blanks are stripped from the

value when the pass phrase is retrieved from the configuration file; therefore, the pass phrase cannot have leading or trailing blanks in the configuration file. Make sure that only trusted accounts have access to the configuration file.

NOTE: If the SequeLink Proxy Server will be started as a Windows service, you must specify the pass phrase in the configuration file because the SequeLink Proxy Server cannot prompt for the pass phrase.

Storing the Private Key in PKCS #8 Format

If your private key is in cleartext format, you can use the `encrypt.bat` utility (on Windows) or the `encrypt.sh` shell script (on UNIX) to store the key in a file in PKCS #8 format.

The private keys are encrypted with triple DES with a 168-bit key derived from the pass phrase using a one-way hash function (SHA).

To provide sufficient randomness in the generated keys, you must provide sufficient randomness in the pass phrase. The English language has approximately 1.3 bits of randomness for each character; therefore, to provide 168 random bits for the two keys, you must have 130 characters (conservatively) of English text. Using punctuation characters and a mix of upper and lowercase letters, you can construct pass phrases that have more randomness with fewer characters.

Using the Encryption Tool



On Windows NT/Windows 200x/Windows XP:

```
encrypt [-v virtual_machine] infile outfile
```

where:

virtual_machine is the executable name of the JVM that is installed on the machine where you encrypt the key. By default, this BAT file uses the JDK JVM. If you want to use the Microsoft JVM, specify the optional parameter `-v jview`.

infile is the name of the cleartext file.

outfile is the name of the encrypted file.



On UNIX:

```
encrypt.sh infile outfile
```

where:

infile is the name of the cleartext file.

outfile is the name of the encrypted file.

You may want to run the encryption tool on a machine other than the one running the SequeLink Proxy Server and transfer the encrypted file to the SequeLink Proxy Server host to avoid writing a copy of the private key in cleartext on the SequeLink Proxy Server host. Make sure that you transfer the complete `proxy/lib` directory to the machine on which you want to run the encryption tool.

The proxy server installation directory also contains a decryption tool that can be used to decrypt a file that has been encrypted with the encryption tool. The encryption and decryption tools prompt for the pass phrase and show it on the screen as you type, so make sure that you close the terminal session window after

you have encrypted or decrypted the file to prevent unauthorized people from viewing it.

Using the Decryption Tool



On Windows NT/Windows 200x/Windows XP:

```
decrypt [-v virtual_machine] infile outfile
```

where:

virtual_machine is the executable name of the JVM that is installed on the machine where you encrypt the key. By default, this BAT file uses the JDK JVM. If you want to use the Microsoft JVM, specify the optional parameter `-v jview`.

infile is the name of the encrypted file.

outfile is the name of the cleartext file.



On UNIX:

```
decrypt.sh infile outfile
```

where:

infile is the name of the encrypted file.

outfile is the name of the cleartext file.

Verifying the SequeLink Proxy Server Certificate

When you use a cipher suite that specifies server authentication, the SSL handshake protocol ensures that the server knows the private key that corresponds to the public key in the certificate. Subsequently, the client application must verify that the server is indeed the server with which it wants to communicate by

verifying that the received certificate is the certificate that it expects from the server.

The JDBC application or applet provides the SequeLink *for* JDBC Client with a class that implements the `com.ddtek.sequelink.cert.CertificateCheckerInterface` interface. If you do not supply a class that implements this interface, the connection will be refused.

This interface is defined as:

```
package com.ddtek.sequelink.cert;  
public interface CertificateCheckerInterface  
{  
    public void CheckCertificate(byte [][] certChain)  
        throws SecurityException;  
}
```

The JDBC driver calls this method and passes the X.509 certificate chain that it received during the SSL handshake to the method. All certificates are DER encoded and the server certificate is the first certificate in the array. The `checkCertificate` method must verify that the received certificate is trusted and is, for example, signed by a trusted authority. If the certificate is not trusted, the method must throw a `SecurityException`. You specify the name of the class that implements this interface in the `certificateChecker` keyword in the JDBC connection URL or the data source.

The driver/examples subdirectory contains the Java source files listed in [Table 15-5](#) as examples of classes that implement `CertificateCheckerInterface`.

Table 15-5. Java Source Files Implementing `CertificateCheckerInterface`

Java Source File	Description
<code>CheckAgainstCertificateFromJar.java</code>	Adapt and use for downloaded applets.
<code>CheckAgainstCertificateFromFile.java</code>	Adapt and use for Java applications on a client machine.
<code>KeyStoreCertificateChecker.java</code>	Adapt and use for Java applications that use a Java 2 keystore to verify that the provided certificate chain is trusted.

These classes retrieve the server certificate from a JAR file, or local file, and compare it with the certificate that is passed as the first element of the `certChain` parameter to the `checkCertificate` method. You can change these files as appropriate for your environment.

Coding the certificate you want to compare other certificates against in the downloaded applet is safe only if no one tampers with the applet while it is being downloaded from your Web server. You must use signed applets and you must configure your Web browser to explicitly check the signer of downloaded applets. Alternatively, you can use a secure and authenticated SSL connection to the web server when downloading the applet.

Using the Demo Certificates, Certificate Checker, and Private-Key Format Conversion Tool

SequeLink provides some demo applications in the *installdir/proxy/demos* directory, where *installdir* is your installation directory, that allow you to create or convert certificates.

Demo Certificates

The demo certificates that SequeLink provides are intended for testing purposes only and cannot be used to provide secure connections. [Table 15-6](#) lists the private key files and describes the corresponding certificates.

Table 15-6. Demo Certificates

File	Descriptions
demo-DSA-CA.cer	Demo Certificate Authority with a DSS X.509 certificate. This certificate is self signed.
demo-DSA-CA.pk8	Corresponding (PKCS #8 encrypted) private key of the public key provided by the certificate demo-DSA-CA.cer.
demo-DSA-server.p7b	Demo DSS server X.509 certificate signed with the public key provided by the certificate demo-DSA-CA.cer.
demo-DSA-server.pk8	Corresponding (PKCS #8 encrypted) private key of the public key provided by the certificate demo-DSA-server.cer.
demo-RSA-CA.cer	Demo Certificate Authority with an RSA X.509 certificate. This certificate is self signed.

Table 15-6. Demo Certificates (cont.)

File	Descriptions
demo-RSA-CA.pk8	Corresponding (PKCS #8 encrypted) private key of the public key provided by the certificate demo-RSA-CA.cer.
demo-RSA-server.p7b	Demo RSA server X.509 certificate signed with the public key provided by the demo-RSA-CA.cer.
demo-RSA-server.pk8	Corresponding (PKCS #8 encrypted) private key of the public key provided by the certificate demo-RSA-server.cer.

NOTES:

- To use the demo certificates, you must add sslsl.jar (if you are using JDK 1.2 or 1.3) or sslsl14.jar and iaik_jce_full.jar (if you are using JDK 1.4) to your CLASSPATH variable.
- You can re-generate demo certificates by running the following Java program in the *installdir/proxy/* directory, where *installdir* is your installation directory:

```
java com.ddtek.sequelink.demo.GenerateDemoCertificates
```

- You can customize the generation of these demo certificates by editing the demo.properties file in the *installdir/proxy/demos/com/datadirect/sequelink/demo* directory, where *installdir* is your installation directory.

The following examples show how to use the demo certificates.

Example A: Using SSL with an RSA Server Certificate

- 1 Start the SequeLink Proxy Server with the following configuration:

```
Port=9500
AdminPort=9600
Host=SequeLinkhost
ServerPort=SequeLinkport
Network=ssl
CipherSuites=SSL_DHE_RSA_WITH_3DES_EDE_CBC_SHA,SSL_
DHE_RSA_WITH_DES_CBC_SHA,SSL_RSA_WITH_3DES_EDE_CBC_
SHA,SSL_RSA_WITH_DES_CBC_SHA,SSL_RSA_WITH_RC4_128_MD5,
SSL_RSA_WITH_RC4_128_SHA
RSACertificate=cert/demo-RSA-server.p7b
RSAPrivateKey=cert/demo-RSA-server.pk8
PassPhrase=Demo Pass Phrase
```

where *SequeLinkhost* is the TCP/IP host name or address of the SequeLink Server and *SequeLinkport* is the port on which the SequeLink Server is listening for connection requests.

- 2 Make a connection to the SequeLink Server, for example, using JDBC Test:

```
jdbc:sequelink:ssl://proxyserverhost:9500;
cipherSuites=SSL_RSA_WITH_RC4_128_MD5;
certificateChecker=com.ddtek.sequelink.cert.
AcceptAllCertificateChecker
```

where *proxyserverhost* is the IP address or symbolic host name of your proxy server host.

If successful, the following message appears:

```
Certificate accepted by
AcceptAllCertificateChecker.
*** ONLY FOR TESTING PURPOSES ***
Certificate chain:
1: O=SequeLink Demo Certificates, OU=Demo RSA
Server Certificate, CN=demo.ddtek.sequelink.com
2: O=SequeLink Demo Certificates, CN=Demo RSA CA
Certificate
```

Example B: Using SSL with a DSS Server Certificate

- 1 Start the proxy server with the following configuration:

```
Port=9500
AdminPort=9600
Host=SequeLinkhost
ServerPort=SequeLinkport
Network=ssl
CipherSuites=SSL_DHE_DSS_WITH_3DES_EDE_CBC_SHA,SSL_
DHE_DSS_WITH_DES_CBC_SHA,SSL_DHE_DSS_WITH_RC4_128_SHA
DSSCertificate=cert/demo-DSA-server.p7b
DSSPrivateKey=cert/demo-DSA-server.pk8
PassPhrase=Demo Pass Phrase
```

where *SequeLinkhost* is the TCP/IP host name or address of the SequeLink Server and *SequeLinkport* is the port on which the SequeLink Server is listening for connection requests.

- 2 Make a connection to the SequeLink Server, for example, using JDBC Test:

```
jdbc:sequelink:ssl://proxyserverhost:9500;
cipherSuites=SSL_DHE_DSS_WITH_DES_CBC_SHA;
certificateChecker=com.ddtek.sequelink.cert.
AcceptAllCertificateChecker
```

where *proxyserverhost* is the IP address or symbolic host name of your proxy server host.

If successful, the following message appears:

```
Certificate accepted by
AcceptAllCertificateChecker.
*** ONLY FOR TESTING PURPOSES ***
Certificate chain:
1: O=SequeLink Demo Certificates, OU=Demo DSA
Server Certificate, CN=demo.sequelink.ddtek.com
2: O=SequeLink Demo Certificates, CN=Demo DSA CA
Certificate
```

Example C: Using SSL with Anonymous Cipher Suites (No Server Authentication)

- 1 Start the proxy server with the following configuration:

```
Port=9500
AdminPort=9600
Host=sequelinkserver
ServerPort=sequelinkport
Network=ssl
CipherSuites=SSL_DH_anon_WITH_3DES_EDE_CBC_SHA,SSL_
DH_anon_WITH_DES_CBC_SHA,SSL_DH_anon_WITH_RC4_128_MD5
```

where *sequelinkhost* is the TCP/IP host name or address of the SequeLink Server and *sequelinkport* is the port on which the SequeLink Server is listening for connection requests.

- 2 Make a connection to the SequeLink Server, for example, using JDBC Test:

```
jdbc:sequelink:ssl://proxyserverhost:9500;
cipherSuites=SSL_DH_anon_WITH_DES_CBC_SHA
```

where *proxyserverhost* is the IP address or symbolic host name of your proxy server host.

Demo Certificate Checker

SequeLink provides a demo certificate checker that accepts all server certificates. It displays on the screen a warning and a description of the certificate the client received from the server through the SSL handshake. This certificate checker is implemented by the `com.ddtek.sequelink.cert.AcceptAllCertificateChecker` class.

Demo Private-Key Format Conversion Tool

SequeLink provides a private-key format conversion tool that can perform the following tasks:

- Export a private key and X.509 certificate from a Java 2 Platform keystore to an encrypted PKCS #8 private-key file and DER-encoded certificate file
- Export a private key and X.509 certificate from a PKCS #12 file

The private-key format conversion tool is a command-line tool that uses the following syntax:

```
java.com.ddtek.sequelink.demo.KeyTool
[-keystore keystore]
[-alias alias]
-certfile certfile
-keyfile keyfile
[-storetype storetype]
[-storepass storepass]
[-keypass keypass]
```

where:

Parameter	Java 2 Platform Keystore Export	PKCS #12 File Export	Description
<i>keystore</i>	X	X	The file name of the Java 2 Platform keystore or the PKCS #12 file.
<i>alias</i>	X		The alias in the Java 2 Platform keystore. If supplied, it is assumed that the keystore parameter is a Java 2 Platform keystore.
<i>certfile</i>	X	X	The DER-encoded X.509 certificate file.

Parameter	Java 2 Platform Keystore Export	PKCS #12 File Export	Description
<i>keyfile</i>	X	X	The PKCS #8 encoded private key. The private key ends with the same password as the Java 2 Platform keystore or the PKCS #12 file.
<i>storetype</i>	X	X	The type of Java 2 Platform keystore. The default is jks. This parameter is optional.
<i>storepass</i>	X		The password used to protect the Java 2 Platform keystore or the PKCS #12 file. If omitted, you will be prompted for this password.
<i>keypass</i>	X		The password that protects the Java 2 Platform key entry. This parameter is required when the password for the key entry is different from the keystore password.

To use the demo private-key format conversion tool, you must add `sslsl.jar` (if you are using JDK 1.2 or 1.3) or `sslsl14.jar` and `iaik_jce_full.jar` (if you are using JDK 1.4) to your CLASSPATH variable.

Part 4: Reference

This part contains the following appendices:

- [Appendix A “Using LDAP with ODBC and ADO Clients” on page 351](#) explains how SequeLink Clients use LDAP directories to retrieve connection information and describes how to create and update LDAP entries for SequeLink services.
- [Appendix B “OS/390 Workload Manager \(WLM\) Classification” on page 355](#) describes the information used by SequeLink Server to classify WLM enclaves.
- [Appendix C “SequeLink Manager Commands” on page 357](#) lists all available SequeLink Manager commands.
- [Appendix D “Operator Interface Commands for OS/390” on page 395](#) lists all available Operator Interface commands by category.
- [Appendix E “SequeLink Service Attributes” on page 407](#) lists the SequeLink Manager attributes you can use to configure and manage your SequeLink environment.
- [Appendix F “SequeLink Events” on page 479](#) lists and defines the SequeLink events, the attributes associated with events, and explains how to write a filter for an event.
- [Appendix G “Internationalization, Localization, and Unicode” on page 489](#) provides an overview of how internationalization, localization, and Unicode relate to each other.

A Using LDAP with ODBC and ADO Clients

This appendix explains how SequeLink Clients use LDAP directories to retrieve connection information and describes how to create and update LDAP entries for SequeLink services.

What is LDAP?

SequeLink Clients can connect directly to a SequeLink Server or retrieve connection information from a Lightweight Directory Access Protocol (LDAP) directory. LDAP is a standard protocol for accessing and updating common directory information. Storing connection information centrally in an LDAP directory provides flexibility to make environment changes and reduces the time it takes to reconfigure your infrastructure when a change takes place.

For example, if a database must be moved to a different server, you do not have to reconfigure the user applications or the client data sources that must now access the new server. Because the connection information is stored in an LDAP directory, you need only update the LDAP directory entries so that the SequeLink Clients can connect to the new server.

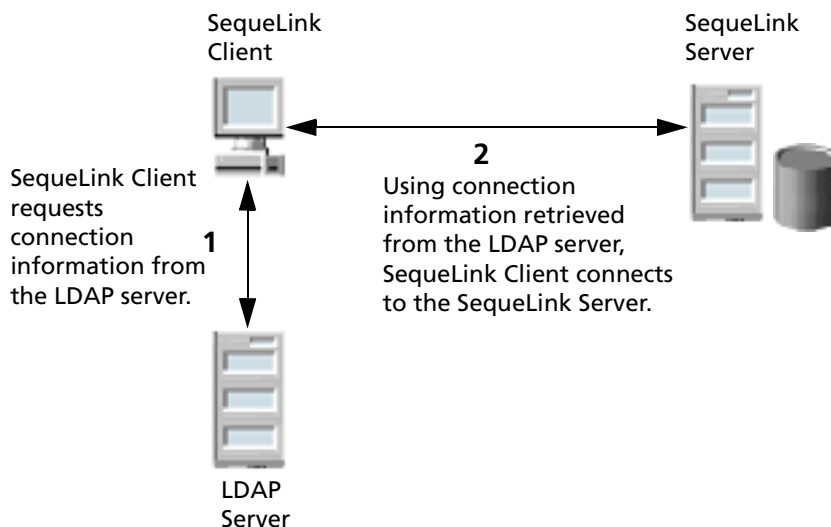
SequeLink supports all LDAP V3 implementations, including Microsoft Active Directory and Netscape Directory Server.

Retrieving Connection Information from LDAP Directories

When a SequeLink Client retrieves connection information from an LDAP directory, the connection to the SequeLink Server takes place as a two-step process as shown in [Figure A-1](#).

- 1 The SequeLink Client connects to the LDAP server and retrieves connection information from an LDAP entry.
- 2 Using the connection information retrieved from the LDAP entry, the SequeLink Client connects to the SequeLink Server.

Figure A-1. Retrieving Connection Information from an LDAP Directory



To retrieve connection information from an LDAP directory, you configure the following information at the SequeLink Client:

LDAP Server Host	is the TCP/IP host name of the LDAP server.
LDAP Server Port	is the TCP/IP port that the LDAP server is listening on for incoming connection requests. If unspecified, the SequeLink Client will use the default LDAP port 389.
Distinguished Name (DN)	is an identifier that uniquely identifies the LDAP entry where connection information is stored. See “Creating LDAP Entries for SequeLink Services” on page 353 for information about what you must include in an LDAP entry.

For information about configuring ODBC Clients and ADO Clients to connect to an LDAP server to retrieve connection information:

- See [Chapter 10 “Configuring the ODBC Client” on page 199](#)
- See [Chapter 11 “Configuring the ADO Client” on page 227](#)

Creating LDAP Entries for SequeLink Services

If you are using LDAP directories to store connection information for SequeLink services, you must create a single LDAP directory entry for each SequeLink service and identify that LDAP directory entry by a Distinguished Name (DN). The LDAP entry must contain the TCP/IP host name of the SequeLink Server and the TCP/IP port on which the SequeLink Server is listening. Optionally, the LDAP entry can contain a server data source to use for the connection to the SequeLink Server. If a server data source is not specified, the default data source is used by the client.

Table A-1 shows an example of an LDAP directory entry and attributes you may want to store in an LDAP entry for a SequeLink service.

Table A-1. Example: LDAP Directory Entry for a SequeLink Service				
Attribute	Syntax	Description	Example	Required?
SequeLinkHost	cis	The TCP/IP host name or the TCP/IP address on which the SequeLink Server is running.	123.4.5.6 dino.yourcompany	Yes
SequeLinkPort	cis	The TCP/IP port on which the SequeLink Server is listening.	5004	Yes
ServerDataSource	cis	A server data source to use for the connection.	Sales	No

How you create LDAP entries depends on the LDAP product you are using. For instructions on creating LDAP entries, refer to your LDAP product documentation.

Updating LDAP Entries for SequeLink Services

You must update LDAP directory entries for SequeLink services when a:

- New SequeLink service is installed or added
- SequeLink service is assigned a new IP address or port
- SequeLink data source is created or deleted
- SequeLink data source is renamed

For instructions on updating LDAP directory entries, refer to your LDAP product documentation.

B OS/390 Workload Manager (WLM) Classification

This appendix describes the information used by SequeLink Server to classify WLM enclaves.

Table B-1. Workload Manager (WLM) Classification Information

WLM Qualifier Name	Value
Subsystem Type	VAI
Subsystem Instance	Sequelink Subsystem Name (MVSGlobalSubSysID attribute)
Function Name	SQLNK
Collection Name	DB2 Collection Name used when the enclave is created
Connection Type	One of the following client types: <ul style="list-style-type: none"> ■ ODBC ■ JDBC ■ OLEDB ■ ADMIN ■ .NET
Correlation Information	Connection ID, for example, Txxxxxxx
Package Name	DB2 Package Name used when the enclave is created
Plan Name	One of the following plan names: <ul style="list-style-type: none"> ■ DB2 Plan Name for attachment CAF ■ ?RRSAF for attachment RRSAF

Table B-1. Workload Manager (WLM) Classification Information *(cont.)*

WLM Qualifier Name	Value
Subsystem Parameter	Information presented in the following pattern: 0-7 Space character 9-23 Client TCP/IP address 24 Space character 25-39 Server TCP/IP address 40 Space character 41-46 Port number of the SequeLink Server 47 Space character 48-55 Original user ID 56 Space character 57-64 Mapped UID 65 Space character 66-73 SequeLink service name 74 Space character 75-138 SequeLink server data source name
Transaction Name / Job Name	Sequelink Server jobname
Userid	Mapped UID

C SequeLink Manager Commands

This appendix lists all available SequeLink Manager commands in alphabetical order. See [“Invoking the SequeLink Manager Command-Line Tool” on page 110](#) for information about starting the SequeLink Manager Command-Line Tool.

IMPORTANT:

- SequeLink Manager command names are not case-sensitive; however, the command parameter *service_name* is case-sensitive.
- If the value of a command parameter contains spaces, the value must be enclosed within single quotes (') or double quotes (").
- If the value of a command parameter contains single or double quotes, use single quotes to quote double quotes and double quotes to quote single quotes.
- The pound sign (#) is a comment character. All text that follows the pound sign on the same line is ignored.
- When issuing commands using the direct or batch method, you must specify all of a command's required and optional parameters in the correct position (specify the parameters in the order they are documented). See [“Direct Command Execution” on page 108](#) and [“Batch Command Execution” on page 108](#) for more information about direct and batch methods of issuing commands.

About | a

Prints to the console the version of the SequeLink Manager Command-Line Tool and copyright information.

Syntax {about | a}

Example about

ActivateLocalConfig | alc

Connects to the SequeLink Agent on a local machine.

Syntax {ActivateLocalConfig | alc}

Example alc

ActivateOfflineConfig | aoc

Opens the local configuration file.

Syntax {ActivateOfflineConfig | aoc} *configuration_file*

where *configuration_file* is the path and name of local configuration file.

Example aoc "c:\Program Files\DataDirect\slserver54\cfg\swandm.ini"

NOTE: The path is enclosed in quotes because there is a space in the path name. Otherwise, the path would not have to be quoted, for example, aoc c:\DataDirect\cfg\swandm.ini.

ActivateRemoteConfig | arc

Connects to a remote SequeLink Agent.

Syntax

{ActivateRemoteConfig | arc} *agent_connection_info*

where *agent_connection_info* is the information required to connect to the SequeLink Agent—host:port, which is the host name and port of the server on which the SequeLink Agent resides.

Example

```
arc caspar.ddtek.com:7500
```

CloseConfig | cc

Closes the activated configuration.

Syntax

{CloseConfig | cc}

Example

```
cc
```

DataSourceAttributeAdd | dsaa

Adds an attribute to the specified server data source and the specified SequeLink service.

Syntax

{DataSourceAttributeAdd | dsaa} *service_name*
data_source_name attribute_name value

where:

service_name is the name of a data access service. Service names can be obtained using the ServiceList | sl command.

data_source_name is the name of the server data source for which you want to add an attribute. This server data source must belong to the data access service you specified.

attribute_name is the name of the attribute you want to add.

value is the value for the attribute.

See [Appendix E “SequeLink Service Attributes” on page 407](#) for a list of SequeLink service attributes and their valid values.

Example

In the following example, the DataSourceCurrentCatalog attribute is being added to the DS_Employees server data source that belongs to the SLOracle8 data access service. The value for the attribute is employees.

```
dsaa SLOracle81 DS_Employees DataSourceCurrentCatalog
employees
```

DataSourceAttributeDelete | dsad

Deletes an attribute from a server data source.

Syntax

```
{DataSourceAttributeDelete | dsad} service_name
data_source_name attribute_name
```

where:

service_name is the name of a data access service. Service names can be obtained using the ServiceList | sl command.

data_source_name is the name of the server data source from which you want to delete an attribute. This server data source must belong to the data access service you specified.

attribute_name is the name of the attribute you want to delete.

See [Appendix E “SequeLink Service Attributes” on page 407](#) for a list of SequeLink service attributes and their valid values.

Example

The following example deletes the DataSourceCurrentCatalog attribute from the DS_Employees server data source that belongs to the SLOracle8 data access service.

```
dsad SLOracle81 DS_Employees DataSourceCurrentCatalog
```

DataSourceAttributeReplace | dsar

Changes the value of a server data source attribute.

Syntax

```
{DataSourceAttributeReplace | dsar} service_name  
data_source_name attribute_name value
```

where:

service_name is the name of a data access service. Service names can be obtained using the ServiceList | sl command.

data_source_name is the name of the server data source you want to modify. This server data source must belong to the data access service you specified.

attribute_name is the attribute for which you want to change the value.

value is the new value of the attribute.

See [Appendix E “SequeLink Service Attributes” on page 407](#) for a list of SequeLink service attributes and their valid values.

Example

The following example changes the value of the DataSourceCurrentCatalog attribute in the DS_Employees server data source that belongs to the SLOracle8 data access service. The value is changed to partners.

```
dsar SLOracle81 DS_Employees DataSourceCurrentCatalog  
partners
```

DataSourceCreate | dsc

Creates a server data source.

Syntax

```
{DataSourceCreate | dsc} service_name data_source_name
```

where:

service_name is the name of the data access service in which to create the new server data source.

data_source_name is the name of the server data source you want to create.

Example

The following example creates a server data source named DS_Employess within the SLOracle8 data access service.

```
dsc SLOracle81 DS_Employees
```

DataSourceDelete | dsd

Deletes a server data source.

Syntax

```
{DataSourceDelete | dsd} service_name data_source_name
```

where:

service_name is the name of the data access service from which to delete a server data source. Service names can be obtained using the ServiceList | sl command.

data_source_name is the name of the server data source you want to delete.

Example

The following example deletes the DS_Employees server data source from the SLOracle8 data access service.

```
dsd SLOracle81 DS_Employees
```

DataSourceInfo | dsi

Lists all attributes and their values for a server data source.

Syntax

```
{DataSourceInfo | dsi} service_name data_source_name
```

where:

service_name is the name of a data access service. Service names can be obtained using the ServiceList | sl command.

data_source_name is the name of the server data source for which you want to list attributes and their values. This server data source must belong to the data access service you specified.

See [Appendix E “SequeLink Service Attributes” on page 407](#) for a list of SequeLink service attributes and their valid values.

Example

The following example lists attributes and their values for the DS_Employees server data source. This server data source belongs to the SLOracle8 data access service.

```
dsi SLOracle81 DS_Employees
```

DataSourceList | dsl

Lists all available SequeLink server data sources.

Syntax

```
{DataSourceList | dsl}
```

Example

```
dsl
```

Echo | e

Echoes a user-defined string. This command is useful when you issue commands from a file. For example, you could issue the DataSourceCreate command and use the Echo command to

display text that says "A new data source was created in the SLOracle8 data access service."

Syntax

```
{Echo | e} string
```

where *string* is the text you want displayed to your console. If the string contains spaces, you must surround the string with either double or single quotes.

Example

```
echo "Testing echo command."
```

EventList | el

Lists events from a specified data access service or from a specified event trace file.

Syntax

```
{eventlist | el} service_name | [remote]file=event_trace_file_name
[details]
[ [{service | svc}] |
[{session | sess}] |
[{statement | stmt}] |
[{transaction | trans}] |
[{network | net}] |
[{error | err}] |
[{other | oth}] ] ]
[count=[{ + | - }] {all | number}]
[offset={begin | end} [{ + | - }]number]
[query='custom_event_filter_string']
```

where:

service_name is the name of a data access service. The event trace file for this specified service will be listed. Service names can be obtained using the ServiceList | sl command.

event_trace_file_name is the path and name of the event trace file you want to list.

number is the event number of events to list when used with the count option. When used with the offset option, *number* is the number of the event from which to start listing events. For example, if *offset=10*, SequeLink would list all events starting with event 10. Another example, if you specify *count=20* and *offset=begin*, SequeLink will list the first 20 events. If you specify *count=20* and *offset=5*, SequeLink will list 20 events starting from event 5.

custom_event_filter_string is an event filter statement. See [“Filtering Events” on page 486](#) for more information.

Options

Details: If you specify Details, SequeLink will list detail information about the event.

Event Types: You can specify one or more of the following event groups for which to list event information: Service, Session, Statement, Transaction, Error, or Other. When you specify one or more of the event groups, SequeLink Manager lists all the events of the type you specified. For example, if you specify Service, SequeLink lists all service events such as Service Started and Service Stopping (these events start with "Service"). Event names that do not start with Service, Session, Network, Error, Statement, or Transaction are Other events (for example, Cursor Closed).

Examples

Local host or remote configuration examples:

Example A: The following example lists detailed event information for the SLAgent service.

```
el SLAgent details
```

Example B: The following example lists detailed event information for all service events starting with event number 10 in the event trace file associated with the SLOracle data access service.

```
el SLOracle details service count=all offset=10
```

Example C: The following example defines a query for the information it will list for the SLOracle81 data access service. The query returns all SQL statements that do not return a return code of 0.

```
el SLOracle81 stmt query='${ReturnCode} != 0'
```

Example D: The following example lists event information for the first 10 events in the local file named SLOracle81.trc.

```
el "file=C:\Program Files\DataDirect\slserver54\tracing\
SLOracle81.trc" count=10
```

Example E: The following example lists detailed event information for only service events in the remote file named SLOracle81.trc.

```
el "remotefile=C:\Program Files\DataDirect\slserver54\
tracing\SLOracle81.trc" service details
```

Offline configuration examples:

Example A: The following example lists event information from the local file named SLOracle81.trc file.

```
el "file=C:\Program Files\DataDirect\slserver54\tracing\
SLOracle81.trc"
```

Example B: The following example lists event information for the first 10 events in the local file named SLOracle81.trc.

```
el "file=C:\Program Files\DataDirect\slserver54\tracing\
SLOracle81.trc" count=10
```

Example C: The following example lists event information from the local file named SLOracle81.trc, starting from the end of the file and listing all events.

```
el "file=C:\Program Files\DataDirect\slserver54\tracing\
SLOracle81.trc" count=-all offset=end
```


Example D: The following example lists only session and service event information from the local file named SLoracle81.trc., starting with the fifth event.

```
e1 "file=C:\Program Files\DataDirect\slserver54\tracing\
SLoracle81.trc" offset=5 service session
```

Example E: The following example lists detailed event information for service events only from the local file named SLoracle81.trc.

```
e1 "file=C:\Program Files\DataDirect\slserver54\tracing\
SLoracle81.trc" service details
```

EventExport | ee

Exports events from a specified service or specified event trace file to a text file or XML file.

Syntax

```
{eventexport | ee} service_name | [remote]file=
event_trace_file_name export_format export_file_name |
[remote]file=event_trace_file_name|
[ [ [{service | svc}] |
[{session | sess}] |
[{statement | stmt}] |
[{transaction | trans}] |
[{network | net}] |
[{error | err}] |
[{other | oth}] ] ]
[count=[{ + | - }] {all | number}]
[offset={begin | end} [{ + | - }]number]
[query='custom_event_filter_string']
```

where:

service_name is the name of a data access service. The event trace file from the specified service is listed. Service names can be obtained using the ServiceList | sl command.

event_trace_file_name is the path and name of the event trace file.

export_format is the format of the file to which you want to export the events, where:

- {delimited_txt | deltxt} is a text file with commas separating each event you export
- {raw_xml | rxml} is a well-formed XML file.
- {validated_xml | vxml} is a valid XML file.

export_file_name is the path and name of the file to which you are exporting the events.

number is the event number of events to export when used with the count option. When used with the offset option, number is the number of the event from which to start exporting events. For example, if offset=10, SequeLink would export all events starting with event 10. Another example, if you specify count=20 and offset=begin, SequeLink will export the first 20 events. If you specify count=20 and offset=5, SequeLink will export 20 events starting from event 5.

custom_event_filter_string is an event filter statement. See [“Filtering Events” on page 486](#).

Options

Event Types: You can specify one or more of the following event groups for which to export event information: Service, Session, Statement, Transaction, Error, or Other. When you specify one or more of the event groups, SequeLink Manager exports all the events of the type you specified. For example, if you specify Service, SequeLink exports all service events such as Service Started and Service Stopping (these events start with "Service"). Event names that do not start with Service, Session, Network, Error, Statement, or Transaction are Other events (for example, Cursor Closed).

Examples

Local host or remote configuration examples:

Example A: The following example exports event information in the local file named `SLoracle81.trc` to a text file named `export.txt`.

```
ee "file=C:\Program Files\DataDirect\slserver54\tracing\
SLoracle81.trc" deltxt export.txt
```

Example B: The following example exports event information for only service events in the remote file named `SLoracle81.trc` to a valid XML file named `export.xml`.

```
ee "remotefile=C:\Program Files\DataDirect\slserver54\
tracing\SLoracle81.trc" vxml export.xml service
```

Example C: The following example exports event information for all service events starting with event number 10 in the event trace file associated with the `SLOracle` data access service to a well-formed XML file named `export.xml`.

```
el SLOracle rxml export.xml service count=all offset=10
```

Example D: The following example exports session event information for the `SLAgent` service to a text file named `export.txt`.

```
el SLAgent deltxt export.txt
```

Example E: The following example defines a query for the information it will export for the `SLOracle81` data access service to a valid XML file named `export.xml`. The query returns all SQL statements that do not return a return code of 0.

```
el SLOracle81 vxml export.xml stmt
query='${ReturnCode} != 0'
```

Offline configuration examples:

Example A: The following example exports event information from the local file named `SLOracle81.trc` to a text file named `export.txt`.

```
el "file=C:\Program Files\DataDirect\slserver54\tracing\
SLOracle81.trc" deltxt export.txt
```

Example B: The following example exports event information for the first 10 events in the local file named `SLOracle81.trc` to a text file named `export.txt`.

```
el "file=C:\Program Files\DataDirect\slserver54\tracing\
SLOracle81.trc" deltxt export.txt count=10
```

Example C: The following example exports event information from the local file named `SLOracle81.trc`, starting from the end of the file and listing all events, to a well-formed XML file named `export.xml`.

```
el "file=C:\Program Files\DataDirect\slserver54\tracing\
SLOracle81.trc" rxml export.xml count=-all offset=end
```

Example D: The following example exports only session and service event information from the local file named `SLOracle81.trc`, starting with the fifth event, to a well-formed XML file named `export.xml`.

```
el "file=C:\Program Files\DataDirect\slserver54\tracing\
SLOracle81.trc" rxml export.xml offset=5 service session
```

Example E: The following example exports event information for service events only from the local file named `SLOracle81.trc` to a valid XML file named `export.xml`.

```
el "file=C:\Program Files\DataDirect\slserver54\tracing\
SLOracle81.trc" vxml export.xml service
```

Exit | e

Quits the SequeLink Manager Command-Line Tool.

Syntax {Exit | e}

Example `exit`

Help | ?

Displays help about the syntax for invoking the command-line tool or displays help about individual commands.

Syntax {Help | ?} [{*short_command_name* | *long_command_name*}]

where:

short_command_name is the short version of the command name. For example, e is the short version of the Echo command.

long_command_name is the long version of the command name, for example, Echo.

Example The following example displays help for the Echo command.

? Echo

MVSDb2InterfaceAttributeAdd | mdiaa

Adds an attribute to a DB2 interface.

Syntax

```
{MVSDb2InterfaceAttributeAdd | mdiaa} DB2_interface_ID
attribute_name value
```

where:

DB2_interface_ID identifies the DB2 interface.

attribute_name is the attribute you want to add.

value is the value of the attribute.

Example

The following example adds the MVSDb2RootDescription attribute to DB2_Interface. The value is set to DB2v7.1.

```
mdiaa DB2_interface MVSDb2RootDescription DB2v7.1
```

MVSDb2InterfaceAttributeDelete | mdiad

Deletes an attribute for a DB2 interface.

Syntax

```
{MVSDb2InterfaceAttributeDelete | mdiad} DB2_interface_ID
attribute_name
```

where:

DB2_interface_ID identifies the DB2 interface from which you want to delete an attribute.

attribute_name is the name of the attribute you want to delete.

Example

```
mdiad DB2_Interface MVSDb2RootDescription
```

MVSDDB2InterfaceAttributeReplace | mdia

Changes the value of a DB2 interface attribute.

Syntax

```
{MVSDDB2InterfaceAttributeReplace | mdia} DB2_interface_ID
attribute_name value
```

where:

DB2_interface_ID identifies the DB2 interface.

attribute_name is the name of the attribute you want to change.

value is the new value of the attribute.

Example

The following example changes the value of the MVSDDB2TraceTableSize attribute to 256.

```
mdia DB2_Interface MVSDDB2TraceTableSize 256
```

MVSDDB2InterfaceInfo | mdii

Lists all attributes and their values for a DB2 interface.

Syntax

```
{MVSDDB2InterfaceInfo | mdii} DB2_interface_ID
```

where *DB2_interface_ID* identifies the DB2 interface for which you want to list attributes and their values.

Example

```
mdii DB2_Interface
```

MVSDb2InterfaceList | mdil

Lists all available external DB2 interfaces.

Syntax {MVSDb2InterfaceList | mdil}

Example mdil

MVSGlobalAttributeAdd | mgaa

Adds an attribute to the OS/390 global settings.

Syntax {MVSGlobalAttributeAdd | mgaa} *attribute_name value*

where:

attribute_name is the name of the attribute you want to add.

value is the value of the attribute.

Example mgaa MVSGlobalCompTrace

MVSGlobalAttributeDelete | mgad

Deletes an attribute in the OS/390 global settings.

Syntax {MVSGlobalAttributeDelete | mgad} *attribute_name*

where *attribute_name* is the name of the attribute you want to delete.

Example mgad MVSGlobalCompTrace

MVSGlobalAttributeReplace | mgar

Changes the value of the specified attribute in the OS/390 global settings.

Syntax {MVSGlobalAttributeReplace | mgar} *attribute_name value*

where:

attribute_name is the name of the attribute you want to change.

value is the new value of the attribute.

Example mgar MVSGlobalCompTrace D

MVSGlobalInfo | mgi

Lists all attributes and their values for the OS/390 global settings.

Syntax {MVSGlobalInfo | mgi}

Example mgi

MVSUserIDMapAttributeAdd | muimaa

Adds an attribute to a user ID map.

Syntax {MVSUserIDMapAttributeAdd | muimaa} *user_ID_map attribute_name value*

where:

user_ID_map is the user ID map to which you want to add an attribute.

attribute_name is the name of the attribute you want to add.

value is the value of the attribute.

Example

The following example adds the MVSUIDDefaultAccess attribute to the UserID1 user ID map. The value is set to PERMIT.

```
miuumaa UserID1 MVSUIDDefaultAccess PERMIT
```

MVSUserIDMapAttributeDelete | muimad

Deletes an attribute for a user ID map.

Syntax

```
{MVSUserIDMapAttributeDelete | muimad} user_ID_map  
attribute_name
```

where:

user_ID_map is the user ID map from which you want to delete an attribute.

attribute_name is the name of the attribute you want to delete.

Example

```
miuumad UserID1 MVSUIDDefaultAccess
```

MVSUserIDMapAttributeReplace | muimar

Changes the value for a user ID map attribute.

Syntax

```
{MVSUserIDMapAttributeReplace | muimar} user_ID_map  
attribute_name value
```

where:

user_ID_map identifies the user ID map.

attribute_name is the name of the attribute you want to change.

value is the value of the attribute.

Example

```
miumar UserID1 MVSUIDDefaultAccess DENY
```

MVSUserIDMapInfo | muimi

Lists all attributes and their values for a user ID map.

Syntax

```
{MVSUserIDMapInfo | muimi} user_ID_map
```

where *user_ID_map* is the user ID map for which you want to list attributes and their values.

Example

```
muimi UserID1
```

MVSUserIDMapList | muiml

Lists all available user ID maps.

Syntax

```
{MVSUserIDMapList | muiml}
```

Example

```
miuml
```

NoOperation | noop

Performs no operation.

Syntax

```
{NoOperation | noop}
```

Example

```
noop
```

ProfileEventTraceCreate | petc

Creates an event trace profile for a SequeLink service.

Syntax

```
{ProfileEventTraceCreate | petc} service_name
```

where *service_name* is the service for which you want to create the event trace profile.

Example

```
petc SLOracle81
```

ProfileEventTraceDelete | petd

Deletes an event trace profile for a SequeLink service.

Syntax

```
{ProfileEventTraceDelete | petd} service_name
```

where *service_name* is the service from which you want to delete an event trace profile. Service names can be obtained using the ServiceList | sl command.

Example

```
petd SLOracle81
```

ProfileEventTraceEdit | pete

Changes an event trace profile for a SequeLink service.

Syntax

```
{ProfileEventTraceEdit | pete} service_name {enable | disable |  
event_group} [{enable | disable} | {event_name | event_id} [{on |  
off}]] [custom_event_filter]
```

where:

service_name is the service for which to change an event trace profile. This is a requirement value. Service names can be obtained using the ServiceList | sl command.

event_group is the type of event within the service to change. Valid values are:

- {Service | srvc}
- {Session | sess}
- {Statement | stmt}
- {Transaction | trans}
- {Network | net}
- {Error | err}
- {Other | oth}

event_name is the name of the event within in the specified event group to change. You can use the ProfileEventTraceInfo command to list available event names.

event_id is the numeric identifier of the event within the specified event group to change. You can specify either *event_name* or *event_id*, not both. You can use the ProfileEventTraceInfo command to list available event identifiers.

custom_event_filter is an optional event filter that can be specified for all events being enabled. See [“Filtering Events” on page 486](#) for more information.

Examples

Example A: The following example disables all events for the SLOracle8 data access service, meaning that no events are written to the event trace file.

```
pete SLOracle81 disable
```

Example B: The following example enables the event specified by the custom event filter.

```
pete SLOracle81 Session enable '${ClientInfo}="127.0.0.1"'
```

Example C: The following example enables all service events for the SLOracle8 data access service.

```
pete SLOracle81 service enable
```

Example D: The following example disables all error events for the SLOracle8 data access service.

```
pete SLOracle81 err disable
```

Example E: The following example changes the state of the transaction event named Transaction Rollback to off.

```
pete SLOracle81 trans "Transaction Rollback" off
```

Example F: The following example changes the state of the session event identified by 2 to "on" *if* the event meets the custom event query filter.

```
pete SLOracle81 sess 2 on '${DbmsUser}' = "scott"
```

ProfileEventTraceInfo | peti

Lists event trace profile information for a SequeLink service.

Syntax

```
{ProfileEventTraceInfo | peti} service_name
```

where *service_name* is the service for which to list event trace profile information. Service names can be obtained using the ServiceList | sl command.

Example

```
peti SLOracle81
```

ProfileMonitorCreate | pmc

Creates a monitoring profile for a SequeLink service.

Syntax

```
{ProfileMonitorCreate | pmc} service_name {yes | no}
```

where *service_name* is the service for which you want to create the monitoring profile.

You must specify either yes or no. Yes indicates that shared counters will be enabled. No indicates that shared counters will not be enabled. Enabling shared counters is for Windows only.

Example

```
pmc SLOracle81
```

ProfileMonitorDelete | pmd

Deletes a monitoring profile for a SequeLink service.

Syntax

```
{ProfileMonitorDelete | pmd} service_name
```

where *service_name* is the service from which you want to delete the monitoring profile. Service names can be obtained using the ServiceList | sl command.

Example

```
pmd SLOracle81
```

ProfileMonitorEdit | pme

Changes a monitoring profile for a SequeLink service.

Syntax

```
{ProfileMonitorEdit | pme} service_name {enable | disable |  
event_group} [{enable | disable} | {event_name | event_id} [{on |  
off}]]
```

where:

service_name is the service for which to change the monitoring profile. Service names can be obtained using the ServiceList | sl command.

event_group is the type of event to change for the monitoring profile. Valid values are:

- {Service | *srvc*}
- {Session | *sess*}
- {Statement | *stmt*}

event_name is the name of the event within in the specified event group to change. You can use the ProfileMonitorInfo command to list available event names.

event_id is the numeric identifier of the event within the specified event group to change. You can specify either *event_name* or *event_id*, not both. You can use the ProfileMonitorInfo command to list available event identifiers.

Examples

Example A: The following example enables all events for the SLOracle8 data access service, meaning that all events are monitored.

```
pme SLOracle81 enable
```

Example B: The following example disables all events for the SLOracle8 data access service, meaning no events are monitored.

```
pme SLOracle81 disable
```

Example C: The following example enables all service events for the SLOracle8 data access service.

```
pme SLOracle81 service enable
```

Example D: The following example disables all session events for the SLOracle8 data access service.

```
pme SLOracle81 session disable
```

Example E: The following example changes the state of the session event named database user to off.

```
pme SLOracle81 session "database user" off
```


Example F: The following example changes the state of the session event identified by 10 to off.

```
pme SLOracle81 session 10 off
```

Example G: The following example changes the state of the statement event named sql to on.

```
pme SLOracle81 stmt sql on
```

ProfileMonitorInfo | pmi

Lists profile monitoring information for a SequeLink service.

Syntax

```
{ProfileMonitorInfo | pmi} service_name
```

where *service_name* is the service for which you want to list profile monitoring information. Service names can be obtained using the ServiceList | sl command.

Example

```
pmi SLOracle81
```

Quit | q

Quits the SequeLink Manager Command-Line Tool.

Syntax

```
{Quit | q}
```

Example

```
q
```

SaveConfig | save

Saves the current configuration. This command is available only when AutoSave setting is set to off. For more information about setting AutoSave, see the Set | s command.

Syntax {SaveConfig | save}

Example save

ServiceActiveDebugLogLevel | sadll

Displays or changes the debug log level of an active SequeLink service. When no debug log level values are provided, the current settings are listed.

Syntax {ServiceActiveDebugLogLevel | sadll} service_name
 [[{dis | disable}]
 [{enall | enableall}]
 [{en | enable}]
 [{ferr | fatalerror}={off | on}] |
 [{err | errors}={off | on}] |
 [{war | warnings}={off | on}] |
 [{info | informationals}={off | on}] |
 [{debug | debugging}={off | on}] |
 [{sspp | ssppackets}={off | on}] |
 [{sspr | ssprequests}={off | on}] | ...]

where *service_name* is the active service for which you want to display or change debug log levels. Service names can be obtained using the ServiceList | sl command.

Example The following example turns on debug messages and turns off error messages in the debug log for the SLOracle8 data access service:

```
sadll SLOracle8 debug=on err=off
```

ServiceActiveInfo | sai

Lists specific information about an active SequeLink service.

Syntax

```
{ServiceActiveInfo | sai} service_name
```

where *service_name* is the active service for which you want to list information. Service names can be obtained using the ServiceList | sl command.

Example

```
sai SLOracle81
```

ServiceAttributeAdd | saa

Adds an attribute to a SequeLink service.

Syntax

```
{ServiceAttributeAdd | saa} service_name attribute_name value
```

where:

service_name is the service to which you want to add an attribute. Service names can be obtained using the ServiceList | sl command.

attribute_name is the name of the attribute you want to add.

value is the value of the attribute.

See [Appendix E “SequeLink Service Attributes” on page 407](#) for a list of SequeLink service attributes and their valid values.

Example

```
saa SLOracle81 ServiceUser sqlnk
```

ServiceAttributeDelete | sad

Deletes an attribute from a SequeLink service.

Syntax

```
{ServiceAttributeDelete | sad} service_name attribute_name
```

where:

service_name is the service from which you want to delete an attribute. Service names can be obtained using the ServiceList | sl command.

attribute_name is the name of the attribute you want to delete.

See [Appendix E “SequeLink Service Attributes” on page 407](#) for a list of SequeLink service attributes and their valid values.

Examples

```
sad SLOracle81 ServiceCodePage
```

```
sad SLOracle81 ServiceUser[2]
```

ServiceAttributeReplace | sar

Changes the value for a SequeLink service attribute.

Syntax

```
{ServiceAttributeReplace | sar} service_name attribute_name value
```

where:

service_name is the service for which you want to change the value of an attribute. Service names can be obtained using the ServiceList | sl command.

attribute_name is the name of the attribute you want to change.

value is the new value of the attribute.

See [Appendix E “SequeLink Service Attributes” on page 407](#) for a list of SequeLink service attributes and their valid values.

Example

```
sar SLOracle81 ServiceUser[2] devuser
```

ServiceCreate | sc

NOTE: This command is not applicable to OS/390.

Creates a SequeLink service based on a service template ID.

Syntax

```
{ServiceCreate | sc} service_name service_ID tcp_port
```

where:

service_name is the name of the service to create.

service_ID identifies the ID of the service template to use to create the new service. To get a listing of available templates and their IDs, use the ServiceTemplateList | stl command.

tcp_port is the TCP/IP port on which the service is listening.

Example

```
sc SLOracle81 SL5_Oracle8 19996
```

ServiceDebugLogLevel | sdll

Displays or changes the debug log level of a SequeLink service. When no debug log level values are provided, the current settings are listed.

Syntax

```
{ServiceDebugLogLevel | sdll} service_name
[ [{dis | disable}]
[{enall | enableall}]
[{en | enable}]
[{ferr | fatalerror}={off | on}] |
[{err | errors=off | on}] |
[{war | warnings}={off | on}] |
```

```
[{info | informationals}={off | on}] |
[{debug | debugging}={off | on}] |
[{sspp | ssppackets}={off | on}] |
[{sspr | ssprequests}={off | on}] | ... ]
```

where *service_name* is the service to which the session belongs.
Service names can be obtained using the ServiceList | sl command.

Example

The following example turns on debug messages and turns off error messages in the debug log file for the SLOracle8 data access service:

```
sdll SLOracle8 debug=on err=off
```

ServiceDelete | sd

NOTE: This command is not applicable to OS/390.

Deletes a SequeLink service.

Syntax

```
{ServiceDelete | sd} service_name
```

where *service_name* is the name of the service you want to delete. Service names can be obtained using the ServiceList | sl command.

Example

```
sd SLOracle81
```

ServiceInfo | si

Lists all attributes and their values for a SequeLink service.

Syntax

```
{ServiceInfo | si} service_name
```

where *service_name* is the service for which you want to list attributes and their values. Service names can be obtained using the ServiceList | sl command.

See [Appendix E “SequeLink Service Attributes” on page 407](#) for a list of SequeLink service attributes and their valid values.

Example

```
si SLOracle81
```

ServiceList | sl

Lists all available SequeLink services.

Syntax

```
{ServiceList | sl}
```

Example

```
sl
```

ServiceRegister | sr

NOTE: This command is not applicable to OS/390.

Registers a SequeLink service.

Syntax

```
{ServiceRegister | sr} service_name
```

where *service_name* is the service you want to register. Service names can be obtained using the ServiceList | sl command.

Example

```
sr SLOracle81
```

ServiceStart | ss

NOTE: This command is not applicable to OS/390.

Starts a SequeLink service.

Syntax {ServiceStart | ss} *service_name*

where *service_name* is the service you want to start. Service names can be obtained using the ServiceList | sl command.

Example ss SLOracle81

ServiceStop | sst

NOTE: This command is not applicable to OS/390.

Stops a SequeLink service.

Syntax {ServiceStop | sst} *service_name*

where *service_name* is the service you want to stop. Service names can be obtained using the ServiceList | sl command.

Example sst SLOracle81

ServiceTemplateList | stl

Lists all available SequeLink service templates and their IDs.

Syntax {ServiceTemplateList | stl}

Example stl

ServiceTemplateInfo | sti

Lists all attributes and their values for a SequeLink service template.

Syntax

```
{ServiceTemplateInfo | sti} service_template_ID
```

where *service_template_ID* identifies the service template. To get a listing of available templates and their IDs, use the ServiceTemplateList | stl command.

Example

```
sti SL5_Oracle81
```

ServiceUnregister | su

NOTE: This command is not applicable to OS/390.

Unregisters the specified SequeLink service.

Syntax

```
{ServiceUnregister | su} service_name
```

where *service_name* is the service you want to unregister. Service names can be obtained using the ServiceList | sl command.

Example

```
su SLOracle81
```

SessionDebugLogLevel | sesdll

NOTE: This command is not applicable to SequeLink services on UNIX or OS/390.

Displays or changes the debug log level of the specified session. When no debug log level values are provided, the current settings are listed.

Syntax

```
{SessionDebugLogLevel | sesdll} service_name  
[ [{dis | disable}]
```

```
[{enall | enableall}]
[{en | enable}]
[{ferr | fatalerror}={off | on}] |
[{err | errors}={off | on}] |
[{war | warnings}={off | on}] |
[{info | informationals}={off | on}] |
[{debug | debugging}={off | on}] |
[{sspp | ssppackets}={off | on}] |
[{sspr | ssprequests}={off | on}] | ... ]
```

where *service_name* is the service to which the session belongs. Service names can be obtained using the ServiceList | sl command.

Examples

Example A: The following example displays the current settings of the debug log for session 5 of the SLOracle8 data access service:

```
sesdll SLOracle8 5
```

Example B: The following example turns on debug messages and turns off error messages in the debug log for session 5 of the SLOracle8 data access service:

```
sesdll SLOracle8 5 debug=on err=off
```

SessionInfo | sesi

Lists specific information about a session and its associated statements (only for data access sessions) for SequeLink service.

Syntax

```
{SessionInfo | sesi} service_name session_ID
```

where:

service_name is the service to which the session belongs. Service names can be obtained using the ServiceList | sl command.

session_ID identifies the session for which you want to display information. This session must belong to the specified service.

Session IDs can be obtained using the ServiceActiveInfo | sai command.

Example

```
sesi SLOracle81 5
```

SessionStop | sess

Stops a session for a SequeLink service.

Syntax

```
{SessionStop | sess} service_name session_ID
```

where:

service_name is the service to which the session belongs. Service names can be obtained using the ServiceList | sl command.

session_ID identifies the session you want to stop. This session must belong to the specified service. Session IDs can be obtained using the ServiceActiveInfo | sai command.

Example

```
sess SLOracle81 5
```

Set | s

Sets the following configuration for the command-line tool settings:

AutoSave={on | off}. When on, the configuration is saved when a change is made. When off, the configuration is not automatically saved, and you must issue a SaveConfig command to save the configuration.

Echo={on | off}. When on, all commands entered on the command line are printed to output. When off, this setting is ignored. The default is off.

IgnoreErrors={on | off}. When on, the SequeLink Manager Command-Line Tool stops when an error occurs. This setting is useful when you want the processing of batch files to stop when an error occurs. When off, this setting is ignored. The default is off.

Syntax {Set | s} [option1={on | off} [option2={on | off} ...]]

Examples

```
set  
set echo=on  
set echo=on ignoreerrors=on
```

D Operator Interface Commands for OS/390

This appendix describes the Operator Interface commands by category:

- [“Server Controller Task \(CNTL\) Commands” on page 397](#)
- [“Logging Controller \(LOGR\) Commands” on page 399](#)
- [“DB2 Component \(DB2\) Commands” on page 401](#)
- [“RRS Component \(RRS\) Commands” on page 402](#)
- [“THREADPOOL Component \(THPL\) Commands” on page 403](#)
- [“XA Component \(XA\) Commands” on page 404](#)

See [“Using the SequeLink Manager for OS/390 Operator Interface” on page 129](#) for information about using the Operator Interface.

Syntax of Operator Interface Commands

The syntax for Operator Interface commands is:

compid command parms

where:

compid is the ID of the server component to which the command is directed. Valid component IDs are:

- CNTL - (Server Controller Tasks)
- LOGR - (Messaging Component)
- DB2 - (DB2 Component)
- RRS - (RRS Component)
- THPL - (Threadpool Component)
- XA - (XA Component)

command is the command name.

parms are the parameters of the command.

For example:

CNTL HALT shuts down the Server immediately.

NOTE: When using the Operator Interface, you can repeat the last command you entered by pressing F24 or Shift+F12.

Server Controller Task (CNTL) Commands

CLOSE

Shuts down the SequeLink Server system in Normal or Immediate mode.

Parameters

TYPE=NORM

Shuts down the SequeLink Server. All connections are allowed to end normally. New connections are refused. If you start shutdown normally, you can still override it to IMMEDIATE mode.

TYPE=IMMED

Shuts down the SequeLink Server immediately. All client connections are terminated in a consistent manner.

Example

`CNTL CLOSE TYPE=NORM` shuts down the SequeLink Server. All connections end normally and new connections are refused. You can still override shutdown to IMMEDIATE mode.

`CNTL CLOSE TYPE=IMMED` shuts down the SequeLink Server immediately. All client connections are terminated in a consistent manner.

HALT

Shuts down the SequeLink Server system.

Parameters

None

Example

`CNTL HALT` shuts down the SequeLink Server immediately.

STATUS

Displays the general status of the SequeLink Server system.

Parameters	<p>SHOW=ALL</p> <p>Lists all active tasks (server core tasks and service tasks) and shows their status. All services known to the server are listed.</p> <p>SHOW=SERVICES</p> <p>Lists all active application service tasks known to the server.</p> <p>NOTE: The SHOW parameter is optional.</p>
-------------------	---

Example	<p>CNTL STATUS displays the status of each attached component. The output displays on the operator’s console.</p> <p>CNTL STATUS SHOW=ALL displays all known active tasks and services. The output displays on the operator’s console.</p> <p>CNTL STATUS SHOW=SERVICES lists all active services. The output displays on the operator’s console.</p>
----------------	---

LIST

Lists free storage, expressed in kilobytes (K), above and below the 16 MB line.

Parameters	<p>Type=Free</p>
Example	<p>CNTL LIST TYPE=FREE lists the free storage above and below the 16 MB line.</p>

Logging Controller (LOGR) Commands

ALTER

Starts or stops logging of VALLOG trace messages.

Parameters

TRACE=ON | OFF

Turns on or off logging of trace messages sent by components.

COMPNT=ALL | *component_ID*

Specifies which components will have messages logged. This can be set to ALL (messages from all system components) or to a component ID (messages for that component only). Valid component IDs include:

- C Common or shared components (operator interface, for example)
- D DB2 or RRS component
- L Generic log component
- S Server controller component
- T Threadpool component

Examples

LOGR ALTER TRACE=ON COMPNT=ALL sets tracing on for all components.

LOGR ALTER TRACE=OFF COMPNT=T sets tracing off for the threadpool component.

LOGR ALTER TRACE=OFF COMPNT=ALL sets tracing off for all components.

PRINT

Prints a SequeLink Server system log.

Parameters

`LOG=log_name`

Prints the primary log, `VAILOGP`, or the secondary log, `VAILOGS`. The default is the inactive log.

`CLASS=class_name`

Indicates which `SYSOUT` class to which to spool the printout. The default is `A`.

`HOLD=Y | N`

Indicates whether the output is to be held on the output queue. Valid values are `Y` (Yes) or `N` (No). The default is `N`.

NOTE: All parameters are optional.

Example

`LOGR PRINT CLASS=L` spools the inactive log to the JES2 output class `L`; the output is not held in the output queue.

STATUS

Displays the status of the message logging component (`LOGR`).

Parameters

None

Example

`LOGR STATUS` returns a single line, providing the general status of the logging component.

SWITCH

Changes the active log. This command switches to the alternate log, making the current log available for printing or archiving.

Parameters None

Example `LOGR SWITCH` changes the active log. For example, if the primary log (VAILOGP) is active when this command is issued, the secondary log (VAILOGS) becomes the active log. Issuing the command again makes VAILOGP the active log again.

DB2 Component (DB2) Commands

SHOW

Show the active DB2 interface.

Parameters None

Example `DB2 SHOW` shows the active DB2 interface.

STATUS

Displays the status of SequeLink Server DB2 interface.

Parameters None

Example `DB2 STATUS` displays the status of the DB2 interface.

RRS Component (RRS) Commands

LIST

Lists all RRS contexts associated with an RRSAF DB2 thread in use by the SequeLink Server.

Parameters None

Example `RRS LIST` lists all RRS contexts, their status, and their age.

RELEASE

Releases RRS contexts associated with *reusable* DB2 threads that are not used for a specified period.

Parameters `AGE=ddd`

Specifies the period, in seconds. When this value is omitted, a value of 300 seconds is used.

Example `RRS RELEASE AGE=60` releases the reusable DB2 threads not used within that last minute, but keeps at least the number of DB2 threads available as specified in `ServiceDB2MinThreads` in the SequeLink configuration file.

`RRS RELEASE AGE=0` releases all reusable DB2 threads even if their reusable status is current, or the value is specified in the SequeLink configuration file for `ServiceDB2MinThreads`.

THREADPOOL Component (THPL) Commands

LIST

Lists the status of all sessions. The maximum number of lines of output for a single invocation of this operator command is 100. The ADDRESS and USERID arguments will further limit the requested output.

Parameters

ADDRESS=*client Ipaddress*

Identifies the client IP address.

USERID=*userid*

Identifies a userid.

Both the *client Ipaddress* and the *userid* parameters can be specified generically.

Example

THPL LIST lists the status of all sessions, up to a maximum of 100 sessions.

THPL LIST USERID=MFI* lists the status of the sessions with a userid prefixed with MFI.

THPL LIST ADDRESS=10.131.* lists the status of all sessions for which the client IP address begins with 10.131.

THPL LIST USERID=MFI*,ADDRESS=10.131.40.59 lists the status of all sessions for userids prefixed with MFI and that have a client IP address of 10.131.40.59.

KILL

Kills a session.

Parameters `ID=session_ID`

Identifies the session that must be stopped. The SessionId can be obtained from the LIST command.

NOTE: This parameter is required.

Example `THPL KILL ID=2` stops session 2.

XA Component (XA) Commands

LIST

Lists all XA transactions and associated RRS contexts in the SequeLink Server.

Parameter None

Example `LIST` lists all XA transactions and associated RRS contexts in the SequeLink Server.

RELEASE

Performs cleanup of XA transactions and associated RRS contexts in the SequeLink Server by releasing contexts without an owner task that may still hold locks on DB2 resources. The transactions can be rolled back or committed to release the locks in the data store held by these contexts.

Parameters

THRDID=*thread_ID*

Identifies the thread ID that holds the resources in the data store.

NOTE: This parameter is required.

TYPE=ROLLBACK | COMMIT

Rolls back or commits the specified transaction. The default is ROLLBACK.

Example

RELEASE THRDID=T0000003 TYPE=ROLLBACK rolls back the specified transaction. The RSS context used the last time by T0000003 will end and all resources held in the data store by the context will be rolled back.

E SequeLink Service Attributes

This appendix lists the SequeLink service attributes you can set to configure and manage your SequeLink services using the SequeLink Manager tools. For each attribute, the following information is listed:

- Valid values for the attribute
- A description of the attribute
- A default value (when an attribute has a default)
- Whether the attribute is a static or dynamic attribute

NOTES:

- Unless noted otherwise, the service attributes apply to all operating systems. Information specific to an operating system is identified as such.
- Attributes beginning with the string "DataSource" are SequeLink data access service attributes that are associated with a server data source.
- *Static attributes* require you to restart a SequeLink service when you add or change the attribute before the change becomes effective. *Dynamic attributes* become effective after the attribute is added or changed and the configuration is saved. Most dynamic attributes affect the behavior of a database connection; therefore, when you add or change an attribute, the new values are used for the next connection, active connections do not use the new values.

NOTE: Server data source attributes are always dynamic.

- The meaning of the default value depends on your SequeLink Server platform.



- On Windows and UNIX, this default value is the value used when it is not overridden during the installation of the SequeLink Server. Some default values are changed when the service is created during the installation process. For example, this appendix states that the default value of the ServiceEventTraceLocation attribute is empty string; however, after the installation of the SequeLink Server, the default value is a directory beneath the installation directory.

z/OS

- On OS/390, the default values are the installation defaults.
- When working with the SequeLink Manager for OS/390, you can access online help for each field by positioning your cursor on the field and pressing F1. The online help will indicate if the field maps to a SequeLink service attribute.
- Some service attributes are intended for internal use or debugging use only. *Do not* modify these attributes unless you are instructed to do so by DataDirect Technologies technical support.

Defining SequeLink Service Attributes

This section lists SequeLink service attributes in alphabetical order.

DataSourceApplID

Specifies a list of application IDs the SequeLink data access service will accept. A valid application ID is an alphanumeric string with a maximum length of 128 characters.

The default is an empty string.

Type=Dynamic

See [Chapter 14, "Configuring SequeLink Security," on page 281](#) for more information about using application IDs to limit access to SequeLink services.

DataSourceArrayFetchMaxBytes

Specifies the number of bytes the SequeLink Server uses when doing an arrayfetch from the DBMS. The larger the size of the buffer, the more rows that SequeLink will fetch in one database fetch. This will have a positive effect on performance. However, a larger buffer increases the amount of memory that SequeLink uses.

A value of 0 disables the array fetch mechanism.

The default is 65536 (see Note).

NOTE: On OS/390, the default is 1, which is the only valid value for this service attribute.

Type=Dynamic

DataSourceAutoAppId

Specifies an application ID that is automatically generated by the ODBC Client to identify the client application to the SequeLink service. A valid automatically generated application ID contains exactly 40 hexadecimal digits. Each provided value can have an optional text description. For example,

```
InventoryControl=aaf7798c8c66e6b3a6b1462eff442b39b7be6946
```

The default is an empty string.

Refer to the *SequeLink Developer's Reference* for more information about using application IDs.

See [Chapter 14, "Configuring SequeLink Security," on page 281](#) for more information about using application IDs to limit access to SequeLink services.

Type=Dynamic



DataSourceBatchProcessing

Configures the behavior for batch processing on the SequeLink server. Valid values are:

- Emulated=Each element of the batch is processed individually. Processing of the batch stops on the first error encountered.
- Native=The batch interface of the DBMS is used.

Handling of error conditions is database-specific:

- DB2 UDB: None of the parameter sets are processed if an error occurs. No update count information is available.
- Oracle 8.0: Processing stops on the first error, even when Native is enabled.

- Oracle8.1, 9i: All elements of the batch are processed. Processing does not stop on errors.
- SQL Server: All elements of the batch are processed. Processing does not stop on errors.
- Sybase: None of the elements of the batch are processed if an error occurs. No update count information is available.
- Socket Server: Behavior depends on the back-end ODBC driver.

The default is Emulated.

For more information about batch processing, refer to your DBMS documentation.

Type=Dynamic



DataSourceBlockFetchForUpdate

When the isolation level is Read Committed and a SELECT FOR UPDATE statement is issued against some data stores, the SequeLink Client does not lock the expected row. Valid values are:

- 0=The appropriate row will be locked. Specifying 0 will degrade the performance for SELECT FOR UPDATE statements because rows will be fetched one at a time.
- 1=The appropriate row is not locked.

The default is 1.

Type=Dynamic

For more information, refer to the *SequeLink Developer's Reference*.



DataSourceCurrentCatalog

Specifies the default catalog to be used when connected to the SequeLink data access service. The valid value is a defined database catalog name.

The default is an empty string.

Type=Dynamic

DataSourceCursorHold

Specifies the effect of transaction completion on open cursors. Valid values are:

- 0=cursor no hold. The cursors are destroyed when the transaction is committed.
- 1=cursor hold. The cursors are not destroyed when the transaction is committed.

For Informix on Windows/UNIX and for DB2 on OS/390: The default is 1.

All other DBMS: The default is 0.

Type=Dynamic

z/OS

DataSourceDB2CatalogOwner

Specifies the owner of the DB2 catalog. This parameter allows you to limit the meta-information that is returned by using views on the DB2 catalog.

Specify SYSIBM when making selections on the native DB2 catalog tables. Otherwise, specify a different value for the catalog owner to limit the number of tables retrieved by SequeLink. The valid value is a defined database catalog name.

The default is SYSIBM.

Type=Dynamic

z/OS

DataSourceDB2CollectionPrefix

Specifies a user-defined prefix, which can be no longer than 15 characters, for the DB2 collection that identifies where the SequeLink package resides.

Based on the isolation level (DataSourceTransactionIsolation attribute), a suffix is added to the DB2 collection name. Possible values are:

- Read Uncommitted: *CollectionPrefix_U*
- Read Committed: *CollectionPrefix_S*
- Repeatable Read: *CollectionPrefix_T*
- Serializable: *CollectionPrefix_R*

For example, if you used the default prefix SWDB2 for an uncommitted connection, the DB2 collection name would be SWDB2_U.

The default is SWDB2.

Type=Dynamic



DataSourceDB2ConnectOptions

Specifies additional connect options to use when the SequeLink server connects to DB2 on Windows or UNIX. This string will be appended to the connect string.

The default is an empty string.

Type=Dynamic

z/OS

DataSourceDB2DBFilterList

Specifies a list of comma-separated values specifying the databases from which tables can be retrieved by a SQLTables (ODBC), getTables (JDBC), or TABLES (ADO) call. You cannot use quotes.

The default is an empty string.

Type=Dynamic

z/OS

DataSourceDB2DecimalPoint

Specifies whether the decimal point for numbers is a comma (,) or a period(.). This setting allows the data source to overwrite the DB2 installation parameter DECIMAL POINT. If no setting is specified, the DB2 installation parameter is read from the load module of DB2.

- PERIOD=The service will use a period as the decimal point character.
- COMMA=The service will use a comma as the decimal point character.

The default is PERIOD.

Type=Dynamic

z/OS

DataSourceDB2MaxLobSize

Specifies the size (in bytes) that is reported for BLOB and CLOB data types, for example, in response to a SQLGetTypeInfo call (ODBC) or the equivalent OLE DB and JDBC calls.

NOTE: This attribute only applies to DB2 V7 and higher on z/OS.

Valid values are from 1 to 2147483647.

The default is 2147483647.

Type=Dynamic

z/OS

DataSourceDB2ReportLobsFirst

Specifies the order in which BLOB and CLOB data types are reported, for example, in response to a SQLGetTypeInfo call (ODBC) or the equivalent OLE DB and JDBC calls.

- FALSE=Report LONG VARCHAR and LONG VARCHAR FOR BIT DATA data types before CLOB and BLOB data types.
- TRUE=Report CLOB and BLOB data types before LONG VARCHAR and LONG VARCHAR FOR BIT DATA data types.

The default is FALSE.

Type=Dynamic

z/OS

DataSourceDB2TranslateCount

On DB2 V7 and earlier, specifies whether the service will substitute COUNT(columnName) with COUNT(*) .

- FALSE=The service will not substitute COUNT(columnName) with COUNT(*) .
- TRUE=The service will substitute COUNT(columnName) with COUNT(*) .

The default is FALSE.

Type=Dynamic

DataSourceDescribeParam

Defers the fetching of parameter metadata until it is needed by the application.

- **Enabled**=The service always requests parameter description information, even when the application does not require it. This value minimizes network traffic and should be used when parameter information is required for most statements.
- **Deferred**=The service requests parameter description information from the server when the client application asks for it. Use this value when the application requests description information for a small number of statements.
- **Disabled**=Parameter description requests are disabled.

The default is Enabled for all databases except Sybase, where the Service template contains Disabled.

Type=Dynamic

DataSourceDescription

Specifies a general description of the server data source.

Type=Static

DataSourceDisableWarnings

Turns on and off the filtering of generated warnings.

- **TRUE**=Turns on filtering
- **FALSE**=Turns off filtering

Type=Dynamic

DataSourceEnableDescribeParam

Turns on a workaround for connections to Oracle data stores only. For more information, refer to the *SequeLink Developer's Reference*.

The default is 0.

- 0=The option is disabled. Support is turned off for SQLDescribeParam.
- 1=Support is turned on for SQLDescribeParam and will describe all parameters as SQL_CHAR with a precision of 999.

Type=Dynamic

DataSourceFetchNextOnly

Turns on a workaround for Visual Basic/Remote Data Objects (RDO) that circumvents a problem with FORWARD_ONLY cursors when the driver reports other values than FETCH_NEXT for SQLGetInfo(SQL_FETCH_DIRECTION).

For example, if the driver only reports FETCH_NEXT, RDO performs SQLExecDirect, SQLBindCol, and SQLExtendedFetch(NEXT). If the driver supports more than FETCH_NEXT, RDO performs SQLExecDirect, SQLExtendedFetch(NEXT), and SQLGetData. This is only valid when the rowsize is 1, but RDO uses a larger rowsize in this situation.

- TRUE=The driver will incorrectly report that only SQL_FETCH_NEXT is supported, which satisfies RDO.
- FALSE=The workaround is not turned on.

The default is FALSE.

Type=Dynamic

For more information, refer to the *SequeLink Developer's Reference*.

DataSourceFetchTimeStampAsString

Specifies whether a workaround for a Microsoft Access problem with timestamps is turned on.

- TRUE=Yes
- FALSE=No

The default is FALSE.

Type=Dynamic

DataSourceFixCharTrim

Turns on a workaround for applications that have a problem using SQL_CHAR data padded with spaces. The ODBC driver returns SQL_CHAR data padded with spaces as mandated by the ODBC specification. For more information, refer to the *SequeLink Developer's Reference*.

- 0=The workaround is turned off.
- 1=Returns SQL_CHAR data that is not padded with spaces.

The default is 0.

Type=Dynamic

DataSourceGetOutputParams

Turns on a workaround that allows you to control when output parameters of stored procedures are returned to calling applications. For more information, refer to the *SequeLink Developer's Reference*.

The value for this service attribute should be set to the cumulative value of all chosen options added together.

The default is 7.

- 0=The workaround is not turned on.
- 1=Output parameters are returned after an execute.
- 2=Output parameters are returned after a fetch is complete.
- 4=Output parameters are returned after moreresults no more rows.
- 7=Output parameters are returned after all of the above.

Type=Dynamic

NOTE: Set GetOutputParams=3 when executing stored procedures with output parameters in RDO (Visual Basic 5 and 6).



DataSourceINFClientLocale

Sets the Informix CLIENT_LOCALE environment variable used by the SequeLink service.

Type=Dynamic



DataSourceINFDbAnsiWarn

Sets the Informix DBANSIWARN environment variable used by the SequeLink service.

Type=Dynamic



DataSourceNFDbLang

Sets the Informix DBLANG environment variable used by the SequeLink service.

Type=Dynamic



DataSourceNFDbLocale

Sets the Informix DBLOCALE environment variable used by the SequeLink service.

Type=Dynamic



DataSourceNFDbNls

Sets the Informix DBNLS environment variable used by the SequeLink service.

Type=Dynamic



DataSourceNFDelimIdent

Sets the Informix DELIMIDENT environment variable used by the SequeLink service.

Type=Dynamic



DataSourceNFHost

Sets the Informix INFORMIXHOST environment variable used by the SequeLink service.

Type=Dynamic



DataSourceNFInformixDir

Sets the Informix INFORMIXDIR environment variable used by the SequeLink service.

Type=Dynamic



DataSourceNFInformixServer

Sets the Informix INFORMIXSERVER environment variable used by the SequeLink service.

Type=Dynamic



DataSourceNFLang

Sets the Informix LANG environment variable used by the SequeLink service.

Type=Dynamic



DataSourceNFService

Sets the value of the Informix SERVICE network parameter used by the SequeLink service.

Type=Dynamic

DataSourceJDBC52WorkaroundsClient1

Turns on workarounds for SequeLink 5.2.6601 or higher Clients in a SequeLink 5.4 service.

NOTE: For SequeLink 5.4 Clients, use the `DataSourceORANumber0IsNumeric` and `DataSourceMSSMapLongToDecimal` attributes instead.

Refer to the *SequeLink Developer's Reference* for more information about connecting using a connection string.

IMPORTANT: Each of these options has potential side effects related to its use. An option should only be used to address the specific problem for which it was designed.

- 1= Oracle. Because Oracle describes both FLOAT columns and columns that are the result of a functions (for example, `COUNT(*)`, `SUM(...)`) as `NUMBER(0,0)`, the SequeLink Server cannot differentiate between them. SequeLink handles all of these columns as SQL data type FLOAT. If this option is enabled, the JDBC Client will treat all of these columns as SQL data type NUMERIC.
- 2=SQLServer 7. According to the JDBC specification, the method `setLong` should be mapped to the SQL type BIGINT. Because SQLServer 7 does not support the SQL data type BIGINT, a call to `setLong` results in the following exception:

```
[DataDirect][SequeLink JDBC Driver]
[SQLServer]Optional feature not implemented
```

If this option is enabled, the JDBC Client will use NUMERIC instead of BIGINT.

Type=Dynamic

DataSourceLogoffBehaviour

Specifies the database action that needs to be taken when an abnormal logoff terminates a transaction. When the attribute is not set, the current transaction will be ended according to the database default logoff behavior.

Valid values are:

- COMMIT=The current transaction will be committed.
- ROLLBACK=The current transaction will be rolled back

Type=Dynamic

DataSourceLogonMethod

Specifies the data store logon method to be used to log on to the data store. The values you use depend on the SequeLink security configuration. Valid values are:

- DBMSLogon(DBUID,DBPWD)
- DBMSLogon(UID,PWD)
- OSIntegrated

See ["Configuring Data Store Logon" on page 295](#) For more information about configuring data source logons.

Type=Dynamic

z/OS

DataSourceMaxCpuAction

Specifies the action to be taken when DataSourceMaxCpuTime is exceeded. Valid values are:

- LOG=Message VAIS208I is written to VAILOG.
- ABORT=The connection will be aborted.

The default is LOG.

Type=Dynamic

z/OS

DataSourceMaxCpuTime

Specifies (in seconds) the total amount of CPU time that the connection is allowed to consume. If unspecified or set to zero (0), the service is not monitored for exceeding total CPU time. Valid values are:

- 0=Service is not monitored for exceeding total CPU time.
- *CPU time_in_seconds*=The number of seconds the connection is allowed to consume.

The default is 0.

Type=Dynamic



DataSourceMSSBindAllLOBs

Specifies which columns will be buffered. Valid values are:

- True=The SequeLink Server buffers all columns in the result set.
- False=The SequeLink Server for Microsoft SQL Server does not buffer large object columns that are at the end of a result set. Instead, it uses SQLGetData to get the CLOB/BLOB data as it is requested by the client, which saves memory on the server.

The default is False.

Type=Dynamic



DataSourceMSSConnectOptions

Specifies additional connection options to use when the SequeLink Server connects to Microsoft SQL Server. This string is appended to the connection string.

You can use this option to connect to a non-default Microsoft SQL Server instance located on another machine. For example:

```
DataSourceMSSConnectOptions=Server=Belg-John\MSSS2000
```

connects to the Microsoft SQL Server instance named MSSS2000 on the machine Belg-John.

The default is an empty string.

Type=Dynamic



DataSourceMSSCursorType

Specifies the type of cursor the SequeLink Server will use. Valid values are:

- Serverside=Allows multiple concurrent statements (and cursors) to be active at the same time for each connection.
- Serverside-Preserve=Server-side cursors that stay open and positioned when a transaction is committed.
- Clientside=Allows only one active statement/cursor for each connection.

The default is Serverside.

Type=Dynamic



DataSourceMSSCursorWarnings

Microsoft SQL Server sometimes has problems opening server-side cursors for select or stored procedure result sets. This setting masks the warning issued by Microsoft SQL Server each time it encounters this problem. Valid values are:

- True=The warning is not masked from the client application.
- False=The warning is masked from the client application.

The default is False.

Type=Dynamic



DataSourceMSSMapLongToDecimal

Specifies whether the JDBC Client uses the NUMERIC data types instead of the BIGINT data type. Because Microsoft SQL Server 7 does not support the SQL data type BIGINT, a call to setLong results in an exception. Valid values are:

- 0=The JDBC Client uses the BIGINT data type for a call to setLong. An exception results, indicating that an optional feature was not implemented.
- 1=The JDBC Client uses the NUMERIC data type for a call to setLong.

The default value is 0.



DataSourceMSSODBCConnStr

Specifies the connection string to be used when the SequeLink Server connects to an ODBC data source. The valid values for UID, PWD, and DB are provided by the client application and are appended to the connection string.

The default is an empty string.

Type=Dynamic



DataSourceMSSODBCLogPath

Specifies the log path to be used for all ODBC calls executed by the SequeLink data access service. The valid value is a defined path for a log file.

Type=Dynamic

DataSourceName

Specifies the name of the server data source. The data source name is defined during configuration and cannot be changed afterward.

The default data source has a fixed name, such as "Default".

Type=Dynamic



DataSourceORANumber0IsNumeric

Specifies how the JDBC Client treats FLOAT columns and columns that are the result of a function (for example, COUNT(*), SUM(...)). Because Oracle describes both types of columns as NUMBER(0,0), the SequeLink Server cannot differentiate between them. SequeLink therefore handles these columns as SQL data type FLOAT.

NOTE: For SequeLink 5.2.6601 Clients, set the DataSourceJDBC52WorkaroundsClient1 attribute.

Valid values are:

- 1=SequeLink treats FLOAT columns and all columns that are the result of a function as SQL data type NUMERIC.
- 0=SequeLink treats FLOAT columns and all columns that are the result of a function as SQL data type FLOAT.

The default is 0.

Type=Dynamic



DataSourceORAMapTSWTZ

Determines whether columns with a TIMESTAMP WITH TIME ZONE data type are mapped to a timestamp data type when they are retrieved from an Oracle 9i database.

- TRUE=Columns with a TIMESTAMP WITH TIME ZONE data type are mapped to a timestamp data type when they are retrieved.
- FALSE=An error is generated when TIMESTAMP WITH TIME ZONE columns are retrieved.

The default is FALSE.

Type=Dynamic



DataSourceORAPublicSchemaSupp

Determines whether the Oracle schema named PUBLIC is supported in catalog statements (for example, SQLTables).

- TRUE=Turns on support.
- FALSE=Turns off support.

Type=Dynamic



DataSourceORAServiceName

Specifies the Oracle service name to which the application wants to connect. The valid value is a defined Oracle service name.

Type=Dynamic



DataSourceORASynDBLinkObjSupp

Turns on and off support for synonyms of remote Oracle objects in Catalog statements. Valid values are:

- TRUE=Turns on support.
- FALSE=Turns off support.

The default is FALSE.

Type=Dynamic



DataSourceProviderTypesFile

Specifies the name of the file that contains the information returned from the OLE DB ProviderTypes call by an ADO provider data source. The file must be located in the SequeLink installation directory.

Each driver is assigned a specific section name, which is configured in the SequeLink server data source using DataSourceProviderTypesSection.

The default file is swsoc.ini.

Type=Dynamic



DataSourceProviderTypesSection

Specifies the section within the providertypes file that will be used to retrieve OLE DB ProviderTypes information.

The default is Default.

Type=Dynamic

DataSourceReadOnly

Controls read-only access to the SequeLink data access service.
Valid values are:

- No=All statements are allowed.
- Select=Only Select statements are allowed.
- Select and batches=Select statements and implicit batches are allowed.
- DBMS=The read-only capabilities of the database are used.

z/OS NOTE: DBMS is not supported on DB2 for OS/390.

The default is No.

Type=Dynamic

DataSourceReportLobsAsLongvar

Enables SequeLink 5.4 *for* JDBC Clients to map BLOB and CLOB data types to LONGVARCHAR or LONGVARBINARY. This attribute is provided for backward compatibility.

- TRUE=BLOB and CLOB are mapped to LONGVARCHAR or LONGVARBINARY, using the same mapping as SequeLink 5.2 Java Clients.
- FALSE=LOBs and getObject on an LOB column use the default behavior for SequeLink *for* JDBC Client 5.4.

The default is FALSE.

Type=Dynamic

DataSourceSchemaFilterList

A schema name filter for SQLTables and SQLProcedures (ODBC), getTables and getProcedures (JDBC), and TABLES and PROCEDURES (OLE DB/ADO). This attribute is not valid when ServiceCodePage=Database. Valid values are any defined schemas including:

- *list_of_schema_names*=A comma-separated list of schemas. Only tables owned by the listed schemas are included in the result set. You can use the % or _ character as a search pattern. You cannot use quotes.
- CURRENT_SCHEMA=Only tables owned by the current user are returned.

The default is an empty string.

Type=Dynamic

DataSourceSessionToken

Specifies a setting that allows easy correlation of the SequeLink session as displayed in SequeLink monitoring/tracing tools, and the RDBMS session as it can be visualized using the RDBMS-specific monitoring/tracing tools.

Associated with each connection, the SequeLink 5.4 server creates a session token, which is exported to:

- The SequeLink monitor tree, if a monitor profile with session monitoring enabled is active.
- The SequeLink event trace, if an event trace profile that has been configured to trace any session-related events is active.
- An RDBMS-specific session/connection setting, which allows easy correlation of the SequeLink session as displayed in the

SequeLink monitor, and the RDBMS session as viewed using RDBMS-specific monitoring and tracing tools.

If the length of the session token exceeds the allowed length of the DBMS field, the session token is truncated and a warning is issued as shown in the following table:

DB2 UDB	TP Monitor client accounting string
DB2 on OS/390	Accounting-token (in DB2 statistics and accounting trace records)
Oracle8	view v\$session:column CLIENT_INFO
Oracle9	view v\$session:column CLIENT_IDENTIFIER
SQL Server	Sysprocesses.program_name
Sybase	table sysprocesses: column clientname

Valid values are a combination of static text and the following placeholders that will be replaced at runtime by the corresponding values. For example,

Session from \${ClientInfo} connected to \${DataSourceName}

Placeholder Value	Runtime Value
\${ClientApi}	One of JDBC, ODBC, ADMIN, or OLEDB
\${ClientInfo}	Client IP address or host name
\${ClientApplName}	Application name provided by the client application through the ApplicationName connect attribute/keyword
\${DataSourceName}	Name of data source for the current session
\${ServiceName}	Name of the SequeLink service for the current session
\${SessionId}	SequeLink session ID

Placeholder Value`${ClientAppId}``${ClientAutoAppIdDesc}`**Runtime Value**

Application ID being used for the current session

The text part of the automatic application ID is used for the current session

Type=Dynamic

DataSourceSLKStcCrsrLngCLBuff

Turns on a workaround that allows you to specify the amount of data (in KB) that is buffered for SQL_LONGVARCHAR and SQL_LONGVARBINARY columns with a static cursor. For more information about this client attribute, refer to the *SequeLink Developer's Reference*.

The default is 4.

Type=Dynamic



DataSourceSOCODBCConnStr

Specifies the connection string used by a SequeLink client application for a connection to an ODBC system data source. When the application provides the optional DBMS user name, password and database values, the values will be appended to the values of the UID, PWD, and DB keywords provided by the client when connecting to the ODBC Socket. The data source specified in the value for this attribute must be a system ODBC data source on Windows.

The default is an empty string.

Type=Dynamic



DataSourceSybConnectOptions

Specifies additional connection options to use when the SequeLink server connects to the Sybase DBMS. This string will be appended to the connect string.

Valid connection options include:

- CharSet

A small icon representing a Windows operating system window.

Use the CharSet connection option *only* on Windows when ServiceCodePage=OS. Use CS=cp<ACP>, where ACP is determined through the registry (see earlier for an explanation on how to find this out).

On a typical English Windows installation, use CS=cp1252.
- IANAAppCodePage

The UNIX logo, consisting of a stylized 'X' and the word 'UNIX' below it.

Use the IANAAppCodePage connection option *only* on UNIX when ServiceCodePage=OS. Use IANAAppCodePage=<value>, where value refers to an entry in [Table E-1](#), namely IANAAppCode value. In order to find the correct value to use, you must map the value that is specified in the LC_ALL environment variable to one of the entries in [Table E-1](#) using the first column of the table.

Table E-1. Values for DataSourceSybConnectOptions

OS Code Page	Description	IANAAppCodePage Value
ascii_8	US_ASCII	3
big5	Big5	2026
cp437	IBM437	2008
cp850	IBM850	2009
cp852	IBM852	2013
cp855	IBM855	2046

NOTE: Depending on the version of UNIX that you are using, the actual description of the code page will be different.

Table E-1. Values for DataSourceSybConnectOptions (cont.)

OS Code Page	Description	IANAAppCodePage Value
cp857	IBM857	2047
cp860	IBM860	2048
cp864	IBM864	2051
cp866	IBM866	2052
cp869	IBM869	2054
cp1250	WINDOWS_1250	2250
cp1251	WINDOWS_1251	2251
cp1252	WINDOWS_1252	2252
cp1253	WINDOWS_1253	2253
cp1254	WINDOWS_1254	2254
cp1255	WINDOWS_1255	2255
cp1256	WINDOWS_1256	2256
cp1257	WINDOWS_1257	2257
cp1258	WINDOWS_1258	2258
iso_1	ISO_8859_1	4
iso88592	ISO_8859_2	5
iso88595	ISO_8859_5	8
iso88596	ISO_8859_6	9
iso88597	ISO_8859_7	10
iso88598	ISO_8859_8	11
iso88599	ISO_8859_9	12
iso885915	ISO_8859_15	111
koi8	KOI8_R	2084
roman8	roman8	2004
sjis	sjis	17
tis620	tis620	2259

NOTE: Depending on the version of UNIX that you are using, the actual description of the code page will be different.

The default is an empty string.

Type=Dynamic



DataSourceSybNetworkAddress

Specifies the Sybase network address. This string will be appended to the connect string.

The default is installation-dependent.

Type=Dynamic

DataSourceTableTypeFilterList

Specifies a table-type filter for SQLTables. This attribute is not applicable when ServiceCodePage=database.

The valid value is a comma-separated list of table types. Valid table types on this platform include:

- ALIAS
- GLOBAL
- SYNONYM
- SYSTEM TABLE
- TABLE
- VIEW

The default is an empty string.

Type=Dynamic

DataSourceThreadMaxRpc

Specifies the number of connection requests that will be accepted before the thread allocated to the connection is released to the thread pool. Valid values are between 0 and 1000.

If 0 is specified, the thread is only released when the connection terminates.

The default is 10.

Type=Dynamic

DataSourceThreadRpcTimeOut

Specifies the idle time (in milliseconds) for threads allocated to connections. Once this value is reached, the thread allocated to the connection is released to the thread pool. Valid values are between 0 and 1 000 000.

Specify 0 to disable the timeout mechanism.

The default is 2000.

Type=Dynamic

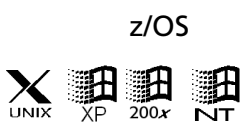
DataSourceTransactionIsolation

Specifies the transaction isolation level used for the connection. Valid values are:

Committed	Dirty reads are not possible. Phantoms and reads that cannot be repeated are possible.
Uncommitted	Phantoms, dirty reads, and reads that cannot be repeated are possible.

RepeatableRead	Dirty reads and reads that cannot be repeated are not possible. Phantoms are possible.
Serializable	Transactions can be serialized. Phantoms, dirty reads, and reads that cannot be repeated are not possible.
Not supported	SequeLink cannot set the transaction isolation level. The DBMS default transaction isolation level will be used.

Refer to your database documentation for a definition of each isolation level.



For DB2 on OS/390: The default is Committed.

All other DBMS: The default is Not Supported.

Type=Dynamic

DataSourceWorkArounds

Turns on workarounds that allow you to take full advantage of the ODBC driver with ODBC applications requiring nonstandard or extended behavior.

When this attribute is set in the configuration file, it is valid for all clients that connect to SequeLink. When you add this attribute in the connection string, it is set for that client connection only.

Refer to the *SequeLink Developer's Reference* for more information about connecting using a connection string.

IMPORTANT: Each of these options has potential side effects related to its use. An option should only be used to address the specific problem for which it was designed.

- 1= If an ODBC driver reports to Microsoft Access 2.0 that its SQL_CURSOR_COMMIT_BEHAVIOR or SQL_CURSOR_ROLLBACK_BEHAVIOR is 0, Microsoft Access opens tables as read-only. If this option is on, the ODBC driver

returns 1, allowing Microsoft Access to open tables as read-write.

- 2=Some applications cannot handle database qualifiers. If this option is on, the driver reports that qualifiers are not supported.
- 4=Visual Basic 4.0 sometimes requires two connections to a DBMS. For DBMSs that support only a single connection, the second attempt fails. If this option is on, the driver detects when this condition occurs and has the two ODBC connections share a single physical connection to the DBMS.
- 8=If an ODBC driver cannot detect the number of rows affected by an Insert, Update, or Delete statement, it may return -1 in SQLRowCount. Some products cannot handle this. Turning this option on causes the driver to return 1 instead.
- 16=If an ODBC driver in SQLStatistics reports to Microsoft Access 1.1 that an INDEX_QUALIFIER contains a period, Microsoft Access returns a tablename is not a valid name error. If this option is on, the driver returns no INDEX_QUALIFIER, allowing Microsoft Access to open the table.
- 32=This option allows users of flat-file drivers to abort a long-running query by pressing the ESC key.
- 64=This option results in a column name of Cposition where position is the ordinal position in the result set. For example:

```
SELECT col1, col2+col3 FROM table1
```

produces the column names col1 and C2. SQLColAttributes/SQL_COLUMN_NAME returns an empty string for result columns that are expressions. Use this option for applications that cannot handle empty strings in column names.

- 256=Forces SQLGetInfo/SQL_ACTIVE_CONNECTIONS to be returned as 1.

- 512=To prevent ROWID results, this option forces the SQLSpecialColumns function to return a unique index as returned from SQLStatistics.
- 2048=This option results in SQLDriverConnect returning "Database=" instead of "DB=" in the returned connection string.
- 65536=This option strips trailing zeros from decimal results, which prevents Microsoft Access from generating an error when decimal columns containing trailing zeros are included in the unique index.
- 131072=This option turns all occurrences of the double quote character (" ") into the accent grave character (`). Some applications always quote identifiers with double quotes. Double quoting causes problems for data sources that do not return SQLGetInfo/SQL_IDENTIFIER_QUOTE_CHAR = ".
- 524288=This option overrides the precision and scale settings for SQL_DECIMAL parameters to precision 40 and scale 20.
- 8388608=This option causes SQLGetInfo/SQL_DATABASE_NAME to be returned as an empty string when SQLGetInfo/SQL_MAX_QUALIFIER_NAME_LEN is 0. This option should be used with Inprise/Borland tools, such as Delphi.
- 536870912=This option allows SQLBindParameter to be called after SQLExecute to change the precision of previously bound parameters.
- 1073741824=Microsoft Access assumes that ORDER BY columns do not have to be in the SELECT list. This option provides a workaround for data stores that always use ORDER BY columns.

Type=Dynamic

DataSourceWorkarounds2

Turns on workarounds that allow you to take full advantage of the ODBC driver with ODBC applications requiring nonstandard or extended behavior.

When this attribute is set in the configuration file, it is valid for all clients that connect to SequeLink. When you add this attribute in the connection string, it is set for that client connection only.

Refer to the *SequeLink Developer's Reference* for more information about connecting using a connection string.

IMPORTANT: Each of these options has potential side effects related to its use. An option should only be used to address the specific problem for which it was designed.

- 2=Some applications incorrectly specify the ColumnSize/DecimalDigits when binding timestamp parameters. This option causes the driver to ignore the ColumnSize/DecimalDigits specified by the application and use the database defaults instead.
- 4=Microsoft Access uses the most recent native type mapping, as returned by SQLGetTypeInfo, for a specific SQL type. This option reverses the order in which types are returned, so that Microsoft Access will use the most appropriate native type. This option is recommended if you are using Microsoft Access against an Oracle8 data store.
- 32=Microsoft Access does require that the characters "DSN=" are returned by SQLDriverConnect in the connection string output parameter.

Type=Dynamic

z/OS MVSDDataSourceDB2Plan

Specifies the DB2 plan name used by the data source. This attribute is required only when MVSGlobalAttachment=CAF.

The default is SWDB2PL.

Type=Dynamic

z/OS MVSDB2ExitLibrary

Specifies the name of the fully qualified DB2 exit-library (without quotes) for this DB2 interface used to generate JCL. Valid values are OS/390 data set names.

NOTE: This library must be APF-authorized.

Type=Static

z/OS MVSDB2LoadLibrary

Specifies the name of the fully qualified DB2 load-library (without quotes) for this DB2 interface used to generate JCL. Valid values are OS/390 data set names.

NOTE: This library must be APF-authorized.

Type=Static

z/OS MVSDB2RootDescription

Specifies a general description of the DB2 interface. The valid value is a defined DB2 interface.

Type=Static

z/OS **MVSDB2SubsystemName**

Specifies the subsystem ID of the DB2 address space. The valid value is a defined interface ID.

The default is MVSDB2InterfaceID.

Type=Static

z/OS **MVSDB2Version**

Specifies the DB2 version of the DB2 interface. Valid values are:

- V510
- V710
- V810

Type=Static

MVSGlobalClustername

Specifies the clustername to which the SequeLink Server must register for DNS/WLM-supported Sysplex connection distribution.

Type=Static

z/OS **MVSGlobalCommandChar**

Specifies the subsystem ID command recognition character that allows you to use the OS/390 modify command to issue SequeLink Operator Interface commands.

To use the subsystem ID command recognition character, the MVSGlobalSubSysID attribute must be defined.

If unspecified, SequeLink will run normally, a subsystem ID will not be used, and Operator Interface commands cannot be issued with a command character. The valid value is a defined command character.

Type=Static

z/OS **MVSGlobalCompTrace**

Turns on and off tracing for server core components. Valid values are ALL or one of the following component_IDs:

C - Core components
 D - DB2 component
 L - Generic Log component
 S - Server controller component
 T - Threadpool component

If unspecified, no tracing will be performed.

The default is no component trace.

Type=Static

z/OS **MVSGlobalDB2Attachment**

Specifies the type of DB2 attachment to be used for the DB2 service.

MVSGlobalDB2Attachment=RRSAF can only be used when RRS is active. Valid values are:

- CAF
- RRSAF

The default is RRSAF.

NOTE: When ServiceConnectionModel=Threadpool is selected, RRSAF must be selected.

Type=Static

z/OS **MVSGlobalDescCode**

Specifies the WTO descriptor code for all messages directed to a console by the message logging task. The valid value is a defined WTO descriptor code.

The default is 06.

Type=Static

z/OS **MVSGlobalID**

NOTE: Set this attribute *only* when instructed to do so by DataDirect Technologies technical support.

An identifier to make this "section" unique. This attribute must be set to GLOBAL and must not be changed.

The default is GLOBAL.

Type=Static

z/OS MVSGlobalRouteCode

Specifies the WTO route code for all messages directed to a console by the message logging task. The valid value is a defined WTO route code.

The default is 11.

Type=Static

z/OS MVSGlobalSMFRecordType

Specifies the System Management Facility (SMF) record type to be used for SMF records produced by the server. Valid values are between 128 and 255.

If 0, SMF recording is turned off.

If unspecified, no SMF records are produced.

If you set this value to a positive number, you must inform the system of these records by changing the OS/390 SMF parameters in the SMFPRMxx member of the SYS1.PARMLIB data set. You can activate the collection of these records using the SET command.

The recommended value is 197.

Type=Static

z/OS MVSGlobalSosLimit

Specifies the global short-on-storage (SOS) limit, which is the total amount of private storage (in KB) that must be available in the address space to accept further connections. If this amount of storage is unavailable, the incoming connections will be rejected. To turn this feature off, specify 0 or delete this attribute. Valid values are between 0 and 2048.

The default is 1024.

Type=Static

z/OS **MVSGlobalSubSysID**

Specifies an ID that the SequeLink Server will use as a suffix to construct a unique ResourceManager name to register to RRS. This is a required parameter when MVSGlobalDB2Attachment=RRSAF.

The default is SQLK.

Type=Static

z/OS **MVSGlobalSwap**

Specifies whether the server address space is swappable. Valid values are:

- TRUE=Makes the server address space swappable.
- FALSE=Makes the server address space unswappable.

The default is FALSE.

Type=Static

z/OS **MVSGlobalWLMEnclaves**

Specifies whether the server address space will use WLM enclaves. Valid values are:

- NONE=The server address space will not use WLM enclaves.
- CONNECTION=One new WLM enclave is created for the duration of the connection.

- **RPC**=A new WLM enclave is created for every SequeLink RPC (each network access to the SequeLink Server).

The default is NONE.

Type=Static

z/OS **MVSServiceAdminSecurity**

Specifies the security type for the agent service. Valid values are:

- **SAFBASIC**=Validates the client's user ID and password.
- **SAFRESOURCE**=Validates the client's user ID and password, and its authority to access the service in administration mode. If specified, the resource name specified in **MVSServiceAdminSecurityResource** must be defined in the security system's general resource class profile. The default resource class name is FACILITY. It can be overridden with the **MVSSecurityAdminSecurityClass** parameter, if the resource class name is defined in your security system.

The default is SAFBASIC.

Type=Dynamic

z/OS **MVSServiceAdminSecurityClass**

Specifies a general resource class name to be used by the server.

The default is FACILITY.

Type=Dynamic

z/OS **MVSServiceAdminSecurityResource**

Validates a connection request against the OS/390 security system when MVSServiceAdminSecurity=SAFRESOURCE. If the attribute is not specified, the server uses the service name of the SequeLink service as the resource name to be checked.

The default is the service name.

Type=Dynamic

z/OS **MVSServiceCodePageNr**

Used when ServiceCodePage=OS and the EBCDIC-coded character set in the DB2 installation is 0 (no CCSID is used). Valid values are between 1 and 65533.

The default is 37.

Type=Dynamic

z/OS **MVSServiceDB2InterfaceID**

Specifies the ID of a DB2 interface. A DB2 interface is a set of parameters that describe a DB2 subsystem which can be accessed by the SequeLink Server for OS/390.

Type=Static

z/OS **MVSServiceLoadModule**

Specifies the name of the load module for the service. Valid values are uppercase.

The default is VAISTHRD (for SequeLink Server for DB2 services).

Type=Static

z/OS **MVSServiceSecurity**

Specifies the type of security used by the service. Valid values are:

- SAFNONE=Allows anonymous access to a service. The user ID (UID) map used by the service (see the attribute "[MVSUID](#)" on [page 452](#)) must contain an entry in the format:

**=mapped_user*

where *** is a wildcard for any user and *mapped_user* is a valid DB2 authorization ID.

- SAFBASIC=Validates the client's user ID and password. If successful, access to the SequeLink service is allowed.
- SAFRESOURCE=Validates the client's user ID and password, and its authority to access a service by verifying that the user has access to a resource defined in a specific resource class. The default resource class name is FACILITY, and the default resource name is the name of the service. The resource class name to be used can be overridden by specifying the MVSServiceSecurityClass attribute. The resource name to be used can be overridden by specifying the MVSServiceSecurityResource attribute.

The default is SAFBASIC.

See [Chapter 14, "Configuring SequeLink Security,"](#) on page 281 for more information about configuring SequeLink security.

Type=Dynamic

z/OS **MVSServiceSecurityClass**

Specifies a general resource class name used by the SequeLink Server when MVSServiceSecurity=SAFRESOURCE.

The default is FACILITY.

Type=Dynamic

z/OS **MVSServiceSecurityResource**

If this attribute is set to SAFRESOURCE, the resource name is used to validate a connection request against the OS/390 security system. If the attribute's value is blank or an empty string, the server uses the service name as the resource name to be checked.

The default is the service name.

Type=Dynamic

z/OS **MVSServiceUIDMap**

Specifies the name of a user ID (UID) map. The valid value is a defined UIDMap name.

The default is an empty string.

Type=Dynamic

z/OS

MVSUID

Specifies an entry in the user ID (UID) map. The format of this entry is: *user=mapped_user* or **=mapped_user*, where:

- *user* is a valid user or user group for the OS/390 security system
- *** is a wildcard for any user
- *mapped_user* is a valid DB2 authorization ID

**=mapped_user* is required when anonymous authentication is configured for the OS/390 server (ServiceAuthMethods=Anonymous and MVSServiceSecurity=SAFNONE).

Type=Dynamic

z/OS

MVSUIDDefaultAccess

Specifies the default action for a user ID (UID) map. Valid values are:

- PERMIT=If user ID mapping is set for the SequeLink service and the user ID cannot be found in the UID map, the connection is accepted.
- DENY=If user ID mapping is set for the SequeLink service and the user ID cannot be found in the UID map, the connection is refused.

Type=Dynamic

z/OS

MVSUIDMapDescription

Specifies a general description of the user ID (UID) mapping table. The valid value is a defined user ID map name.

Type=Dynamic

ServiceAdminAuthMethods

Specifies one or multiple authentication mechanisms that the SequeLink Manager can use to authenticate itself to the server. Valid values are:

- Anonymous
- integrated_nt
- OSLogon(UID,PWD)

See [Chapter 14, "Configuring SequeLink Security,"](#) on page 281 for more information about SequeLink security features.

Type=Dynamic

ServiceAdministrator

Sets authorization for users who are allowed to manage SequeLink services using the SequeLink Manager.

NOTES:



- On Windows, users who are allowed to manage SequeLink services using the SequeLink Manager must have administrator rights.



- On Windows and UNIX, specify `everyone` when `ServiceAuthMethod=anonymous`.

Valid values for the ServiceAdministrator attribute are:

- `user_name`=The user ID of a user who is allowed to use the SequeLink Manager. To configure authorization for multiple users, you must set this attribute multiple times, one instance of the attribute for each user. For example:

```
ServiceAdministrator=RSMITH
ServiceAdministrator=DJONES
ServiceAdministrator=TCONRAD
```



NOTE: On Windows servers, you must prefix the user ID with the Windows server name or the Windows domain name, for example, SALES\DJONES. When connecting, the user must also prefix the user ID with the Windows server name, if connecting to a local server, or the Windows domain name.

NOTE: Alternatively, you can set the ServiceAdministratorGroup attribute to configure authorization for groups of users defined on Windows or UNIX. See ["ServiceAdministratorGroup" on page 455](#) for more information about configuring authorization for user groups on Windows and UNIX.

- `authenticated`=Any user who can provide a valid host user ID and password or who uses Integrated authentication will receive the same authorization.
- `everyone`=All connections will receive the same authorization level, regardless of how they are authenticated.

See [Chapter 14, "Configuring SequeLink Security," on page 281](#) for more information about configuring SequeLink security.

Type=Dynamic



ServiceAdministratorGroup

Sets authorization for defined Windows and UNIX user groups who are allowed to manage SequeLink services using the SequeLink Manager. Valid values are user groups defined on Windows or UNIX.

To configure authorization for multiple user groups, you must set the ServiceAdministrator attribute multiple times, one time for each user group. For example:

```
ServiceAdministratorGroup=SLUSERG1
ServiceAdministratorGroup=SLUSERG2
ServiceAdministratorGroup=SLUSERG3
```



NOTE: On Windows servers, you must prefix the user group ID with the Windows server name or the Windows domain name where the group is defined, for example, SALES\SLUSERG1.

See [Chapter 14, "Configuring SequeLink Security," on page 281](#) for more information about configuring SequeLink security.

Type=Dynamic

ServiceAuthMethods

Specifies one or multiple authentication mechanisms the service accepts. The client must select the supported mechanism to authenticate itself to the server. Valid values are:

- | | |
|---------------|---------------------------|
| Windows NT, | ■ Anonymous |
| Windows 200x, | ■ integrated_nt |
| Windows XP | ■ OSLogon(UID,PWD) |
| | ■ OSLogon(HUID,HPWD) |
| | ■ OSLogon(UID,PWD,NPWD) |
| | ■ OSLogon(HUID,HPWD,NPWD) |

- | | |
|--------|---|
| UNIX | <ul style="list-style-type: none">■ Anonymous■ OSLogon(UID,PWD)■ OSLogon(HUID,HPWD) |
| OS/390 | <ul style="list-style-type: none">■ Anonymous■ OSLogon(UID,PWD)■ OSLogon(HUID,HPWD)■ OSLogon(UID,PWD,NPWD)■ OSLogon(HUID,HPWD,NPWD) |

See [Chapter 14, "Configuring SequeLink Security,"](#) on page 281 for more information about configuring SequeLink security.

Type=Dynamic

ServiceAuthorizedAdminClient

Specifies one or multiple client TCP/IP network identifiers that are allowed to access the service using an administrator client. Use configuration values to limit the clients that are allowed administrative connections to the agent service.

The attribute supports both address and name formats as shown in the following examples:

Client TCP/IP host name	burner.ddtek.com
Client TCP/IP domain names through the use of a wild card	192.16.2.* or *.ddtek.com
Client TCP/IP address	127.0.0.1
Client TCP/IP address range	192.16.*.*

NOTE: When using host names, ServiceResolveHostNames must be set to True, and only primary domain names can be used.

To configure multiple TCP/IP location filters, you must set the `ServiceAuthorizedAdminClient` attribute multiple times, one instance for each location filter. For example:

```
ServiceAuthorizedAdminClient=192.16.*.*
ServiceAuthorizedAdminClient=192.17.*.*
ServiceAuthorizedAdminClient=192.18.*.*
```

Type=Dynamic

ServiceAuthorizedClient

Specifies one or multiple client TCP/IP network identifiers that are allowed to access the service using a client application. Use configuration values to limit the number of clients that are allowed data access connections to data access services.

The attribute supports both address and name formats as shown in the following examples:

Client TCP/IP host name	burner.ddtek.com
Client TCP/IP domain names through the use of a wild card	192.16.2.* or *.ddtek.com
Client TCP/IP address	127.0.0.1
Client TCP/IP address range	192.16.*.*

NOTE: When using host names, `ServiceResolveHostNames` must be set to True, and only primary domain names can be used.

To configure multiple TCP/IP location filters, you must set the `ServiceAuthorizedClient` attribute multiple times, one instance for each location filter. For example:

```
ServiceAuthorizedClient=192.16.*.*
ServiceAuthorizedClient=192.17.*.*
ServiceAuthorizedClient=192.18.*.*
```

Type=Dynamic

ServiceCancelEnabled

Specifies whether cancelling connection requests using SQLCancel is supported. Valid values are:

- TRUE=yes
- FALSE=no

The default is TRUE.

Type=Static

ServiceCatchExceptions

Specifies how the SequeLink service will handle exceptions. Valid values are:

- TRUE=The service will attempt to recover from unexpected exceptions.
- FALSE=The exception is passed to the operating system resulting in an error or core dump.

The default is TRUE.

Type=Static

ServiceCodePage

Controls transliteration for the SequeLink service. Valid values are:

- **Default**=SequeLink supports only standard ASCII/EBCDIC transliteration for ODBC and OLE DB/ADO Clients, and transliteration to UTF-16 for JDBC and .NET Clients.
- **OS**=The client transliterates character data from the code page the SequeLink service is using to the code page of the client application/system.
- **Database**=Internationalization support features are enabled. The client uses the optimal encoding to exchange character information between client and server. This value minimizes the amount of transliteration required. Graphic data types are always supported.

NOTE: The Database value is supported only for the ODBC, JDBC, and .NET Clients. This value cannot be used with SequeLink Server for Informix or SequeLink Server for Oracle using Oracle8.0.

The default is Default.

Type=Static

ServiceCodePageMap

Controls transliteration for the SequeLink service when the code page retrieved from the operating system or database is not recognized. When ServiceCodePage is set to OS or Database, database- or operating system-specific code pages can be mapped to the IANA character set name, overwriting or extending the service build-in mappings. For more information about the IANA character set, refer to the IANA Web site.

The format of the value depends on the type of mapping that is being extended. In general, the value is a semi-colon separated list of values, where the first or second (Oracle8) value specified is the code page value retrieved from either the operating system or the database. The ianaName is the official IANA identifier for the code page.

Valid values are:

- OS=The code page value returned from the operating system. The format is

```
OS code page identifier;ianaName
```

- Oracle8=The code page value returned from Oracle8 database. The format is

```
charSetId;oracleName;ianaName;[maxByteSz;fixedWidth]
```

- Oracle9=The code page value returned from Oracle8 database. The format is

```
charSetId;oracleName;ianaName;[maxByteSz;fixedWidth]
```

Type=Dynamic

ServiceConnectInfo

Specifies the TCP/IP port on which the service is listening for connection requests. The port is specified using the format:

```
tcp://host.port
```

where *host* is the name of the host on which the SequeLink service runs and *port* is an available TCP port.

Type=Static

ServiceConnectionModel

Specifies the connection model to be used for connections to the SequeLink service. If you change to another connection model, you must delete and recreate any monitoring or event trace profiles. Valid values are:

- **ThreadPool**=A pool of threads is created with **ServiceMinThreads** prestarted threads and maximum **ServiceMaxThreads** threads. This thread pool is used to service client connection requests.
- **Process/Connection**=SequeLink creates a separate OS process to service client connection requests. (Not valid for OS/390.)
- **Thread/Connection**=SequeLink creates a separate thread for each client connection requests.

The default is **ThreadPool**.

Type=Static

z/OS

ServiceDB2MaxThreads

Limits the number of DB2 threads used by the SequeLink DB2 service. This value must be higher than the value of the **ServiceMaxThreads** parameter and lower than the value of the **MAX_BATCH_CONNECT** parameter in the Thread Management panel (DSNTIPE) of the DB2 installation.

A value of 0 means that the number of threads will not be limited by the SequeLink DB2 service.

The default is 0.

Type=Dynamic

z/OS

ServiceDB2MaxTransactions

Specifies the number of DB2 transactions that a DB2 thread is allowed to service before it is closed. This ensures that when the DB2 thread terminates, the locks set on temporary tables are released.

A value of 0 means that the DB2 thread is not terminated.

The default is 0.

Type=Dynamic

z/OS

ServiceDB2MinThreads

Specifies the number of reusable DB2 threads that will not be released by the release timer routine or by the RRS RELEASE operator command.

A value of 0 means that all reusable DB2 threads that exceed an age of 300 seconds will be released.

The default is 0.

Type=Dynamic

ServiceDeadCIntDetInt

Specifies the interval in seconds between requests that are sent from the SequeLink Server to the SequeLink Client to verify the availability of the SequeLink Client. Valid values are 0 and from 61 to 1000000.

A value of 0 disables the dead client detection feature.

The default is 600.

Type=Static

ServiceDebugLogLevel

Specifies the level of detail for messages logged in the debug log file. One or multiple message levels can be enabled/disabled.

Valid values are:

- Fatal
- Error
- Warnings
- Information
- Debug
- SSP Packet log
- SSP Requests

The default is Fatal.

NOTE: The value of this attribute is a bitmask with each bit having the following decimal values when turned on:

Fatal:	Bit 0=1
Error:	Bit 1=2
Warnings:	Bit 2=4
Information:	Bit 3=8
Debug:	Bit 4=16
SSP Packet Log:	Bit 5=32
SSP Requests:	Bit 6=64

If you set this attribute using a SequeLink Manager command that prompts for a decimal value, such as the `ServiceAttributeReplace` command, the value you set must equal the total decimal value of the bits you want to turn on. For example, if you want to turn all bits on, meaning all options would be logged, you would set the attribute to 127 ($1+2+4+8+16+32+64=127$). To turn off all bits, set the attribute to 0.

Type=Dynamic

ServiceDebugLogPath

Specifies the directory where debug log files are written.



On Windows and UNIX: Contains the directory in which debug log files will be written.

z/OS

On OS/390: Specifies a UNIX System Services HFS directory to which Log files will be written.

The default directory is /tmp.

Type=Static

ServiceDescription

Specifies a general description of the SequeLink service.

Type=Static

ServiceDetailedOSLogonErrors

Specifies what type of error will be returned when the OSLogon based authentication fails. Valid values are:

- TRUE=A detailed error will be returned.
- FALSE=A generic error will be returned.

The default is TRUE.

Type=Dynamic

ServiceEncryptionAlgorithm

Specifies the data scrambling algorithm used when sending requests or replies across the network between client and server. Valid values are:

- None
- DES
- 3DES
- Byteswap

The default is None, which means cleartext.

See [Chapter 14, "Configuring SequeLink Security,"](#) on page 281 for more information about configuring SequeLink security.

Type=Static



ServiceEnvironmentVariable

Specifies a list of variables that will be set before the SequeLink service is started. The syntax for valid values is *varname=value*. For example, ORACLE_SID=ORA8i.

To define more than one variable, you must add more than one instance of the attribute to your service.

Type=Static

The default for SequeLink Server for Oracle is to use the Oracle Bequeath protocol to communicate to the Oracle database engine. However, we strongly recommend that you configure the SequeLink Oracle service to use the Oracle Net Service instead.

To use the Oracle Net Service:

- 1 Configure the Oracle listener for Net service (refer to your Oracle documentation for instructions).
- 2 Configure the SequeLink Oracle service to use the Oracle Net service. Using the SequeLink Manager, add the SequeLink service attribute `ServiceEnvironmentVariable` to your SequeLink Oracle service and set it to `ServiceEnvironmentVariable=Two_Task=NetServiceName`, where *NetServiceName* is the Oracle IPC service name you configured in step 1.
- 3 If the SequeLink service attribute `ServiceEnvironmentVariable=ORACLE_SID=OracleSid` exists for this SequeLink service, delete it.
- 4 Restart the SequeLink Oracle service.



ServiceEventTraceLocation

Specifies the directory where the event trace file is located. The valid value is an existing directory.

The default is an empty string.

Type=Static

ServiceEventTraceSize

Specifies the size (in bytes) of the event trace file. Valid values are between 10000 and 2000000000.

The default is 1000000.

Type=Static

ServiceEvQGetNrEventsMax

Specifies the number of events to get from the event queue in one read operation.

The default is 10.

Type=Static

NOTE: Set this attribute *only* when instructed to do so by DataDirect Technologies technical support.



ServiceEvQPingTimeout

Specifies the timeout (in milliseconds) the SequeLink Agent will wait for a SequeLink data access service response while determining whether the service is started.

The default is 1000.

Type=Static



ServiceEvQShmMonitorSize

Specifies the size of the shared memory segment (in bytes) to be used for the shared monitor counters. The shared monitor counters are monitor values that are accessible using the Windows performance monitor integration.

The default is 4096.

Type=Static

ServiceEvQShmQMaxResend

Specifies the number of attempts while sending events on the event queue before generating a fatal error.

The default is 5.

Type=Static

ServiceEvQShmQSize

Specifies the size of the shared memory segment for the event queue. The event queue is used as a communication path between SequeLink services.

The default is 65536.

Type=Static

ServiceEvQShmQWaitResend

Specifies the time, in milliseconds, to wait between successive attempts to send events on the event queue.

The default is 50.

Type=Static

NOTE: Set this attribute *only* when instructed to do so by DataDirect Technologies technical support.



ServiceExecPath

Specifies the path of a SequeLink Server executable and is used differently depending on platform. The valid value is a defined location of a SequeLink server executable.

- On Windows: The value of the ServiceExecPath is used when registering the service.
- On UNIX: The value of ServiceExecPath is used by the SequeLink Agent when starting the service.

Do not alter this attribute.

Type=Static



ServiceExecPath2

Specifies the path of a SequeLink server executable to start by SequeLink service starter. The valid value is a defined location of a SequeLink server executable.

Type=Static

ServiceHost

Specifies the name of the host on which the SequeLink service is installed.

Type=Dynamic for newly-created services, read-only for existing services.

ServiceIIOPObjectKey

NOTE: Set this attribute *only* when instructed to do so by DataDirect Technologies technical support.

Specifies IIOPO object key in IIOPO header.

The default is IIOPO:slx::.

Type=Static

ServiceIIOPOperationTarget

NOTE: Set this attribute *only* when instructed to do so by DataDirect Technologies technical support.

Specifies IIOPO operation target in IIOPO header.

The default is SSP.

Type=Static



ServiceINFMaXNrActStat

Specifies the maximum number of active statements that are allowed for each connection to an Informix database.

The default is 250.

Type=Dynamic

ServiceInternalTimeout

The number (in milliseconds) that thread pool synchronization actions block before generating an internal error. Valid values are positive numbers.

The default is 60000.

Type=Static

ServiceLanguage

The specified language for SequeLink messages. The only valid value and the default is 1= English.

Type=Static

ServiceMaxSessions

Specifies the maximum number of sessions a multithreaded SequeLink Server will accept.

z/OS

On OS/390, verify that this parameter does not exceed the value of MAXFILEPROC in BPXPRMxx. The MAXFILEPROC parameter can be changed dynamically.

- On Windows and UNIX, the default value is 0. A value of 0 means unlimited number of sessions is accepted.
- On OS/390, the default value is 2000.

Type=Dynamic

ServiceMaxThreads

The maximum number of threads that can be started in the thread pool. This attribute is ignored when ServiceConnectionModel is set to Thread/Connection or ProcessConnection.

Valid values are:

- For DB2 on OS/390, valid values are from 6 to 256.
- For DB2 UDB on AIX, valid values are from 6 to 512.
- For all others, valid values are from 6 to 64000.

The default is 64.

Type=Static



ServiceMessageFile

The location of the service message file:

On Windows: The valid value is the path to a resource-only DLL.

On UNIX: The valid value is the path to a .cat file.

Type=Static

ServiceMinThreads

The number of pre-started threads that will be started in the thread pool. The value should be equal to or less than the value of ServiceMaxThreads. This attribute is ignored when ServiceConnectionModel is set to Thread/Connection or ProcessConnection.

Valid values are:

- For DB2 on OS/390, valid values are from 6 to 256.
- For DB2 UDB on AIX, valid values are from 6 to 512.
- For all others DBMSs, valid values are from 6 to 64000.

The default is 8.

Type=Static



ServiceMSSMergeXaBranches

When accessing Microsoft SQL Server, enables the application to merge all XA branches as one transaction branch, emulating tightly coupled branch transactions. When disabled, multiple connections within the same distributed transaction ignore each other's locks.

Valid values are:

- TRUE=SequeLink merges all XA branches as one transaction branch.
- FALSE=All XA branches are kept separately.

The default is FALSE.

Type=Static

ServiceName

Specifies the name of the service to be specified during service creation. After a service is created, the name of a service cannot be changed.

Type=Dynamic for newly-created services; read-only for existing services.



ServiceORASerializeLogon

Specifies whether all Oracle API calls that are executed to establish a connection with the Oracle database are serialized.

Valid values are:

- TRUE=yes
- FALSE=no

The default is TRUE.

Type=Static



ServiceRegisterTCPPort

Specifies whether the TCP/IP port will be registered automatically in the operating systems services file (/etc/services on UNIX or %SystemRoot%\system32\drivers\etc\services on the Microsoft Windows platforms on which SequeLink Server runs, for example).

- TRUE=The TCP/IP port used by the SequeLink service will be registered automatically in the operating system services file.
- FALSE=The TCP/IP port used by the SequeLink service will not be registered automatically in the operating system services file.

The default is FALSE.

Type=Static

ServiceResolveHostNames

Specifies how host names are resolved. Valid values are:

- TRUE=Information about connected clients is displayed using symbolic system names.
- FALSE=Information about connected clients is displayed in an IP format.

The default is FALSE.

Type=Dynamic

ServiceTCP1stRecvTimeLimit

Maximum amount of time (in seconds) the server will wait to receive the first network packet.

The default is 30.

Type=Static

NOTE: Set this attribute *only* when instructed to do so by DataDirect Technologies technical support.

ServiceThreadLockThreshold

Specifies a percentage of the value of ServiceMaxThreads. When the number of active threads is less than this percentage, a connection that has executed more RPCs than DataSourceThreadMaxRpc on the current thread is allowed to lock this thread for another DataSourceThreadRpcTimeOut period.

This attribute is required when ServiceConnectionModel=Threadpool (see ["ServiceConnectionModel" on page 461](#) for more information).

Valid values are from 0 to 50.

The default is 0 (the thread switching mechanism is disabled, improving performance in times of low system activity).

Type=Dynamic



ServiceUnixSyslogFacility

Facility with which all SequeLink syslog messages are logged.
Valid values are:

- USER
- LOCAL0-LOCAL7

The default is USER.

Type=Dynamic



ServiceUser

Sets authorization for users who are allowed to access the service for data access.

On Windows and UNIX: Specify everyone when ServiceAuthMethods=anonymous. To configure authorization for multiple users, you must set the ServiceUser attribute for each user. Valid values are:

- *user_id*=The user ID of a user who is allowed to use the SequeLink service. To configure authorization for more than one user, you must configure this attribute multiple times, one instance for each user.

NOTES:



- On Windows servers, you must prefix the user ID with the Windows server name or the Windows domain name, for example, SALES\DJONES.
- Alternatively, you can set the ServiceUserGroup attribute to configure authorization for groups of users defined on Windows or UNIX. See ["ServiceUserGroup" on page 477](#) for more information about configuring authorization for user groups on Windows and UNIX.

- **authenticated**=Any user who can provide a valid host user ID and password or who uses Integrated NT authentication will receive the same authorization.
- **everyone**=All connections will receive the same authorization level, regardless of how they are authenticated.

See [Chapter 14, "Configuring SequeLink Security," on page 281](#) for more information about configuring SequeLink security.

Type=Dynamic



ServiceUserGroup

Sets authorization for defined Windows and UNIX user groups who are allowed to access the service for data access. Valid values are user groups defined on Windows or UNIX.

To configure authorization for multiple user groups, you must set the ServiceAdministrator attribute multiple times, one time for each user group. For example:

```
ServiceUserGroup=SLUSERG1
ServiceUserGroup=SLUSERG2
ServiceUserGroup=SLUSERG3
```



NOTE: On Windows servers, you must prefix the user group ID with the Windows server name or the Windows domain name where the user group is defined, for example, SALES\SLUSERG1.

See [Chapter 14, "Configuring SequeLink Security," on page 281](#) for more information about configuring SequeLink security.

Type=Dynamic

F SequeLink Events

This appendix lists the SequeLink events, describes the events, lists the attributes associated with the events, and explains how to write a filter for an event.

SequeLink Events

[Table F-1](#) lists SequeLink events and the attributes that apply to each attribute. See [Table F-2](#) for the definition of the attributes.

Table F-1. SequeLink Events

Event	Description
DataSourceSet Attributes: SessionId, ClientInfo, DataSourceName	Data Source for the specified session.
DbmsSessionStarted Attributes: SessionId, ClientInfo, ServiceUser, DbmsSessionId, DbmsUser	DBMS Connection opened.
DbmsSessionStopped Attributes: SessionId, ClientInfo, ServiceUser, DbmsSessionId, DbmsUser	DBMS Connection closed.

* These attributes cannot be specified within a filter.

Table F-1. SequeLink Events (cont.)

Event	Description
ErrorInternal Attributes: ErrorCode, ErrorMessage, [SessionId, ClientInfo, ServiceUser]	Fatal error occurred.
ErrorOccurred Attributes: ErrorCode, ErrorMessage, [SessionId, ClientInfo, ServiceUser]	Error occurred.
EvProcStarting Attributes: none	Event Processing is started.
EvProcStopping Attributes: none	Event Processing is stopped.
NetPacketRead Attributes: SessionId, ClientInfo, ServiceUser, NumberOfBytes	Packet read from network (from client).
NetPacketWrite Attributes: SessionId, ClientInfo, ServiceUser, NumberOfBytes	Packet written to network (to client).
RowsFetched Attributes: SessionId, ClientInfo, ServiceUser, StatementId, RowsFetched	Rows fetched from the DBMS.

* These attributes cannot be specified within a filter.

Table F-1. SequeLink Events (cont.)

Event	Description
ServiceParams Attributes: DebugLogLevel*	Service Parameters.
ServiceStarted Attributes: none	Service started.
ServiceStopping Attributes: none	Service stopped.
SessionAuthenticated Attributes: SessionId, ClientInfo, ServiceUser, Authorization	Authentication succeeded.
SessionIdentification Attributes: SessionId, ClientInfo, DataSourceName, ClientAppName, ClientAppId, ClientAutoAppIdDesc, SessionToken	Sets session identification
SessionParams Attributes: SessionId, ClientInfo, DebugLogLevel*	Session Parameters.
SessionStarted Attributes: SessionId, ClientInfo, Authorization, DataSourceName, ClientApi	Session started.

* These attributes cannot be specified within a filter.

Table F-1. SequeLink Events (cont.)

Event	Description
SessionStopped Attributes: SessionId, ClientInfo, ServiceUser, ReceivedPackets*, SumReceivedPackets*, MinReceivedPackets*, MaxReceivedPackets*, SentPackets*, SumSentPackets*, MinSentPackets*, MaxSentPackets*, RowsFetched, ExecuteCount, TxnPrepare, TxnCommit, TxnRollback	Session stopped.
StatementClosed Attributes: SessionId, ClientInfo, ServiceUser, StatementId, RowsFetched, RowsAffected, ExecuteCount	DBMS Statement closed.
StatementExecuted Attributes: SessionId, ClientInfo, ServiceUser, StatementId, Statement, RowsAffected, ReturnCode, Statement	DBMS Statement executed.
StatementOpened Attributes: SessionId, ClientInfo, ServiceUser, StatementId	DBMS Statement opened.
TransactionCommit Attributes: SessionId, ClientInfo, ServiceUser	DBMS Transaction Committed.

* These attributes cannot be specified within a filter.

Table F-1. SequeLink Events (cont.)

Event	Description
TransactionPrepare Attributes: SessionId, ClientInfo, ServiceUser	DBMS Transaction prepared.
TransactionRollback Attributes: SessionId, ClientInfo, ServiceUser	DBMS Transaction rollback occurred.
* These attributes cannot be specified within a filter.	

SequeLink Event Attributes

Table F-2 describes each event attribute.

Table F-2. SequeLink Event Attributes

Event Attribute	Description	Type
Authorization	Session authorization (Administrator, User).	String
ClientApi	Type of client application (for example, Administrator, ODBC, ADO/OLE DB, .NET, or JDBC).	String
ClientApplId	Application ID used to authorize the current sessions.	String
ClientApplName	Application name as provided by the client application when connecting (ApplicationName property).	String
ClientAutoApplId	Application ID used to authorize the current sessions.	String
ClientAutoApplIdDesc	Text portion of the Application ID used to authorize the current sessions.	String
ClientInfo	IP address or host name of the client system.	String
DataSourceName	Identification of the data source used for the session.	String
DbmsSession	Identification of the DBMS session.	String
DbmsUser	User used to open the DBMS session.	String
ErrorArgument	One or more arguments completing the ErrorMessage attribute.	String
ErrorCode	Numeric error code associated with an error event.	Integer

Table F-2. SequeLink Event Attributes (cont.)

Event Attribute	Description	Type
ErrorMessage	Error text.	String
EventId	Numeric identification of the event.	Integer
ExecuteCount	Number of SQL statements executed.	Integer
NumberOfBytes	Number of bytes sent or received.	Integer
ReturnCode	Result of statement execution: 0 when OK, -1 when Error, -2 when Warning.	String
RowsAffected	Rows affected by SQL statement(s).	Integer
RowsFetched	Number of rows fetched.	Integer
ServiceName	Name of the service generating the event.	String
ServiceUser	Authenticated user.	String
SessionId	Numeric identification of the session.	Integer
SessionToken	Contains the value of DataSourceSessionToken after evaluation of placeholders and the session token for this session after placeholder replacement.	Integer
Statement	SQL statement.	String
StatementId	Numeric identification of the session.	Integer
Timestamp	Timestamp when event occurred.	String

Table F-2. *SequeLink Event Attributes* (cont.)

Event Attribute	Description	Type
TxnCommit	Number of transactions committed.	Integer
TxnPrepare	Number of transactions prepared.	Integer
TxnRollback	Number of transaction rollbacks.	Integer

Filtering Events

You can place a filter on the attributes of any event. For example, if you want to monitor and trace only sessions that are started by users, not administrators, you would write the following filter for the Session Started event:

```
${Authorization} = "user"
```

The syntax for a filter placed on an event is:

```
[not] [(!${event_attribute} comparison_operator filter_value)]  
[boolean_operator (${event_attribute} comparison_operator  
filter_value)...
```

where:

comparison_operator is one of the following comparison operators:

=	>	equals	bigger	nsmaller
!=	<=	nequals	nbigger	
<	>=	contains	smaller	

You can use the symbols or the words; they are equivalent (for example, using `!=` is the same as using `nequals`).

filter_value is the value for the attribute. The value can be a string or an integer, depending on the attribute type (see [Table F-2 on page 484](#)). Strings must be quoted.

boolean_operator is one of `and`, `nand`, `or`, `nor`, `xor`, `nxor`

For example:

```
[not] (${ServiceUser} equals "sluser")
(${ClientInfo} contains "196.72") and (${RowsFetched} >
1000)
(${Statement} contains "insert") and (${ReturnCode} != 0)
(${Statement} contains "insert" and (${ReturnCode} = -1 or
${ReturnCode} = -2)
```

NOTE: Strings must be quoted, and the comparison operator "contains" can only be used in combination with string constants.

G Internationalization, Localization, and Unicode

This appendix provides an overview of how internationalization, localization, and Unicode relate to each other. It also provides a background on Unicode use in SequeLink, and how Unicode is accommodated by Unicode ODBC drivers.

Internationalization and Localization

Software that has been designed for *internationalization* is able to manage different linguistic and cultural conventions transparently and without additional modification. The same binary copy of an application should run on any localized version of an operating system, without requiring source code changes.

Software that has been designed for *localization* includes language translation (such as text messages, icons, and buttons), cultural data (such as dates, times, and currency), and other components (such as input methods and spell checkers) for meeting regional market requirements.

Properly designed applications can accommodate a localized interface without extensive modification. The software should be designed, first, to run internationally, and, second, to accommodate the language- and cultural-specific elements of a designated locale.

Locale

A locale represents the language and cultural data chosen by the user and dynamically loaded into memory at run time. The locale settings are applied to the operating system and to subsequent application launches.

While language is a fairly straightforward item, cultural data is a little more complex. Dates, numbers, and currency are all examples of data that is formatted according to cultural expectations. Because cultural preferences are bound to a geographic area, country is an important element of locale. Together these two elements (language and country) provide a precise context in which information can be presented. Locale presents information in the language and form that is best understood and appreciated by the local user.

Language

A locale's language is specified by the ISO 639 standard. The following table lists some language codes in the standard.

Language Code	Language
en	English
nl	Dutch
fr	French
es	Spanish
zh	Chinese
ja	Japanese
vi	Vietnamese

Because language is correlated with geography, a language code might not capture all the nuances of usage in a particular area. For example, French and Canadian French may use different

phrases and terms to mean different things even though basic grammar and vocabulary are the same. Language is only one element of locale.

Country

The locale's country identifier is also specified by an ISO standard, ISO 3166, which describes valid two-letter codes for all countries. ISO 3166 defines these codes in uppercase letters. The following table lists some language codes in the standard.

Country Code	Country
US	United States
FR	France
IE	Ireland
CA	Canada
MX	Mexico

The country code provides more contextual information for a locale and affects a language's usage, word spelling, and collation rules.

Variant

A variant is an optional extension to a locale. It identifies a custom locale that is not possible to create with just language and country codes. Variants can be used by anyone to add additional context for identifying a locale. The locale en_US represents English (United States), but en_US_CA represents even more information and might identify a locale for English (California, U.S.A). Operating system or software vendors can use these variants to create more descriptive locales for their specific environments.

Unicode Character Encoding

In addition to locale, the other major component of internationalizing software is the use of the Universal Codeset, or Unicode. Most people know that Unicode is a standard encoding that can be used to support multi-lingual character sets.

Unfortunately, understanding Unicode is not as simple as its name would indicate. Software developers have used a number of character encodings, from ASCII to Unicode, to solve the many problems that arise when developing software applications that can be used worldwide.

Background

Most legacy computing environments have used ASCII character encoding developed by the ANSI standards body to store and manipulate character strings inside software applications. ASCII encoding was convenient for programmers because each ASCII character could be stored as a byte. The initial version of ASCII used only 7 of the 8 bits available in a byte, which meant that software applications could use only 128 different characters. This version of ASCII could not account for European characters, and was completely inadequate for Asian characters. Using the eighth bit to extend the total range of characters to 256 added support for most European characters. Today, ASCII refers to either the 7-bit or 8-bit encoding of characters.

As the need increased for applications with additional international support, ANSI again increased the functionality of ASCII by developing an extension to accommodate multi-lingual software. The extension, known as the Double-Byte Character Set or DBCS, allowed existing applications to function without change, but provided for the use of additional characters, including complex Asian characters. With DBCS, characters map to either one byte (such as American ASCII characters) or two bytes (for example, Asian characters). The DBCS environment also

introduced the concept of an operating system code page that identified how characters would be encoded into byte sequences in a particular computing environment. DBCS encoding provides a cross-platform mechanism for building multi-lingual applications; however, using variable-width codes is not ideal.

Many developers felt that there was a better way to solve the problem. A group of leading software companies joined forces to form the Unicode Consortium. Together, they produced a new solution to building worldwide applications—Unicode. Unicode was originally designed as a fixed-width, uniform two-byte designation that could represent all modern scripts without the use of code pages. The Unicode Consortium has continued to evaluate new characters, and the current number of supported characters is over 95,200.

Although it seemed to be the perfect solution to building multi-lingual applications, Unicode started off with a significant drawback—it would have to be retrofitted into existing computing environments. To use the new paradigm, all applications would have to change. This was clearly unacceptable, and several standards-based transliterations were designed to convert two-byte fixed Unicode values into more appropriate character encodings, including, among others, UTF-8, UCS-2, and UTF-16.

UTF-8 is a standard method for transforming Unicode values into byte sequences that maintain transparency for all ASCII codes. UTF-8 is endorsed by the Unicode Consortium as a standard mechanism for transforming Unicode values and is popular for use with HTML, XML, and similar protocols.

UCS-2 encoding is a fixed two-byte encoding sequence and is a method for transforming Unicode values into byte sequences for Microsoft Windows platforms. It is the standard for Windows 98, Windows Me, and Windows NT.

UTF-16 is a superset of UCS-2, with the addition of some special characters in surrogate pairs. UTF-16 is the standard encoding for Windows 2000 and Windows XP.

Unicode Support in Databases

Recently, database vendors have begun to support Unicode data types natively in their systems. With Unicode support, one database can hold multiple languages. For example, a large multinational corporation could store expense data in the local languages for the Japanese, U.S., English, German, and French offices in one database.

Not surprisingly, the implementation of Unicode data types varies from vendor to vendor. For example, the Microsoft SQL Server 2000 implementation of Unicode provides data in UTF-16 format, while Oracle provides Unicode data types in UTF-8 and UTF-16 format. A consistent implementation of Unicode not only depends on the operating system, but also on the database itself.

Unicode Support in ODBC

Prior to Version 3.5 of the ODBC standard, all ODBC access to function calls and string data types was through ANSI encoding (either ASCII or DBCS). Applications and drivers were both ANSI-based.

The 3.5 ODBC standard specified that the ODBC Driver Manager (on both Windows and UNIX) be capable of mapping both Unicode function calls and string data types to ANSI encoding as transparently as possible. This meant that ODBC 3.5-compliant Unicode applications could use Unicode function calls and string data types with ANSI drivers because the Driver Manager could convert them to ANSI. Because of character limitations in ANSI, however, not all conversions are possible.

Unicode Support in JDBC

Multi-lingual applications can be developed on any operating system platform with JDBC using the *SequeLink for JDBC Client* to access both Unicode and non-Unicode enabled databases. Internally, Java applications use UTF-16 Unicode encoding for string data. When fetching data, the *SequeLink for JDBC Client* automatically performs the conversion from the character encoding used by the database to UTF-16. Similarly, when inserting or updating data in the database, the JDBC driver automatically converts UTF-16 encoding to the character encoding used by the database.

Unicode Support in .NET

Internally, .NET applications use UTF-16 Unicode encoding for string data. When fetching data, the *SequeLink for .NET Client* automatically performs the conversion from the character encoding used by the database to UTF-16. Similarly, when inserting or updating data in the database, the driver automatically converts UTF-16 encoding to the character encoding used by the database.

Using Unicode ODBC Drivers

All drivers that are ODBC 3.5-compliant must be able to accommodate Unicode string data; however, the way in which a driver handles function calls from a Unicode application determines whether it is called a "Unicode driver."

Function Calls

Instead of the standard ANSI SQL function calls, such as `SQLConnect`, Unicode applications employ "W" (wide) function calls, such as `SQLConnectW`. A true Unicode driver can understand the "W" function calls and communicate through the Driver Manager without conversions.

The following examples illustrate the conversion streams.

Unicode Application with Unicode Driver

An operation involving a Unicode application and a Unicode driver is more efficient because no function conversion is involved.

Windows

- 1 The Unicode application sends UCS-2 or UTF-16 function calls to the Driver Manager.
- 2 The Driver Manager does not have to convert the UCS-2 or UTF-16 function calls to ANSI. It passes the Unicode function call to the Unicode driver.
- 3 The driver returns UCS-2 or UTF-16 argument values to the Driver Manager.
- 4 The Driver Manager returns UCS-2 or UTF-16 function calls to the application.

UNIX

- 1 The Unicode application sends UTF-8 function calls to the Driver Manager.
- 2 The Driver Manager does not have to convert the UTF-8 function calls to ANSI. It passes the Unicode function call to the Unicode driver.

- 3 The driver returns UTF-8 argument values to the Driver Manager.
- 4 The Driver Manager returns UTF-8 function calls to the application.

Data

ODBC C data types are used to indicate the type of C buffers that store data in the application. This is in contrast to SQL data types, which are mapped to native database types to store data in a database (data source). ANSI applications bind to the C data type `SQL_C_CHAR` and expect to receive information bound in the same way. Similarly, Unicode applications bind to the C data type `SQL_C_WCHAR` (wide data type) and expect to receive information bound in the same way. Any ODBC 3.5 compliant driver must be capable of supporting `SQL_C_CHAR` and `SQL_C_WCHAR` so that it can take data of one type and communicate with a database composed of a different type of data.

When the driver communicates with the database, it must use ODBC SQL data types, such as `SQL_CHAR` and `SQL_WCHAR`, that map to native database types. In the case of ANSI data and an ANSI database, the driver receives data bound to `SQL_C_CHAR` and passes it to the database as `SQL_CHAR`. The same is true of `SQL_C_WCHAR` and `SQL_WCHAR` in the case of Unicode data and a Unicode database.

When data from the Driver Manager and the data stored in the database differ in format, such as ANSI and Unicode, then conversions must be performed. The driver cannot receive `SQL_C_CHAR` data and pass it to a Unicode database that expects to receive a `SQL_WCHAR` data type. It must, therefore, be capable of converting `SQL_C_CHAR` to `SQL_WCHAR`, and vice versa.

The simplest case of data communication is when ANSI data is sent to or retrieved from an ANSI database. The driver does not have to do any data conversion in these instances.

In cases of data conversion, which involve additional overhead, the driver must do one of the following:

- Take ANSI data and communicate with a Unicode database
- Take one type of Unicode-encoded data and communicate with a database of a different Unicode-encoding.

With Unicode data and an ANSI database, the Driver Manager performs the conversion.

In the case of ANSI databases, which character set to use is determined from the database code page. Flat-file databases often use the code page of the client, while RDBMSs may manage their own code pages.

The following example illustrates the sequence of data conversion.

ANSI Data to a Unicode Database

The driver must use client code page information to determine which ANSI conversion is appropriate. SQL_C_CHAR must be converted to SQL_WCHAR, and vice-versa.

- 1 To send ODBC Parameter marker data to a Unicode database, the driver must convert ANSI data to the Unicode encoding system of the database.
- 2 When retrieving result column data from the database, the driver must convert the Unicode encoding system of the database to ANSI data.

Unicode Data to an ANSI Database

The Driver Manager performs Unicode/ANSI data conversions and communicates with the driver (see ["Unicode Support in ODBC" on page 494](#) for a detailed discussion). The Driver Manager must use client code page information to determine which ANSI conversion is appropriate. The Driver Manager converts the Unicode data to ANSI data and changes the C data type from SQL_C_WCHAR to SQL_C_CHAR.

Windows

- 1 To send ODBC Parameter marker data to an ANSI database, the Driver Manager must convert UCS-2 or UTF-16 encoded data to ANSI data.
- 2 To receive result column data from the database, the Driver Manager must convert ANSI data to UCS-2 or UTF-16 encoded data.

UNIX

- 1 To send ODBC Parameter marker data to an ANSI database, the Driver Manager must convert UTF-8 encoded data to ANSI data.
- 2 When receiving result column data from the database, the Driver Manager must convert ANSI data to UTF-8 encoded data.

Unicode Data to a Unicode Database

The driver must use database code page information to determine which Unicode encoding conversion is appropriate. A conversion between SQL_C_WCHAR and SQL_WCHAR may be required, depending on the Unicode encoding system of the database.

Windows

- 1 To send ODBC Parameter marker data to a Unicode database, the driver must convert UCS-2 or UTF-16 encoded data to the Unicode encoding system of the database.
- 2 When retrieving result column data from the database, the driver must convert the Unicode encoding system of the database to UCS-2 or UTF-16 encoded data.

UNIX

- 1 To send ODBC Parameter marker data to a Unicode database, the driver must convert UTF-8 encoded data to the Unicode encoding system of the database.
- 2 When retrieving result column data from the database, the driver must convert the Unicode encoding system of the database to UTF-8 encoded data.

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