SYBASE®

User’s Guide for Transaction Router Services

Mainframe Connect DirectConnect™ for z/OS Option

12.6

[Microsoft Windows and UNIX]

DOCUMENT ID: DC38581-01-1260-01

LAST REVISED: February 2005

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Contents

About This Book

This guide describes how to configure, control, monitor, and use Transaction Router Service (TRS). TRS allows Sybase® clients to access data stored on a mainframe computer. TRS supports mainframe connections for LU 6.2 or TCP/IP networks.

Audience

This book is written for:

- Application Programmers, who develop organization-specific programs using the major features of DirectConnect.
- System Administrators, who install and test DirectConnect. When DirectConnect is running, System Administrators provide ongoing administration support, disaster recovery, and troubleshooting support.
- System Programmers, who install and test DirectConnect. System Programmers also provide product administration, troubleshooting, and disaster recovery.

How to use this book

This guide describes a set of tasks, with each chapter representing a task. The following table shows how this book is organized.

See	When you are ready to.....
Chapter 1, “Introducing Transaction Router Service”	• Understand Enterprise Connect products. • Understand how DirectConnect and TRS work together.
Chapter 2, “Creating a TRS”	• Set up a TRS configuration file. • Define the properties in that file. • Use the file to establish a TRS.
Chapter 3, “Configuring a TRS”	• Configure TRS. • Perform administration procedures. • Use the TRS elements that require administration. • Review quick reference tables for the procedures.
Chapter 4, “Accessing Catalog Information with CSPs”	Use CSPs to access the DB2 UDB catalog

See	When you are ready to.....
Chapter 5, “Configuring a TRS Library for Security”	Control client access to TRS, to specific host connections, and to mainframe transactions.
Chapter 6, “Using Password Expiration Management (PEM) with TRS”	Implement and use the Advanced Program-to-Program Communications (APPC) Password Expiration Management (PEM) function with TRS.
Chapter 7, “Controlling a TRS”	Use the controlling administration tasks that TRS may need while it is running.
Chapter 8, “Monitoring a TRS”	• Find information about TRS users, connections, regions, and Remote Procedure Calls (RPCs). • Find information about the trace status of TRS. • Determine the options specified when TRS started.
Appendix A, “Sending Requests to TRS”	For clients using the Enterprise Connect product set, use TRS to access mainframe data.
Appendix B, “Testing a TRS Installation with Sample Programs”	Test a TRS installation by running mainframe access products sample programs.
Appendix C, “Localization”	Set up an application to run in a particular national language environment.
Appendix D, “TRS Process User Exits”	Implement processing user exits.
Appendix E, “Compatibility with MDI Database Gateway and Net-Gateway”	Require information regarding the compatibility between DirectConnect and both the MDI Database Gateway™ and Net-Gateway.

Related documents

To install DirectConnect products, use the ECDA *Installation Guide* for your database system.

To configure and administer DirectConnect for z/OS access services, use the Mainframe Connect DirectConnect for z/OS Option *User’s Guide for DB2 Access Services*.

To install and administer mainframe products, use the following documents:

- MainframeConnect Client Option *Installation and Administration Guide* for CICS
- Mainframe Connect Client Option *Installation and Administration Guide* for IMS and MVS

- Mainframe Connect Server Option *Installation and Administration Guide* for IMS and MVS
- MainframeConnect™ Server Option *Installation and Administration Guide* for CICS
- Open Client™ and Open Server™ *Common Libraries Reference Manual*
- Open Client *Client-Library/C Programmer's Guide*
- Open Client *Client-Library/C Reference Manual*
- Open Server *Server-Library/C Reference Manual*

Other sources of information

Use the Sybase Getting Started CD, the Sybase Technical Library CD, and the Technical Library Product Manuals Web site to learn more about your product:

- The Getting Started CD contains release bulletins and installation guides in PDF format, and may also contain other documents or updated information not included on the Technical Library CD. It is included with your software. To read or print documents on the Getting Started CD, you need Adobe Acrobat Reader (downloadable at no charge from the Adobe Web site, using a link provided on the CD).
- The Technical Library CD contains product manuals and is included with your software. The DynaText reader (included on the Technical Library CD) allows you to access technical information about your product in an easy-to-use format.

  Refer to the *Technical Library Installation Guide* in your documentation package for instructions on installing and starting the Technical Library.
- The Technical Library Product Manuals Web site is an HTML version of the Technical Library CD that you can access using a standard Web browser. In addition to product manuals, you will find links to EBFs/Maintenance, Technical Documents, Case Management, Solved Cases, newsgroups, and the Sybase Developer Network.

  To access the Technical Library Product Manuals Web site, go to Product Manuals at http://www.sybase.com/support/manuals/.

Sybase certifications on the Web

Technical documentation at the Sybase Web site is updated frequently.

❖ **Finding the latest information on product certifications**

1. Point your Web browser to Technical Documents at http://www.sybase.com/support/techdocs/.
2. Select Products from the navigation bar on the left.

3 Select a product name from the product list and click Go.

4 Select the Certification Report filter, specify a time frame, and click Go.

5 Click a Certification Report title to display the report.

❖ **Creating a personalized view of the Sybase Web site (including support pages)**

Set up a MySybase profile. MySybase is a free service that allows you to create a personalized view of Sybase Web pages.

1 Point your Web browser to Technical Documents at http://www.sybase.com/support/techdocs/.

2 Click MySybase and create a MySybase profile.

Sybase EBFs and software maintenance

❖ **Finding the latest information on EBFs and software maintenance**

1 Point your Web browser to the Sybase Support Page at http://www.sybase.com/support.

2 Select EBFs/Maintenance. If prompted, enter your MySybase user name and password.

3 Select a product.

4 Specify a time frame and click Go. A list of EBF/Maintenance releases is displayed.

Padlock icons indicate that you do not have download authorization for certain EBF/Maintenance releases because you are not registered as a Technical Support Contact. If you have not registered, but have valid information provided by your Sybase representative or through your support contract, click Edit Roles to add the "Technical Support Contact" role to your MySybase profile.

5 Click the Info icon to display the EBF/Maintenance report, or click the product description to download the software.

Style conventions

This book uses the following style conventions:

This type of information	Looks like this
Gateway Library function names	TDINIT, TDCANCEL
Client–Library™ function names	CTBINIT, CTBCANCEL

This type of information	Looks like this
Other executables (DB-Library™ routines, SQL commands) in text	The dbrpcparam routine, a select statement
Directory names, path names, and file names	*/usr/bin directory, interfaces* file
Variables	*n* bytes
SQL Server™ datatypes	datetime, float
Sample code	01 BUFFER PIC S9(9) COMP SYNC
User input	*01 BUFFER PIC X(n)*
Client-Library and Gateway Library function argument names	*BUFFER, RETCODE*
Names of objects stored on the mainframe	SYCTSAA5
Symbolic values used with function arguments, properties, and structure fields	CS-UNUSED, FMT-NAME, CS-SV-FATAL
Client-Library property names	CS-PASSWORD, CS-USERNAME
Client-Library and Gateway Library datatypes	CS-CHAR, TDSCHAR

All other names and terms are in regular typeface.

Syntax conventions

Syntax statements that display options for a command look like this:

sp_columns *table_name* [, *table_owner*]
[, *table_qualifier*] [, *column_name*]

Symbol	Convention
( )	Parentheses are part of the command.
{ }	Braces indicate that you must choose at least one of the enclosed options. Do not type the braces when you type the option.
[ ]	Brackets indicate that you can choose one or more of the enclosed options, or none. Do not type the brackets when you type the options.
|	The vertical bar indicates that you can select only one of the options shown. Do not type the bar in your command.
,	The comma indicates that you can choose one or more of the options shown. Separate each choice by using a comma as part of the command.

The following table explains the syntax conventions used in this guide.

If you need help

Each Sybase installation that has purchased a support contract has one or more designated people who are authorized to contact Sybase Technical Support. If you cannot resolve a problem using the manuals or online help, please have the designated person contact Sybase Technical Support or the Sybase subsidiary in your area.

CHAPTER 1

Introducing Transaction Router Service

This chapter provides an overview of DirectConnect for z/OS, of which Transaction Router Service (TRS) is a component. DirectConnect for z/OS combined with other Sybase products provides access and integration of mainframe data. For more information, see the *Overview Guide* for Mainframe Connect.

This chapter contains the following topics:

DirectConnect for z/OS overview

This section describes DirectConnect for z/OS and other Sybase products that DirectConnect and TRS interact with. This section covers the following topics:

- DirectConnect architecture
- DirectConnect components
- Related products
- DirectConnect and TRS environment

DirectConnect architecture

DirectConnect for z/OS is Open Server-based software that supports DB-Library, CT-Library, and Open Database Connectivity (ODBC) application programming interfaces (APIs).

DirectConnect serves as a fundamental building block for highly-scalable database middleware applications. DirectConnect products are local area network (LAN)-based middleware gateways and servers that provide access to non-Sybase data and applications.

In addition, DirectConnect can be used with other Sybase products, such as Adaptive Server®, ASE/CIS, and Replication Server.

DirectConnect for z/OS consists of:

- A server, which provides the framework in which service libraries can operate
- One or more service libraries (DB2 UDB and TRS), which provide the framework in which access services can operate
- One or more access services for each service library (DB2 UDB and TRS), which are the logical points of connection for DirectConnect clients.

The following subsections describe each of these components.

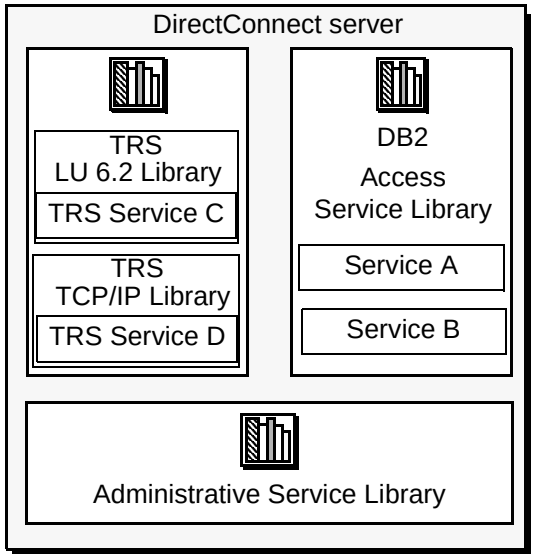
DirectConnect components

This section describes the following DirectConnect components:

- DirectConnect server
- DirectConnect service libraries
- DirectConnect services

Note Mainframe Client Connect (MCC) is no longer being provided or supported. Sybase recommends that you migrate from a three-tier (gateway-enabled) environment to a two-tier (gateway-less) environment using TCP.

Figure 1-1: DirectConnect server, libraries, and services



DirectConnect server

The DirectConnect server provides management and support functions for DirectConnect service libraries, such as:

- Routing client connections to the appropriate access service based on user ID, requesting application, and access service name.
- Providing a single log file and a trace file for access services. TRS has its own Tabular Data Stream™ (TDS) trace file, LU 6.2 protocol trace file and TCP/IP protocol trace file.
- Logging server, access service, and client messages.
- Tracing server, access service, and client events.
- Providing configuration management of all installed services.

For detailed information about configuring and starting the server, see the DirectConnect *Server Administration Guide*.

DirectConnect service libraries

Residing on the DirectConnect server, a service library is a set of configuration properties that describes how its access services will function. The following service libraries reside on the DirectConnect server:

- Transaction Router Service Library
- Access Service Library
- Administrative Service Library

DirectConnect services

An access service is the client connection point for a DirectConnect server. It is the pairing of a service library with a set of specific values for the configuration properties.

DB2 UDB access services

A DB2 access service works with MainframeConnect for DB2 UDB to allow clients to access DB2 data.

Each access service is a specific set of configuration properties that:

- Transforms SQL
- Convert datatypes
- Supports remote stored procedures (RPCs)
- Transfers data between DB2 UDB and other servers accessible through Open Client
- Supports Catalog Stored Procedures (CSPs) and system stored procedures
- Supports RSPs and host-resident requests

For more information about the DirectConnect for z/OS DB2 UDB Access Service Library, see the Mainframe Connect DirectConnect for z/OS Option *User's Guide for DB2 Access Services*.

Transaction Router Service (TRS)

Each TRS library contains a TRS that provides access to DB2 data and supports Open ServerConnect™ mainframe applications, defined to TRS as (RPCs).

The TRS access service routes requests from remote LAN-based clients to Open ServerConnect transactions. Optionally, it can also route requests to MainframeConnect™ for DB2 UDB and return results to the client.

Security can also be configured on a transaction or user basis.

There are two TRS service libraries:

- *TRSLU62* service library, which uses the LU 6.2 communications protocol to talk to Mainframe Connect or any Open ServerConnect application running in CICS
- *TRSTCP* service library, which uses the Transmission Control Protocol/Internet Protocol (TCP/IP) communications protocol to talk to MainframeConnect for DB2 UDB or any Open ServerConnect application running in CICS

Having multiple instances of a TRS library on a server results in different physical copies of the shared library files that constitute the TRS component.

An explanation of the TRS components of DirectConnect can be found in the DirectConnect *Transaction Router Service User's Guide*.

Administrative Service Library

The Administrative Service Library provides specific administrative services for all DirectConnect libraries, including writing to logs and allowing remote configuration of DirectConnect services (for example, through DirectConnect Manager).

DirectConnect Manager

DirectConnect Manager is a graphical user interface (GUI) systems management tool for administering DirectConnect. It allows you to:

- Manage DirectConnect servers on multiple platforms
- Change configuration properties of DirectConnect servers, service libraries, and services
- Create and copy services
- Create new servers using DCDirector
- Start and stop existing servers using DCDirector
- Start, stop, and delete services
- Test the availability of a data source by creating a connection to it

- Retrieve a DirectConnect server log file or a subset of the log, and view log file messages with a text editor
- Update DirectConnect server connection information
- View the status of a service and data source on the desktop

Related products

This section describes products that DirectConnect interacts with to provide mainframe access for LAN client requests.

MainframeConnect for DB2 UDB

MainframeConnect for DB2 UDB is a CICS transaction that works with DirectConnect for z/OS to provide access to mainframe data. It performs the following functions:

- Supports full read-write, dynamic SQL access to data
- Allows applications to use cursors for flexible and efficient result set processing
- Permits the use of long-running transactions against mainframe databases
- Allows applications to use dynamic events to map SQL to a static plan

DirectConnect invokes MainframeConnect to access mainframe data on behalf of its Open Client-based clients, such as:

- ASE/CIS
- ASE through RPCs
- Enterprise Application Server
- JDBC or ODBC applications
- Replication Server

Note MainframeConnect for DB2 UDB is available only for z/OS CICS environments.

Open ServerConnect

Open ServerConnect is a programming environment that lets you create mainframe transactions that are accessible to Sybase client applications. To provide this access, Open ServerConnect uses the following basic interfaces:

- Traditional Open Server programming environment (for new customers and Sybase-heritage customers using new applications)
- RSP programming environment (only for MDI-heritage customers using their legacy applications)

These transactions provide access to virtually any MVS data source and are used for a variety of functions, including:

- Accessing existing mainframe applications
- Initiating mainframe batch jobs
- Providing source data for data transfer operations
- Providing data mapped to a table within ASE/CIS thus allowing results to be accessed or joined with data from other targets

LAN-side client applications access Open ServerConnect transactions directly through DirectConnect or indirectly through ASE/CIS or a Sybase Adaptive Server RPC.

Open ClientConnect

Open ClientConnect is a programming environment that lets you create mainframe applications that access:

- LAN data residing on a Sybase Adaptive Server or other supported data sources
- Other CICS regions

It allows you to treat the mainframe as if it were just another node on a LAN.

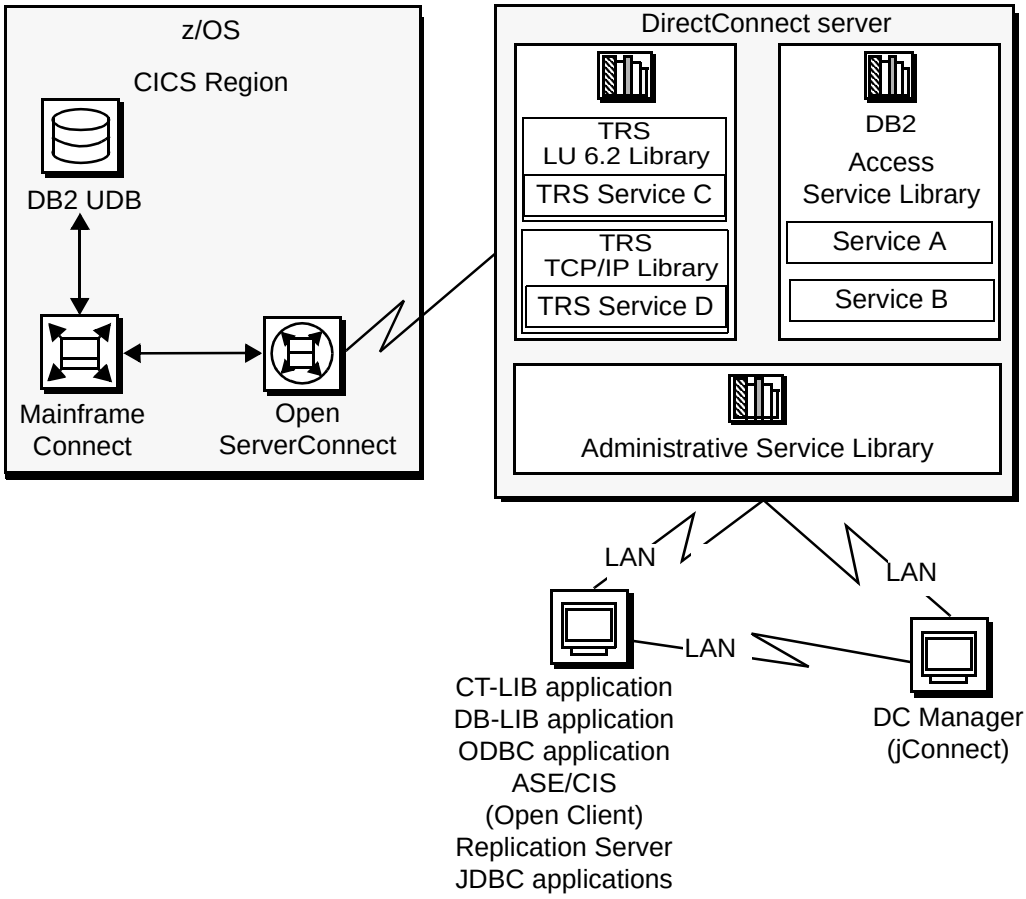
Open ClientConnect uses the following APIs:

- Traditional Open Client programming environment (for new customers and Sybase-heritage customers using new applications)
- Client Services Application (CSA) programming environment (only for MDI-heritage customers using their legacy applications)

DirectConnect and TRS environment

The following figure shows the relationship of the DB2 UDB access service library and TRS library with various components of the client workstation, LAN, and mainframe environments.

Figure 1-2: DirectConnect for z/OS environment



As shown, the request from a client application goes over the LAN to the DirectConnect server. From there, either TRS or a DB2 access service routes the request to the appropriate CICS region. Then, the request accesses data on the UDB database.

For more information on how to create multiple TRS libraries, see “Creating additional TRS configurations” on page 15.

How TRS differs from a DB2 access service

Like the DB2 UDB service library component of DirectConnect for z/OS, TRS allows users access to DB2 UDB data. They both perform protocol translation, route client requests and server results, and allow remote mainframe password management.

A DB2 UDB access service allows the client application to access data stored in a DB2 UDB database running on z/OS through MainframeConnect for DB2 UDB, a CICS transaction; however, the DB2 UDB access service cannot invoke other CICS transactions. In direct contrast, TRS allows the client through MFC, to invoke CICS, IMS, and MVS transactions that are based on Open ServerConnect APIs.

In addition, TRS provides:

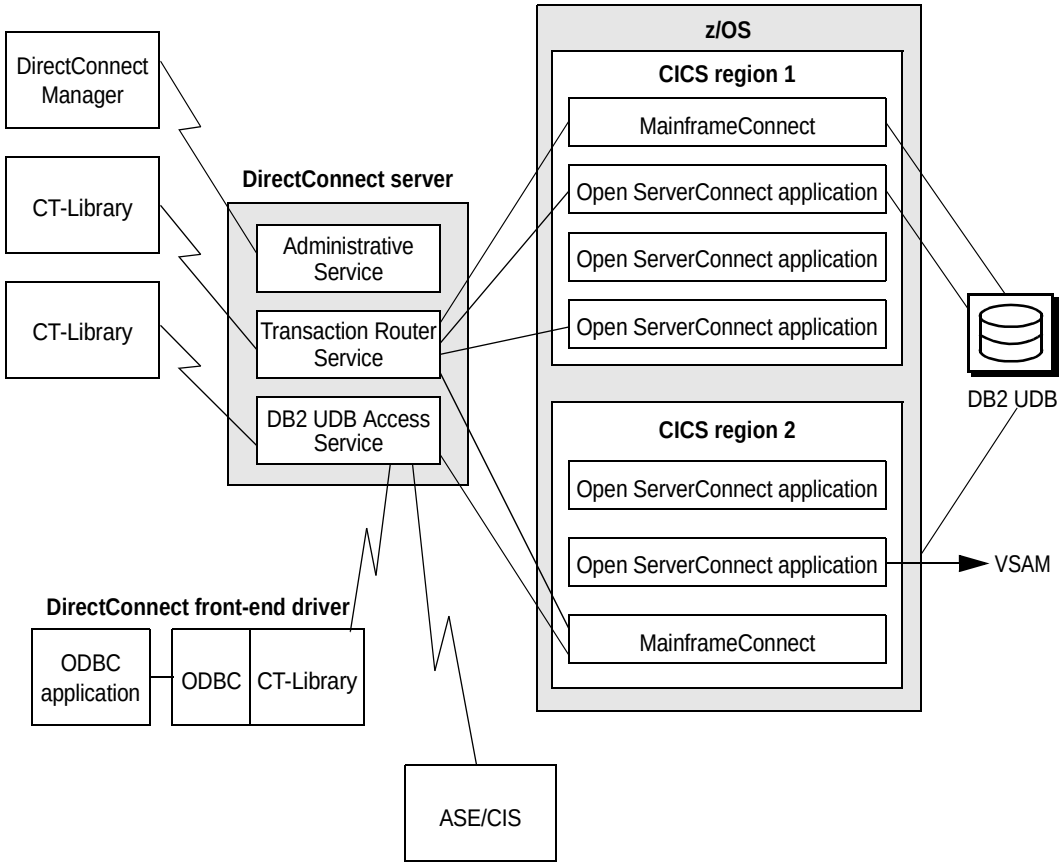
- Additional security control on a user or transaction basis
- Access to IMS and MVS data
- Access to multiple Open ServerConnect-based CICS transactions in multiple CICS regions, including any MainframeConnect running in the defined regions.

A DB2 UDB access service provides:

- Access to remote stored procedure (RSP) programs (TRS does not)
- DB2 and SQL datatype transformation
- Access to bidirectional transfer functionality
- Advanced datatype conversion

The following figure shows how a single client connection through TRS can access many CICS transactions.

Figure 1-3: TRS accessing many CICS transactions



Basically, you use TRS when:

- Your applications invoke Open ServerConnect-based mainframe transactions.
- You use client applications written for the TRS predecessor, Net-Gateway.

CHAPTER 2

Creating a TRS

This chapter describes how to create and customize a DirectConnect Transaction Router Service (TRS) library and name a service associated with that service library.

This chapter contains the following topics:

Note You can use DirectConnect Manager to create and edit a TRS configuration file.

Configuring a TRS library

To create and modify a TRS, you must edit the TRS configuration file. It is a simple text file named *srvlibname.cfg*, where *srvlibname* is the base name of the TRS executable file. For example, if you have the sample LU 6.2-based TRS, your default configuration file is called *TRSLU62.CFG*. You can use a text editor to change any service library property by editing and saving this file. This file is located in one of the following directories:

- For Microsoft Windows:

  `%SYBASE%\%SYBASE_ECON%\`*`srvrname`*`\cfg`

- For UNIX:

  `$SYBASE/$SYBASE_ECON/`*`srvrname`*`/cfg`

Running DirectConnect with the -N option as part of the initial configuration will create a sample TRS configuration file that you can modify for your site. For information about installing the sample service library, see the Mainframe Connect DirectConnect for z/OS Option *Installation Guide*.

When you edit the TRS configuration file:

- Enter values for configuration properties that apply to that TRS only. The system ignores properties that are not applicable to your installation. For example, the ConnInfoFile property applies *only* to LU 6.2 installations and not to TCP/IP installations.
- Ignore properties for which the default value is sufficient.
  See “Service library configuration properties” on page 18 for the default values of each configuration property.

The TRS library uses some configuration information from the DirectConnect server. For instructions about configuring DirectConnect server properties, see the ECDA and Mainframe Connect *Server Administration Guide* for DirectConnect.

Sample TRS configuration file

Following is an example of a TRS configuration file:

```
[Service Library]
{Transaction Router Service Property}
PEMDest=CICSQA
RPCInfoFile=d:\newpath\SYBASE\DC-12_0\srvrname\cfg\trslu62.rpc
LogInfoFile=d:\newpath\SYBASE\DC-12_0\srvrname\log\trslu62.grp
TDSTraceFile=d:\newpath\SYBASE\DC-12_0\srvrname\log\trslu62.tds
AccountFile=d:\newpath\SYBASE\DC-12_0\srvrname\log\trslu62.act
MaxConnections=100
TraceTRS=short
Security=no
DirectPrevent=yes
Accounting=yes
UseDBRPC=no
TruncateLV=no
UpperCase=no
ConnInfoFile=c:\newpath\SYBASE\DC-12_0\srvrname\cfg\trslu62.cid
ConQTimeout=120
DeactCon=no
[ServiceA]
EnableAtStartup=yes
```

TRS configuration file format

The following principles apply to TRS configuration properties:

- Service library properties apply to the service library as a whole. TRS configuration properties are service library properties, except the service-level properties Description, EnableAtStartup and ClientIdleTimeout. How a TRS service operates is affected by the values of its parent service library.
- Configuration properties are not case sensitive. In this guide, property names appear in mixed case for easier reading.

A TRS configuration file consists of the following lines. (For a sample file, see "Sample TRS configuration file" on page 12.)

- The name of the TRS service library is shown in brackets on the first line of the file. This character string must appear at the top of the file.
- The subsection name, Transaction Router Service Property, is shown in braces on the next line. This character string must appear under the service library line. There are no other subsections.
- Each configuration property and its value are shown on individual lines. Configuration properties can be listed in any order within their subsection. If a configuration property line is deleted or omitted from the file for any reason, the default value for that property is applied automatically. See "Service library configuration properties" on page 18 for the default values of each configuration property.
- The TRS service name is shown in brackets and must conform to the following rules:
  - Service names must be unique within the first 11 characters in length.
  - The initial character must be an alphabetic character (a–z, A–Z).
  - Subsequent characters can be alphabetic or numeric characters or the underscore (_) character.
  - To add a service named "ServiceA," the following line must exist in the TRS configuration file:

```
[ServiceA]
```

For a client to successfully connect to a service, the service name must correspond to a query type entry in the client *interfaces* file. For an explanation of query type entries and how to add them to the interfaces file, see the Mainframe Connect DirectConnect for z/OS Option *Installation Guide*. When a client connects to DirectConnect, it specifies a service name, as shown in the following isql example:

```
isql -Usa -P -SServiceA
go
```

where *ServiceA* is the service name (or server name to the client).

You can include comments in the TRS configuration file. Each comment must be on a separate line and begin with a semicolon or "#" symbol.

Modifying property values

Most configuration properties have default values. Some properties require that you supply values for your site. You can change the properties by using a text editor or by using DirectConnect Manager.

Using DirectConnect Manager

You can configure the TRS library properties and the TRS service properties by using the DirectConnect Manager. To configure the TRS library and service properties, refer to the DirectConnect Manager online Help topic, Managing Configuration | Modifying server configuration properties.

Note When you use DirectConnect Manager to change Accounting, LogTRS, and TraceTRS properties, changes take effect immediately. Changes to all other TRS library configuration properties take effect when you restart the server.

Using a text editor

To change the TRS service library and services configuration property values:

1 Open the TRS configuration file and change the service library properties as applicable.

2 Open the TRS service file and change the TRS service property values as applicable.

3 Save the file.

4 Stop the server, and then restart it to implement the changes.

Creating additional TRS configurations

This section describes how to create additional TRS libraries and services.

Creating additional TRS libraries

Because many of the server library specific properties affect the major functions of TRS, you may want to create multiple instances of a TRS Library to obtain functionally different configurations. For example, if you want one TRS LU62 Library service that enforces security and one that does not, create two instances of the TRS LU62 Library. This is necessary because the security configuration property operates at the server library level and affects all services in that library. To copy a TRS library, use the trscopy utility, described in the following subsection.

Description of the trscopy utility

The trscopy utility creates a copy of a DirectConnect TRS Library by using an existing TRS as a template to find all of the related source files.

Note This utility makes a copy of a TRS service library executable available for all DirectConnect servers defined under the installation area, but sets up a sample service only under the same DirectConnect server as provided on the command line.

The utility copies files with a base file name of the source TRS in the directory tree of the source DirectConnect server to files with a base file name of the target TRS in the directory tree of the target DirectConnect server.

For example, if you are using Windows, to create a new instance of the TRS LU62 Library (named *new_trslu62*), run the trscopy program with the appropriate arguments. Doing this produces two complete sets of the TRS LU62 files:

- The original *trslu62* executable and all its files

- An executable named *new_trslu62* and a copy of all of its files, with a base file name of *new_trslu62*, placed in the destination DirectConnect server subdirectory tree

The following table shows the TRS executable file names based upon the platform:

Table 2-1: File names for TRS libraries based on platform

Platform	File name and extension
Windows	*trslu62.dll and trstcp.dll*
HP	*trslu62.sl and trstcp.sl*
AIX	*trslu62.so and trstcp.so*
Solaris	*trslu62.so and trstcp.so*

After you run trscopy, you must edit the new TRS Library's configuration file and change the service name. Then, add this new service name to the SYBASE interfaces file on the client. For instructions regarding the interfaces file refer to the Mainframe Connect DirectConnect for z/OS Option *Installation Guide*.

Note The UNIX version of *trscopy* has an option that automatically generates a new TRS Service name in the target TRS Library configuration file and adds that service to the SYBASE interfaces file on the server.

Using the trscopy command

Following is the trscopy command for Microsoft Windows:

```
trscopy source_DirectConnect source_Service_Library
destination_DirectConnect destination_Service_Library
```

Following is the trscopy command for UNIX platforms:

```
trscopy.sh source_DirectConnect source_Service_Library
destination_DirectConnect destination_Service_Library
[-a] [-l] [-v]
```

Table 2-2 describes the parameters and options in the trscopy command.

Table 2-2: Description of trscopy parameters and options

Parameter	Description
source_DirectConnect	(Required) Name of the server that contains the source TRS files. It is located in the directory under the following name: • *%SYBASE%\%SYBASE_ECON%* for Windows • *$SYBASE/$SYBASE_ECON* for UNIX *%SYBASE%* or *$SYBASE* is the Sybase environment variable. It points to the Sybase product directory structure that contains DirectConnect for both the source and target TRS service libraries.
source_TRS_Library	(Required) The name of the source TRS library associated with this server. It must exist under the source DirectConnect server name.
destination_DirectConnect	(Required) Name of the target DirectConnect server, located in the directory under *%SYBASE%\%SYBASE_ECON%.*
destination_TRS_Library	(Required) Name of the target TRS library. Follow these guidelines: • The executable associated with the server library name must not exist under the target DirectConnect server. • The file name must not exist anywhere under the following *locales* directory structure, based on platform: - *%SYBASE%\locales*, for Windows - *$SYBASE/locales*, for UNIX
-a	(Optional and for UNIX only) Option that generates new service names for the new service library and adds these new services to the *interfaces* file.
-l	(Optional and for UNIX only) A “softlink” option. When possible, use softlinks instead of copying a file.
-v	(Optional and for UNIX only) Verbose option, which displays a description of each operation while it runs.

Creating additional TRS services

You can create additional services through DirectConnect Manager or through use of your text editor.

To create a new service using DirectConnect Manager, see Creating a new service in the DirectConnect Manager Online Help topic, Managing Access Services.

Using a text editor

Create and change existing services by following these steps:

1 Open the TRS configuration file from one of the following directories:

- For Windows platforms:
  `%SYBASE%\%SYBASE_ECON%\`***`srvrname`***`\`***`trs_service_lib`***`.cfg`
- For UNIX platforms:
  `$SYBASE/$SYBASE_ECON/`***`srvrname`***`/`***`trs_service_lib`***`.cfg`

2 Add the service name in brackets below the initial service names section.

3 By default, services are not enabled for client connection at start-up. If you want this service to be enabled at start-up, add the EnableAtStartup configuration property, set to yes, below the new service name.

4 Save the file.

5 Stop the server, and then restart it to implement the changes.

6 To be sure that client applications can connect to a new TRS service from a client machine, you must enter the service name in the SYBASE *interfaces* file on the client machine. If you choose to use the Service Name Redirection utility, make an assigned service name entry in the *Service Name Redirection* file.

- Start DirectConnect Manager.
- Double-click server name.
- Right-click the Services folder. Select create service.
- Select TRS-LU62 or TRS-TCP/IP from the type of services window and enter the name of your new TRS service.
- Click Finish. The new service name will be displayed.

For instructions about editing the *interfaces* file, see the Mainframe Connect DirectConnect for z/OS Option *Installation Guide*.

For information about service name redirection, see the ECDA and Mainframe Connect *Server Administration Guide* for DirectConnect.

Service library configuration properties

The following table lists all TRS service library configuration properties and identifies the location, in this chapter, for a more detailed description.

TRS is compatible with all mainframe access products that were accessed through Net-Gateway. The following table shows the name of the Net-Gateway start-up parameter that is equivalent to each TRS configuration property.

Table 2-3: TRS configuration properties

TRS configuration property	Equivalent Net-Gateway start-up parameter	TRS configuration property description	Location
AccountFile	(none)	Specifies the directory, path, and file name to which accounting records are written.	"AccountFile" on page 21
Accounting	-K flag	Turns accounting on and off.	"Accounting" on page 22
ConnInfoFile (LU 6.2 only)	-L flag	Specifies the directory, path, and file name that contains LU 6.2 connection information for this TRS.	"ConnInfoFile" on page 22
ConQTimeout (LU 6.2 only)	-Q flag	Specifies the LU 6.2 connection queue timeout period (wait period) in seconds.	"ConQTimeout (LU 6.2 only)" on page 23
DeactCon (LU 6.2 only)	-d flag	Indicates whether an LU 6.2 connection should be deactivated or left active if a line failure or other error occurs.	"DeactCon (LU 6.2 only)" on page 23
Description	(none)	An optional customer-supplied description of the service library.	"Description" on page 24
DirectPrevent	-D flag	Instructs TRS to accept requests from Adaptive Server clients only.	"DirectPrevent" on page 24
LogInfoFile	-G flag	Specifies the directory, path, and file name that contains client login and security group information.	"LogInfoFile" on page 24
LogTRS	(none)	Enables or disables logging to the server log file.	"LogTRS" on page 25
MaxConnections	-M flag	Specifies the maximum number of clients that can be logged into this TRS library concurrently.	"MaxConnections" on page 25
PEMDest	-P flag	Specifies the destination region handling the IBM Password Expiration Management (PEM) transaction program. Applies to LU 6.2 only.	"PEMDest" on page 26

TRS configuration property	Equivalent Net-Gateway start-up parameter	TRS configuration property description	Location
PEMDestType	-m flag	Specifies the type of destination region (*PEMDest*) managing the PEM server transaction. Applies to LU 6.2 only.	“PEMDestType” on page 26
ProcessExitEnabled	(none)	Enables the use of process user exits.	“ProcessExitEnabled” on page 27
ProcessExitFile	(none)	Identifies the path and name of the shared library that you have created.	“ProcessExitFile” on page 27
RegionInfoFile (TCP/IP only)	(none)	Specifies the directory path and file name for the file that contains TCP/IP connection information for this TRS.	“RegionInfoFile” on page 28
RPCInfoFile	-R flag	Specifies the directory, path, and file name of the file containing the remote procedure call (RPC) information for this TRS.	“RPCInfoFile” on page 29
Security	-O flag	Tells TRS whether to validate logins against its own login information in addition to the validation done by the mainframe.	“Security” on page 29
Send5701	-u flag	Indicates whether the message 5701 should be sent back to the client for use database statements.	“Send5701” on page 30
TDSTraceFile	(none)	Specifies the directory, path, and name of the file to which TDS information is written.	“TDSTraceFile” on page 30
TraceProcessUserExits	(none)	Traces entry/exit points of function call to each process user exit you have created.	“TraceProcessUserExits ” on page 31
TraceTRS	-T and -t flags	Specifies the level of TDS tracing that TRS is to record.	“TraceTRS” on page 31
TruncateLV	-V flag	Truncates any mainframe long varchar fields to 255 bytes before sending them to the client.	“TruncateLV” on page 32

TRS configuration property	Equivalent Net-Gateway start-up parameter	TRS configuration property description	Location
UpgradePassword	-s flag	Indicates whether pre-TRS passwords (8 bytes maximum) should be upgraded to the new format (30 bytes maximum). **Note** If you are upgrading from Net-Gateway version 2.0, set this configuration property to yes.	"UpgradePassword" on page 32
UpperCase	-C flag	Automatically changes lowercase user IDs and passwords to uppercase for users logged into the LAN before forwarding these values to the mainframe.	"UpperCase" on page 33
UseDBRPC	-E flag	Allows a client to send RPC requests larger than 64K to the mainframe.	"UseDBRPC" on page 33

The remainder of this chapter describes each TRS configuration property. Configuration properties are presented in alphabetical order.

AccountFile

Specifies the directory, path, and name of the file to where TRS writes accounting records. See "Controlling accounting" for more information about the type of accounting information that TRS captures.

Syntax

AccountFile=*newpath*

where *newpath* is the directory, path, and name of the file to which TRS writes accounting records.

Default

- For an LU 6.2-based TRS on Windows, *newpath* is:

  `%SYBASE%\%SYBASE_ECON%\`*`srvrname`*`\log\`*`srvlibname`*`.act`

- For a TCP/IP-based TRS on Windows, *newpath* is:

  `%SYBASE%\%SYBASE_ECON%\`*`srvrname`*`\log\`*`srvlibname`*`.act`

- For a TRS on UNIX platforms, *newpath* is:

  `$SYBASE/$SYBASE_ECON/`*`srvrname`*`/log/ngact.`*`srvlibname`*

Values

%SYBASE% (or $SYBASE) is the name of the default Sybase environment variable, which can be reset before server start-up.

srvrname is the name of the DirectConnect server defined during server installation.

srvlibname is the name of the TRS library.

Accounting

Turns accounting on or off. TRS writes accounting records to the file specified in the AccountFile configuration property.

TRS users with administrative privileges can also turn accounting on and off using the sgw_startact and sgw_stopact procedures while TRS is running.

Note Using DirectConnect Manager, you can turn accounting on and off dynamically while TRS is running or at server start-up.

Syntax

Accounting=[no | yes]

Default

no

Values

no turns accounting off.

yes turns accounting on.

ConnInfoFile

Specifies the directory, path, and name of the file that contains LU 6.2 connection information for this TRS. This file is created the first time you define an LU 6.2 connection. A default is defined for TCP/IP on non-UNIX platforms. (To define connections, use the sgw_addcon procedure.)

Syntax

ConnInfoFile=*newpath*

where *newpath* is the directory path and name of the TRS LU 6.2 connection information file.

Default

- For an LU 6.2-based TRS on Windows, *newpath* is:

```
%SYBASE%\%SYBASE_ECON%\srvrname\cfg\srvlibname.cid
```

- For a TCP/IP-based TRS on Windows, *newpath* is:

```
%SYBASE%\%SYBASE_ECON%\srvrname\log\srvlibname.ngcid
```

- For a TRS on UNIX platforms, *newpath* is:

```
$SYBASE/$SYBASE_ECON/srvrname/cfg/ngcid.srvlibname
```

Values

%SYBASE% (or $SYBASE) is the name of the default Sybase environment variable, which can be reset before server start-up.

srvrname is the name of the DirectConnect server defined during server installation.

srvlibname is the name of the TRS library.

ConQTimeout (LU 6.2 only)

Specifies the number of seconds client requests are allowed to wait in a queue for an available LU 6.2 connection to the destination system. A client request times-out (expires) if a connection does not become available in the specified length of time.

Syntax

ConQTimeout=*timeout*

where *timeout* is the maximum number of seconds that each client request remains in a queue to wait for an available LU 6.2 connection to the destination system before the client request expires.

Range

0 to 50000

Default

60

Comments

Specify 0 (zero) if you do not want client requests to queue up. When a timeout occurs, TRS returns a message to the client.

DeactCon (LU 6.2 only)

Indicates whether TRS deactivates or leaves active an LU 6.2 connection if a line failure or other error occurs on that connection.

If you specify deactivation, TRS marks the failing connections as inactive when an LU 6.2 error occurs. You can restart connections while TRS is running by using the sgw_actcon procedure.

Syntax DeactCon=[no | yes]

Default yes

Values yes deactivates a connection when an LU 6.2 error occurs on the connection.

no leaves a connection active even after an LU 6.2 error occurs on the connection.

Description

An optional customer-supplied description of the service library.

Syntax Description=*description*

description where is the description of the service library up to 255 alphanumeric characters.

Default A blank string, for example:

```
Description=
```

Comments Specifying the default sets the value to a blank string.

DirectPrevent

Instructs TRS to reject all direct requests from a client, forcing clients to route all requests through Adaptive Server. Setting this property to no allows clients to send RPCs and language requests directly to TRS.

Syntax DirectPrevent=[no | yes]

Default no

Values yes rejects all direct requests from the client and forces the client to route all requests through Adaptive Server.

no allows clients to send RPCs and language requests directly to TRS.

LogInfoFile

Specifies the directory, path, and name of the file that contains client login and security group information. TRS creates this file the first time you define a client login, connectivity group, or transaction group. (To define client logins, use the sgw_addlog procedure.)

Syntax

LogInfoFile=*newpath*

where *newpath* is the directory path and file name of the file containing the client login and security group information for this TRS library.

Default

- For an LU 6.2-based TRS on Windows, *newpath* is:

```
%SYBASE%\%SYBASE_ECON%\srvrname\cfg\srvlibname.grp
```

- For a TCP/IP-based TRS on Windows, *newpath* is:

```
%SYBASE%\%SYBASE_ECON%\srvrname\cfg\srvlibname.nggrp
```

- For UNIX platforms, *newpath* is:

```
$SYBASE/$SYBASE_ECON/srvrname/cfg/nggrp.srvlibname
```

Values

%SYBASE% (or $SYBASE) is the name of the default Sybase environment variable, which can be reset before server start-up.

srvrname is the name of the DirectConnect server defined during server installation.

srvlibname is the name of the TRS library.

LogTRS

Enables or disables logging to the server log file, located at:

- For UNIX platforms:

```
$SYBASE\$SYBASE_ECON\srvrname\log\srvlibname.log
```

- For Windows platforms:

```
%SYBASE%\%SYBASE_ECON%\srvrname\log\srvlibname.log
```

Syntax

LogTRS=[no | yes]

Default

no

Values

yes turns logging on.

no turns logging off.

MaxConnections

Specifies the maximum number of clients that can be logged into this TRS library concurrently.

Syntax	MaxConnections=*integer* where *integer* is a number of clients.
Range	1–*n*, where *n* is the maximum number of clients allowed by the server. (For more information, see "MaxConnections" in the DirectConnect *Server Administration Guide*.)
Default	25
Comments	TRS does not verify the validity of this number.

PEMDest

Specifies the destination system for the IBM Password Expiration Management (PEM). PEM is a password management program that IBM provides.

Sybase provides support for PEM as a feature of TRS for LU 6.2. This feature is not available for TRS connections to the mainframe using TCP/IP.

For more information about implementing PEM, see Chapter 6, "Using Password Expiration Management (PEM) with TRS."

Syntax	PEMDest=*destsys* where *destsys* is system-dependent value identifying the LU 6.2 connection from which the IBM PEM sign-on transaction can be accessed. Use the value supplied for the *region* parameter when this LU 6.2 connection was defined with the sgw_addcon procedure.
Default	No default. No value is required unless clients are using TRS PEM support.
Comments	Leaving the default blank string in place disables PEM RPCs.

PEMDestType

Specifies the type of destination region managing the PEM server transaction as defined by the PEMDest configuration property.

Syntax	PEMDestType=[CICS | MVS]
Default	CICS
Values	CICS indicates that the PEMDest value connects to a CICS region. MVS indicates that the PEMDest value connects to native MVS.

ProcessExitEnabled

Enables the use of process *user exits*. Only the exits that you have defined and added to your *user exit* library will be invoked.

Syntax: ProcessExitEnabled=[yes | no]

Default: *no*

Values: *yes* enables the use of process user exits.

no does not allow process user exits to be invoked.

ProcessExitFile

Provides the full path and name of the *user exit* shared library that you have created.

Syntax: ProcessExitFile=[*path* / *filename* | null]

Default: null

Values: *path* / *filename* identifies the full path and file name of the *user exit* shared library that you created.

null indicates that no process *user exit* shared library has been created.

ProtocolTraceFile

Specifies the directory path and file name in which DirectConnect uses the back-end transport protocol traces and errors for conversations between the TRS library and the mainframe.

Syntax: TDSTraceFile=*newpath*

where *newpath* is the directory path and file name to which traces are written for TRS.

Default:

- On Windows, back-end TCP/IP tracing goes into the *newpath*:

  `%SYBASE/%SYBASE_ECON/`*`srvrname`*`/log/trstcp.ngtcp`

- On UNIX, back-end TCP/IP tracing goes into the *newpath*:

  `$SYBASE/$SYBASE_ECON/`*`srvrname`*`/log/ngtcp.trstcp`

- On Windows, back-end LU 6.2 tracing goes into the *newpath*:

```
%SYBASE/%SYBASE_ECON/srvrname/log/trslu62.nglu62
```

- On UNIX, back-end LU6.2 tracing goes into the *newpath*:

```
$SYBASE/$SYBASE_ECON/srvrname/log/nglu62.trslu62
```

Values

%SYBASE% (or $SYBASE) is the name of the default Sybase environment variable, which can be reset before server start-up.

srvrname is the name of the DirectConnect server defined during server installation.

RegionInfoFile

Specifies the directory, path, and name of the file containing the TCP/IP connection information that it creates the first time you define a TCP/IP region. A default has been defined for LU 6.2-based TRS on Windows. (To define regions, use the sgw_addregion procedure.)

Syntax

RegionInfoFile=*newpath*

where *newpath* is the directory path and file name of the file containing the TRS TCP/IP connection information.

Default

- For an LU 6.2-based TRS on Windows, *newpath* is:

```
%SYBASE%\%SYBASE_ECON%\srvrname\cfg\srvlibname.reg
```

- For a TCP/IP-based TRS on Windows, *newpath* is:

```
%SYBASE%\%SYBASE_ECON%\srvrname\cfg\srvlibname.ngreg
```

- For UNIX platforms, *newpath* is:

```
$SYBASE/$SYBASE_ECON/srvrname/cfg/ngreg.srvlibname
```

Values

%SYBASE% (or $SYBASE) is the name of the default Sybase environment variable, which can be reset before server start-up.

srvrname is the name of the DirectConnect server defined during server installation.

srvlibname is the name of the TRS library.

RPCInfoFile

Specifies the directory path and file name of the file containing the RPC information that TRS creates the first time you define an RPC. (To define RPCs, use the sgw_addrpc procedure.)

Syntax

RPCInfoFile=*newpath*

where *newpath* is the directory path and file name of the file containing the RPC information for this TRS.

Default

- For an LU 6.2-based TRS on non-UNIX platforms, *newpath* is:

  `%SYBASE%\%SYBASE_ECON%\`*`srvrname`*`\cfg\`*`srvlibname`*`.rpc`

- For a TCP/IP-based TRS on non-UNIX platforms, *newpath* is:

  `%SYBASE%\%SYBASE_ECON%\`*`srvrname`*`\cfg\`*`srvlibname`*`.ngrpc`

- For UNIX platforms, *newpath* is:

  `$SYBASE/$SYBASE_ECON/`*`srvrname`*`/cfg/ngrpc.`*`srvlibname`*

Values

%SYBASE% (or $SYBASE) is the name of the default Sybase environment variable, which can be reset before server start-up.

srvrname is the name of the DirectConnect server defined during server installation.

srvlibname is the name of the TRS library.

Security

Tells TRS whether to validate logins against its own login information in addition to the validation done by the mainframe. If you set the Security configuration property to no, TRS forwards transparently the user ID and password to the mainframe (based on the RPC definition security parameter values defined in the sgw_addrpc procedure). You do not need to use the sgw_addlogsecurity procedure to add new users to TRS when you set to no.

Syntax

Security=[no | yes]

Default

yes

Values

yes turns security on.

no turns security off.

Send5701

Indicates whether message 5701 should be sent to the client for use database statements.

Syntax

Send5701=[no | yes]

Default

no

Values

yes sends message 5701 to the client for use database statements.

no does not send message 5701 to the client for use database statements.

TDSTraceFile

Specifies the directory path and file name in which the Tabular Data Stream (TDS) records traces and errors for conversations between the TRS library and the mainframe. TDS is the Sybase application-level protocol that defines the form and content of relational database requests and replies.

Syntax

TDSTraceFile=*newpath*

where *newpath* is the directory path and file name to which TDS traces are written for TRS.

Default

- For an LU 6.2-based TRS on Windows, *newpath* is:

```
%SYBASE%\%SYBASE_ECON%\srvrname\log\srvlibname.tds
```

- For a TCP/IP-based TRS on Windows *newpath* is:

```
%SYBASE%\%SYBASE_ECON%\srvrname\log\srvlibname.ngtds
```

- For UNIX platforms, *newpath* is:

```
$SYBASE/$SYBASE_ECON/srvrname/log/ngtds.srvlibname
```

Values

%SYBASE% (or $SYBASE) is the name of the default Sybase environment variable, which can be reset before server start-up.

srvrname is the name of the DirectConnect server defined during server installation.

srvlibname is the name of the TRS library.

TraceProcessUserExits

Traces the entry/exit points of the function call to each of the process *user exits* that you have created. Normal setting is *no*, however, a setting of *yes* will assist you in determining execution through your processing user exits.

Syntax: TraceProcessUserExits=[yes | no]

Default: no

Values: yes tracing is turned on for the process user exits you have created.

no tracing is not turned on for the process user exits that you have created.

TraceProtocol

Provides protocol level tracing for DirectConnect using LU 6.2 or TCP/IP, depending on which service library is being traced.

Syntax: TraceProtocol=[none | short | long]

Default: none

Values: short or long protocol level tracing is turned on for LU 6.2 or TCP/IP.

none protocol level tracing is not turned on for LU 6.2 or TCP/IP.

TraceTRS

Turns TDS tracing on or off. Using the long or short option turns on tracing. You can also turn tracing on and off when TRS is running using the sgw_starttrace and sgw_stoptrace procedures, with the TDS parameters, or by using DirectConnect Manager. Formatted TDS traces are written to a file defined by the TDSTraceFile configuration property. See “Starting tracing” on page 131.

Note Using DirectConnect Manager, you can turn tracing on and off dynamically while TRS is running or at server start-up.

Syntax: TraceTRS=[none | short | long]

Default: none

Values: long traces both TDS header information and TDS data packets.

short traces TDS header information only.

none turns tracing off.

TruncateLV

Truncates any mainframe long varchar fields to 255 bytes before sending them to the client. Setting this property to no causes long varchar data to be sent as text and image datatypes for 4.x TDS clients, or as the appropriate long varchar datatype for 5.0 TDS clients. (Sybase System 10 and later versions use TDS 5.0.)

Syntax

TruncateLV=[no | yes]

Default

no

Values

no turns long varchar truncation off, causing long varchar data to be sent as text and image datatypes for 4.x TDS clients, or as the appropriate long varchar datatype for 5.0 TDS clients.

yes turns long varchar truncation on, truncating any mainframe long varchar fields to 255 bytes before sending them to the client.

UpgradePassword

Indicates whether pre-Net-Gateway version 3.0.1 passwords (8 bytes maximum) should be upgraded to the new format (30 bytes maximum). If this property is set to yes, all existing old passwords are lost and are initialized to null.

Syntax

UpgradePassword=[no | yes]

Default

yes

Values

no prevents the upgrading of pre-TRS passwords.

yes upgrades all pre-TRS passwords to the new format, and deletes all existing passwords and initializes them to null.

Comments

- If you are upgrading from Net-Gateway version 2.0, set this configuration property to yes.
- Before setting UpgradePassword to yes and triggering the upgrade, copy your log information files to a *save* directory, as follows:

```
cd %SYBASE%
```

```
mkdir save_nggrp
copy log_info_files save_nggrp
```

For the name of the log information file for your system configuration, see the LogInfoFile configuration property.

UpperCase

Automatically changes lowercase user IDs and passwords to uppercase for clients before forwarding these values to the mainframe.

Syntax: UpperCase=[no | yes]

Default: yes

Values: no prevents the automatic changing of lowercase user IDs and passwords to uppercase before forwarding these values to the mainframe. TRS forwards the user ID and password as is.

yes enables the automatic changing of lowercase user IDs and passwords to uppercase.

UseDBRPC

Allows a client to send RPC requests larger than 64KB to the mainframe.

When an RPC is executed, a client sends a TDS_RPC TDS token stream to the server. The server reads the stream, processes the request and returns any results back to the client. The TDS_RPC stream in TDS version 5.0 had a 2-byte integer indicating the total length of the TDS_RPC stream, which limits each TDS_RPC stream to 64KB in length.

DirectConnect provides a new token, named TDS_DBRPC. This token removes the RPC length limit.

Note If you want to send RPC requests larger than 64K to the mainframe, and you are running Open ServerConnect software that predates Open ServerConnect 3.1, check your latest release bulletins to verify that the UseDBRPC property is compatible with your version. If your Open ServerConnect version is incompatible with the UseDBRPC property, your RPC requests will fail when this feature is on.

Syntax: UseDBRPC=[no | yes]

Default	yes
Values	no turns DBRPC off, preventing a client from sending RPC requests larger than 64K to the mainframe. yes turns DBRPC on, allowing a client to send RPC requests larger than 64K to the mainframe.
Comments	None

Service configuration properties

This section describes the TRS service configuration properties. The following table identifies and describes the TRS service configuration properties:

Table 2-4: TRS Service configuration properties

TRS service configuration property	Equivalent Net-Gateway start-up parameter	TRS service configuration property description	Location
ClientIdleTimeout	(none)	Specifies the number of minutes a connected TRS client can remain idle before being disconnected.	"ClientIdleTimeout" on page 34
Description	(none)	An optional customer supplied definition of the TRS service.	"Description" on page 35
EnableAtStartup	(none)	Specifies whether the TRS service starts and accepts client connections when the DirectConnect server starts.	"EnableAtStartup" on page 35
XNLChar	(none)	Specifies the maximum size of both char and binary results.	"XNLChar" on page 36
XNLVarChar	(none)	Specifies the maximum size of both varchar and varbinary results.	"XNLVarChar" on page 36

ClientIdleTimeout

Specifies how many minutes a client connection can remain inactive before an access service terminates the connection.

Syntax	ClientIdleTimeout=*integer*
Range	0–1024
Default	0
Values	*integer* is how many minutes a client connection can remain inactive before an access service terminates the connection. 0 indicates that an access service never terminates an idle connection.

Comments	• A connection is idle when:
	  • A client is connected, but did not issue a command.
	  • A command processed, but the client did not issue another command.
	  • A large result set returned from SQL request processing, and the result screen paused for the specified timeout period.
	• The TRS access service checks client activity once per minute. Therefore, a client can remain inactive for up to one minute beyond the ClientIdleTimeout value before the TRS access service terminates the connection.

Description

An optional customer-supplied description of the TRS service.

Syntax	Description=*where* *description* is the description of the TRS service up to 255 alphanumeric characters.
Default	No default.
Comments	Specifying no value sets the value to a blank string.

EnableAtStartup

Specifies whether this TRS service starts and accepts client connections when the DirectConnect server starts.

Syntax	EnableAtStartup=[no | yes]
Default	yes
Values	no means that the TRS service does not start when the server starts.

yes means that the TRS service starts when the server starts.

Comments

If you are not using DirectConnect Manager to manage your access services, set this property to yes.

XNLChar

Specifies the maximum size of both char and binary results. If the maximum size is exceeded, the datatype is promoted to text and image, respectively.

Syntax

XNLChar=*integer*

Default

256

Values

integer is a valid number between 256 - 2147483647 (two gigabytes).

Comments

Sybase recommends that this value match the maximum size of the char and binary datatypes of the back end database. It is common for this limit to be the same for the char and binary datatypes.

XNLVarChar

Specifies the maximum size of both varchar and varbinary results. If the maximum size is exceeded, the datatype is promoted to text and image, respectively.

Syntax

XNLVarChar=*integer*

Default

256

Values

integer is a valid number between 256 - 2147483647.

Comments

Sybase recommends that the value match the maximum size of the varchar and varbinary datatypes of the back end database. It is common for this limit to be the same for the varchar and varbinary datatypes.

CHAPTER 3

Configuring a TRS

This chapter describes DirectConnect Transaction Router Service (TRS) configuration tasks and the command line administration procedures you use to perform those tasks.

This chapter contains the following topics:

Using TRS administration procedures

TRS administration procedures begin with sgw_, which stands for server gateway.

The TRS administration procedures are isql execute commands. Start isql or your preferred dynamic SQL utility as usual, and then enter the commands at the prompt.

Command conventions

Observe the following conventions when you use TRS administration procedures:

- Run each exec command individually; do not batch them.

- Enter go after each command, or execute the command according to the conventions of your SQL utility. (Generally, go is not shown in the syntax illustrations in this guide; it is shown in the examples.)
- Enclose command parameters that contain numerical values in quotation marks.
- Enter all command parameters in the order shown. Separate the parameters with commas. (Spaces are optional.)

  If you omit any parameters, include the commas as placeholders or use the keyword NULL (not case sensitive). For example, if you want the TRS user WAYNE to have a password of BLEUCHEZ, you enter the following:

  ```
  exec sgw_chpwd  WAYNE, , BLEUCHEZ
  go
  ```

  or

  ```
  exec sgw_chpwd WAYNE, NULL, BLEUCHEZ
  go
  ```

  The first parameter after sgw_chpwd is the login, in this case, WAYNE. The second comma (or null) holds the place of the TRS password, which you are not changing. The parameter BLEUCHEZ represents the new password that is passed to the mainframe.
- When entering TRS administration procedures, you need to enter only as many characters as required to make each parameter distinct from any other (you must enter at least three characters). For example, to query the status of the clients on TRS, the command is as follows:

  ```
  execute sgw_status clients
  ```

  Or, you can enter the following:

  ```
  exec sgw_status cli
  ```

Viewing command results

The results of the administration procedures display on the screen where you entered the command. If the results take up more lines than one screen can display, the information may scroll by quickly (depending on your SQL utility). In this case, you can use your operating system utilities to direct the results of the procedure to a file.

Quick reference to TRS administration procedures

This section provides a quick reference to the administration procedures available for TRS. Sorted by type of procedure, the tables list the object to be operated on, the procedure to use, and a location you can access for detailed information.

In these procedure tables, the parameter values you should replace with the appropriate values for your site are shown in *italics*. Parameters shown in uppercase should be entered in UPPERCASE.

Help procedure

To display an online listing of the command syntax for TRS administration procedures, use the exec command, as shown in the following isql example:

```
exec sgw_help
go
```

The results show a list of the commands, with a short description and syntax for each, identifying all optional entries.

Procedure tables

You may find it useful to photocopy the following tables and post them near your workstation for easy reference. The tables provided on the following pages are listed here:

- For add/drop procedures for client, connection, login, region, RPC, and transaction group, refer to Table 3-1 on page 40.
- For change procedures for login (password) and transaction group, refer to Table 3-2 on page 41.
- For display and status procedures for accounting, client, connection, login, region, RPC, parameter, trace and transaction group, refer to Table 3-3 on page 41.
- For start and stop procedures for accounting, connection, TRS, region, RPC, and trace, refer to Table 3-4 on page 42.
- For Password Expiration Management (PEM) procedures for login (host password) and group login (host password) refer to Table 3-5.

Add/drop procedures

For add/drop procedures for client, connection, login, region, RPC, see the following table.

Table 3-1: Add/drop procedures

Element	Procedure	Location
Client	sgw_disclient "*client_number*"	"Disconnecting a client" on page 129
Connection (LU 6.2 only)	sgw_addcon *con_name*, *region*, *mode*, "*max_sessions*"	"Adding a connection configuration" on page 46
	sgw_dropcon *con_name*	"Dropping a connection configuration" on page 47
	sgw_dropcon *con_name*, *region*	"Dropping individual regions from a connection configuration" on page 48
	sgw_addcongrp *group_name*	"Adding a connection group" on page 106
	sgw_dropcongrp *group_name*	"Dropping a connection group" on page 108
	sgw_addcontogrp *group_name*, *con_name*	"Adding connections to a connection group" on page 107
	sgw_dropconfromgrp *group_name*, *con_name*	"Dropping connections from a connection group" on page 107
Login	sgw_addlog *login*, *pwd*, *HOST_LOGIN*, *HOST_PWD*, *tran_group*, *con_group*, *gwctrl* **Note** *con_group* is for LU 6.2 only. For TCP/IP, include comma or null as a placeholder.	"Adding a login" on page 101
	sgw_droplog *login*	"Deleting a user definition" on page 103
Region (TCP/IP only)	sgw_addregion *region*, *HOSTNAME*, *"port_number"*	"Defining regions to TRS" on page 48
	sgw_addregion *region*, *HOSTNAME*, *"port_number"*, *regiontype* (CICS, IMS, MVS)	"Defining regions to TRS" on page 48
	sgw_dropregion *region*	"Dropping a region" on page 49

Element	Procedure	Location
RPC	sgw_addrpc *rpc_name*, *TRAN_ID*, *region*, *security* (none|userid|both)	"Adding an RPC" on page 50
	sgw_droprpc *rpc_name*	"Dropping an RPC" on page 53
	sgw_addrpctogrp *tran_group*, *rpc_name*, *rpcpwdlevel* (none|user|group)	"Adding RPCs to a transaction group" on page 112
	sgw_droprpcfromgrp *tran_group*, *rpc_name*	"Deleting RPC names from a transaction group" on page 113
Transaction group	sgw_addtrngrp *tran_group*, *GROUP_LOGIN*, *GROUP_PWD*, *langrpc*, *langpwdlevel* (none|user|group)	"Adding a transaction group" on page 111
	sgw_droptrngrp *tran_group*	"Deleting a transaction group" on page 115

Change procedures

For change procedures for login (password) and transaction group, see the following table.

Table 3-2: Change procedures

Element	Procedure	Location
Login (password)	sgw_chpwd *login*, *pwd*, *HOST_PWD*	"Changing passwords" on page 103
Transaction group	sgw_modtrngrp *tran_group*, *GROUP_LOGIN*, *GROUP_PWD*, *langrpc*, *langpwdlevel* (none|user|group)	"Modifying a transaction group" on page 114

Display and status procedures

For display and status procedures for accounting, client, connection, login, region, RPC, parameter, trace and transaction group, see the following table.

Table 3-3: Display/status procedures

Element	Procedure	Location
Accounting	sgw_dspact	"Reading the accounting log" on page 133
Client	sgw_status clients	"Monitoring clients" on page 136
	sgw_status summary	"Summary of clients in each listed state" on page 142

Element	Procedure	Location
Connection (LU 6.2 only)	sgw_status connections	"Monitoring connections (LU 6.2 only)" on page 137
	sgw_dspcongrp	"Displaying one connection group" on page 106
	sgw_dspcongrp *con_group*	"Displaying one connection group" on page 106
Login	sgw_dsplog	"Displaying current logins" on page 101
Region (TCP/IP only)	sgw_status region	"Monitoring regions (TCP/IP only)" on page 138
RPC	sgw_status rpc	"Monitoring RPCs" on page 139
Parameter	sgw_status parameters	"Displaying TRS configuration properties" on page 140
Trace	sgw_status trace	"Requesting trace information" on page 141
Transaction group	sgw_dsptrngrp	"Displaying all transaction groups" on page 110
	sgw_dsptrngrp *tran_group*	"Assigning transaction groups" on page 108
	sgw_dsptrngrp *tran_group*, rpc	"Assigning transaction groups" on page 108

Start and stop procedures

For start and stop procedures for accounting, connection, TRS, region, RPC, and trace, see the following table.

Table 3-4: Start/stop procedures

Element	Procedure	Location
Accounting	sgw_startact	"Activating and deactivating accounting" on page 133
	sgw_stopact	"Activating and deactivating accounting" on page 133
Connection (LU 6.2 only)	sgw_actcon all	"Restarting all connections" on page 126
	sgw_actcon "*con_number*"	"Activating a single connection" on page 126
	sgw_deactcon "*con_number*"	"Deactivating a connection" on page 127
	sgw_deactcon "*con_number*", force	"Deactivating a connection" on page 127

Element	Procedure	Location
TRS	sgw_shutdown	"Stopping TRS" on page 133
	sgw_shutdown now	"Stopping TRS" on page 133
Region (TCP/IP only)	sgw_actregion *region*	"Activating a single region" on page 128
	sgw_actregion all	"Activating regions" on page 128
	sgw_deactregion *region*	"Deactivating a region" on page 128
RPC	sgw_actrpc *rpc_name*	"Activating an RPC" on page 129
	sgw_deactrpc *rpc_name*	"Deactivating an RPC" on page 130
Trace	sgw_starttrace *PROT*	"Starting tracing" on page 131
	sgw_starttrace *TDS*	
	sgw_stoptrace *PROT*	"Stopping tracing" on page 132
	sgw_stoptrace *TDS*	

Password Expiration Manager (PEM) procedures

For Password Expiration Management (PEM) procedures for login (host password) and group login (host password), see the following table.

Table 3-5: PEM procedures

Element	Procedure	Location
Login (Host password)	sqw_peminfopwd *host_login*, *host_password*	"Obtaining information about passwords" on page 120
Login (Host password)	sgw_pemchpwd *new_password*, *new_password*	"Changing an individual password" on page 121
Group login (Host password)	sgw_peminfogrppwd *tran_grp*	"Group password" on page 120
Group login (Host password)	sgw_pemchgrppwd *tran_grp*, *new_pwd*, *new_pwd*	"Changing a group's password" on page 122

Configuration quick-start

Note This section assumes that you are not enforcing security at TRS.

The following are brief, step-by-step instructions for configuring TRS. These steps help you run the sample programs described in Appendix B, “Testing a TRS Installation with Sample Programs” after you first install TRS.

Refer to the complete description of each procedure for details.

1 Set the TRS Security property to no.

See “Security” on page 29.

2 Start TRS.

DirectConnect brings up TRS at start-up as long as the TRS exists in one of the following directories:

- For Windows:
  %SYBASE%\%SYBASE_ECON%\<srvrname>\svclib
- For UNIX:
  $SYBASE/$SYBASE_ECON/<srvrname>/svclib/

3 Start an isql session, connecting to TRS.

4 Do one of the following:

- *LU 6.2 only:* Use sgw_addcon to define the connections your TRS uses.

  See “Adding a connection configuration” on page 46.

  ```
  exec sgw_addcon con_name, region, mode,
     "max_sessions"
  ```

- *TCP/IP only:* Use sgw_addregion to specify the regions your TRS uses.

  See “Defining regions to TRS” on page 48.

  ```
  exec sgw_addregion region, hostname,
    "port_number", regiontype
  ```

5 Use the sgw_addrpc procedure to add remote procedure calls (RPCs).

See “Defining RPCs to TRS” on page 50.

```
exec sgw_addrpc rpc_name, tran_id, region, security
```

The TRS client is now able to log in to TRS with a valid host user ID and password and execute the added RPCs.

Note Be sure to set up the default SQL language transaction as AMD2, SYRT, or SYIH. For more information, see "Defining a default SQL language handler" on page 53.

Configuring service communications

Use the instructions in this section if you are installing TRS, a new Open ServerConnect transaction, or if you need to configure TRS to use MainframeConnect for DB2 UDB.

There are some differences in the steps required depending on whether you are using LU 6.2 connections or TCP/IP:

- For LU 6.2, configure TRS by defining mainframe *connections* and client RPCs to TRS.
- For TCP/IP, configure TRS by defining mainframe *regions* and client RPCs to TRS.

Configuring connections for LU 6.2

This section explains how to define new LU 6.2 connection configurations to TRS and how to remove existing connection configurations.

Every connection between TRS and a transaction processing region must be defined to TRS. When you execute an RPC, TRS chooses a connection with a *region* value that matches the definition in the RPC to execute the transaction.

Consider the following:

- If you are not using parallel sessions, do not use the same LU 6.2 pair or more than one session on it for more than one TRS, or for any other LU 6.2 application. Dedicate a separate set of connections for each TRS.

- If you use parallel sessions, you can use an LU 6.2 pair for TRS. However, be sure that you configure a sufficient number of sessions for the total number of Open ServerConnect users and Open ClientConnect users. Also, be sure that the workstation is configured as the "contention winner." (Check with your mainframe system programmer.)

Note When possible, Sybase recommends limiting use of an LU 6.2 pair to only one TRS other LU 6.2 application. This configuration simplifies the analysis if there are any LU 6.2 problems.

Adding a connection configuration

Add a connection configuration to TRS for each LU 6.2 pair defined to your SNA support. To define a new connection configuration to TRS, use this procedure:

```
exec sgw_addcon con_name, region, mode,
 "max_sessions"
```

where

- *con_name* is the name assigned to this local connection. It is also the name by which the *Local LU* is known to your local SNA support. Because there is a secondary name that qualifies this connection, this parameter corresponds to different values for different platforms. See the Mainframe Connect DirectConnect for z/OS Option *Installation Guide* for specific information about connection name parameter values.

  Length: maximum of eight characters.

- *region* specifies the *remote LU* name of the target mainframe region in this parameter. This is the Virtual Telecommunications Access Method (VTAM) APPLID name to which your *Local LU* is bound. An entry in this field is required.

  All RPCs that use this connection configuration to access the mainframe must have this same value specified as the *region* in their RPC definitions. (See also "Adding an RPC" on page 50.)

  Length: maximum of eight characters.

  For different platforms, this parameter corresponds to different values. See the Mainframe Connect DirectConnect for z/OS Option *Installation Guide* for specific information about the mode name parameter value.

- *mode* is a value that must match the name of the mode defined to the mainframe and to the local SNA support for this *LU* pair.

  Length: maximum of eight characters.

- *"max_sessions"* is the maximum number of sessions that this TRS can have simultaneously allocated from the LU pair. Enter one of the following:

  - For parallel sessions, enter a value between 2 and 255.
  - For a single session, this value can only be 1.

  Be sure to enclose numeric parameter values in quotation marks.

  Check with your SNA System Administrator to make sure this number is not larger than the maximum number of sessions (for this mode) defined to the SNA subsystem.

Note If you do not provide a value for "max_sessions," TRS creates a default value = 1 for the connection, which will not support parallel sessions.

Example

This example adds an LU 6.2 connection configuration named SYBLU01, bound to region (remote LU) TESTREG, with mode name M6S1024V, and not using parallel sessions:

```
exec sgw_addcon SYBLU01, TESTREG, M6S1024V, "1"
go
```

This example adds an LU 6.2 connection configuration named SYBLU01, bound to region (remote LU) PRODEMO, with mode name M6P1024V and eight parallel sessions:

```
exec sgw_addcon SYBLU01, PRODEMO, M6S1024V, "8"
go
```

Dropping a connection configuration

To delete all LU 6.2 connection configurations of a particular *con_name* from TRS, use this procedure:

```
exec sgw_dropcon con_name
```

where *con_name* with the name of the connection configuration you want to drop. The connection configuration name appears in the connections status display.

Example

To drop the connection configuration named SYBLU01, use the following procedure:

```
exec sgw_dropcon SYBLU01
go
```

Dropping individual regions from a connection configuration

To delete a connection configuration for a particular *LU* pair from a connection configuration, use this procedure:

```
exec sgw_dropcon con_name, region
```

Provide a value for the *con_name* parameter and the *region* (optional) parameter to drop a specific connection.

Warning! Providing only the *con_name* parameter value deletes all connection configurations for that *con_name*.

Example

The following isql example deletes both sets of connection configurations added in the example:

```
exec sgw_dropcon SYBLU01
go
```

The next example deletes only the eight connections defined to PRODEMO:

```
exec sgw_dropcon SYBLU01, PRODEMO
go
```

Configuring regions with TCP/IP

This section describes how to define and drop regions to TRS using TCP/IP.

Defining regions to TRS

For TRS to recognize the specified *region* parameter of the sgw_addrpc procedure, you must define the region using the following sgw_addregion procedure:

```
exec sgw_addregion region, hostname, portnumber,
```

```
regiontype
```

where:

- *region* is a TRS administrator-defined alias for the *hostname* and *portnumber* pair, described next. For RPCs to use this region, this value must match the value in their region parameter of the sgw_addrpc procedure. (See “Adding an RPC” on page 50.)

  Length: maximum of eight characters.

- *hostname* is the value you specify for this parameter that identifies the TCP/IP network host name. This name corresponds to the mainframe in your */etc/hosts* file or in your NIS map.

  Length: maximum of 31 characters.

- *portnumber* is the number you specify for this parameter that must match the port number on which the transaction listens. (This is not the same as the port number used to configure the *interfaces* file.) TRS does not verify the validity of this number with the CICS TCP/IP Listener.

  This value can be any number between 1024 and 9996.

- *regiontype* (optional) is the type of the mainframe processing environment specified by the region parameter. Valid values are CICS, MVS, and IMS. If you do not specify a value, the region type defaults to CICS.

Dropping a region

When you want to remove a *region* from those configured to TRS, use the following procedure:

```
exec sgw_dropregion region
```

where *region* is the name of the region you intend to drop.

Configuring RPCs

A remote procedure call (RPC) is an Open ServerConnect mainframe application. TRS can be configured to invoke any Open ServerConnect mainframe application.

This section explains how to define new RPCs to TRS, and how to remove existing RPC definitions.

Defining RPCs to TRS

When TRS receives a request from a client, it needs the following information before it can forward the request to the mainframe:

- The name of the associated mainframe transaction
- The name of the *region* that identifies connectivity to the mainframe location where the transaction runs (defined in the sgw_addcon or sgw_addregion procedure)

You define this information to TRS when you add an RPC.

Adding an RPC

To define a new RPC to TRS for each new Open ServerConnect transaction and map it to a region, use this procedure:

```
exec sgw_addrpc rpc_name, tran_id, region,
 security
```

where:

- *rpc_name* is the TRS alias for the remote procedure. This is the name the client uses to call this RPC.

  Length: maximum of 30 characters.

- *tran_id* is the name by which the associated transaction is known on the mainframe. This is the mainframe transaction that TRS calls when a client requests the named procedure. The value of this field must be in uppercase. If the first character is numeric, the *tran_id* must be in quotes. Length:

  - For CICS: maximum of 4 characters
  - For IMS: maximum of 8characters
  - For MVS: maximum of 8 characters

- *region*
  For LU 6.2, specifies the *region* name used to identify the LU 6.2 connection configuration in the sgw_addcon procedure.

At least one defined connection configuration must have this value specified as its region. See “Adding a connection configuration” on page 46. An entry in this field is required.

For TCP/IP, specifies the *region* name used to identify this TCP/IP connection in the sgw_region procedure. See “Defining regions to TRS” on page 48. This field is required.

Length: maximum of eight characters.

- *region*
(TCP/IP only) Specifies the *region* name used to identify this TCP/IP connection in the sgw_region procedure. See “Defining regions to TRS” on page 48. This field is required.
Length: maximum of eight characters.

- *security*
specifies the type of user login information that TRS passes to the mainframe. The *security* parameter is not case sensitive.

  - The *security* parameter can have any of the following values to specify the information to send:

    none. Do not send login information to the mainframe.

    userid. Send only the user ID to the mainframe. To determine which userid is used, see the Security level source section.

    Note This setting is not applicable when using the TRS TCP/IP Library.

    both. Send both the user ID and the password to the mainframe. To determine which userid is used, see the Security level source section.

  - If you are using LU 6.2, TRS passes the information in the conversation-level security fields of the SNA LU 6.2 Function Management Header 5 (FMH-5).

  - With TCP/IP, TRS passes these fields to the Listener Transaction when the called transaction starts.

For example, if you use native CICS security, the none value corresponds to the CICS security option NONE, userid corresponds to IDENTIFY, and both corresponds to the security option VERIFY.

Note SNA network products vary in that some do not allow only the user ID to be forwarded; in other words, the *ALREADY VERIFIED* bit may not be set. Check your platform-specific DirectConnect and vendor SNA documentation for restrictions.

Example

To add an RPC named SYD2, use this command:

```
exec sgw_addrpc SYD2, SYD2, TESTREG, none
go
```

This maps SYD2 to the mainframe transaction named SYD2, which executes in the mainframe region named TESTREG. A user ID or password is not passed through to the mainframe when the RPC is invoked.

Security level source

When you invoke an RPC defined with a security parameter value of userid or both, the values passed to the mainframe for the user ID and password can come from one of three different pairs of values:

- If TRS security is *off*, (see the security configuration parameter), TRS passes to the mainframe the user ID and password that is used to login to TRS.
- If TRS security is *on*, (see the security configuration parameter), and the *rpcpwd* level for the invoked RPC is defined as user (see sgw-addrpctogrp), TRS passes to the mainframe the user ID and password defined to TRS using the sgw_addlog procedure.
- If the security is *on*, (see the security configuration parameter), and the *rpcpwd* level for the invoked RPC is defined as group (see sgw_addrpctogrp), TRS passes to the mainframe the user ID and password defined to TRS using the sgw_addtrngrp procedure for the *trn* group of that particular rpc.

For more information about these value sets, see sgw_addrpc.

Dropping an RPC

To drop an RPC, use the following procedure. The RPC must be idle to be dropped.

```
exec sgw_droprpc rpc_name
```

where *rpc_name* is the name of the RPC you intend to drop.

Example

The following example shows how to drop the sample RPC named SYD2:

```
exec sgw_droprpc SYD2
go
```

Configuring a default SQL language handler for TRS

To pass client SQL language requests through TRS to the DB2 on the mainframe, the TRS System Administrator must configure a default SQL language handler. This language handler is a TRS RPC that is mapped to an Open ServerConnect program on the mainframe which handles the interaction with DB2 UDB.

Sybase provides the following programs:

- For SQL language requests (including cursors, dynamic, and long-running transactions) on CICS, MainframeConnect for DB2 UDB using the CICS transaction name AMD2.
- For SQL language requests on IMS or MVS, OmniSQL Access Module for DB2 using the transaction name SYRT.

Use the instructions in this section to define the default SQL language handler RPC to TRS by specifying the mainframe transaction ID that handles language requests.

Defining a default SQL language handler

The values you provide for defining the default SQL language handler to TRS depend on the following:

- The environment on the mainframe (CICS, IMS, or MVS)
- The status of TRS security (enforced or not enforced)

To define a default SQL language handler for your site configuration, use the sgw_addrpc procedure:

```
sgw_addrpc rpc_name, tran_id, region, security
```

Refer to Table 3-6 for the appropriate *rpc_name* and *tran_id* parameters, then set *region* and *security* to the appropriate values for your site.

Table 3-6: Default SQL language handler settings by host and security settings

TRS	CICS host (MainframeConnect)	MVS host and IMS host (OmniSQL Access Module)
TRS Security Enforced	• Set *rpc_name* = name you create • Set *tran_id* = AMD2	• Set *rpc_name* = name you create • Set *tran_id* = SYRT
TRS Security Not Enforced	• Set *rpc_name* = SYRT • Set *tran_id* = AMD2	• Set *rpc_name* = SYRT • Set *tran_id* = SYRT

Note If security is enforced, define the *rpc_name* that you create as the default SQL language handler when defining the *tran_group*. When security is *not* enforced, the default SQL language rpc_name must be SYRT.

Example

Following is an isql example of the sgw_addrpc procedure, which defines a default SQL language handler:

```
exec sgw_addrpc SYRT, AMD2, TESTREG, both
go
```

where:

- Language requests are routed to MainframeConnect for DB2 UDB, which has a predefined CICS *tran_id* of AMD2.
- TESTREG is the *region* parameter value that corresponds to the LU 6.2 or TCP/IP connection that provides access to the CICS region running MainframeConnect for DB2 UDB.

If TRS security were enforced for this example, the TRS system administrator would need to define a transaction group (using sgw_addtrngrp) with SYRT as the default language RPC. SYRT then would become the default SQL language handler for all TRS users assigned to that transaction group.

Defining multiple SQL language handlers

To send SQL language requests to more than one language RPC (that is, if you have copies of MainframeConnect for DB2 UDB or OmniSQL Access Module for DB2 in other regions), define multiple language handlers, each with a different RPC name and a different region name. Clients can explicitly specify the particular language RPC in the request.

Add the alternate language handlers using the sgw_addrpc procedure, using the following parameter values:

- An *rpc_name* of your choice
- The *tran_id* as defined in "Default SQL language handler settings by host and security settings" on page 54
- The *region* and *security* values appropriate for your site

The following isql example shows three procedures that define different RPCs for the AMD2 transactions at the DALLAS, DETROIT, and MIAMI regions, respectively. This example allows a user to specify the region to which TRS sends the language request: DALLASrpc uses the DALLAS region, DETROITrpc uses the DETROIT region, and MIAMIrpc uses the MIAMI region.

```
exec sgw_addrpc DALLASrpc, AMD2, DALLAS, both
 go
exec sgw_addrpc DETROITrpc, AMD2, DETROIT, both
 go
exec sgw_addrpc MIAMIrpc, AMD2, MIAMI, both
 go
```

If security is enforced, add the preceding RPCs to the appropriate *tran_group* that the *tran_group* users can access.

For example:

```
exec sgw_addrpctogrp TRANGRP2, DALLASrpc, user
go
exec sgw_addrpctogrp TRANGRP2, DETROITrpc, user
go
exec sgw_addrpctogrp TRANGRP2, MIAMIrpc, user
go
```

To obtain results from TESTREG with SYRT as the default (using the "Example" on page 54), a user invokes a SQL query program, such as isql, and enters a query similar to the following:

```
select * from payroll
go
```

To obtain results from MIAMI, a user enters the following execute command, specifying the RPC named MIAMIrpc:

```
exec MIAMIrpc "select * from payroll"
go
```

Adaptive Server stored procedure example

Following is an example of creating an Adaptive Server stored procedure that connects to TRS and uses a parameter to choose the DB2 UDB system to use:

```
create proc dbp1
              @salary int
            as
              if @salary < 60000
                   exec BLUETRS...MIAMIrpc "select *
from payroll"
            else
                   exec BLUETRS...DALLASrpc "select *
from payroll"
```

In this example, the Adaptive Server is configured to connect to the TRS named BLUETRS and to execute an RPC. The value of the @salary parameter determines the language RPC that the TRS named BLUETRS uses to route the select statement. Based on the value of @salary, one of the following occurs:

- If the value of @salary is less than 60,000, the procedure sends the select * from payroll statement to the TRS named BLUETRS.
  In BLUETRS, the AMD2 transaction in MIAMI executes it.
  The AMD2 transaction in MIAMI is mapped to the RPC named MIAMIrpc on BLUETRS.
- If the value of @salary is greater than or equal to 60,000, the procedure executes against the AMD2 transaction in DALLAS, which is mapped to the RPC named DALLASrpc on BLUETRS.

Using Catalog Stored Procedures (CSPs)

CSPs serve as a uniform catalog interface for accessing the system tables of different database management systems, including Adaptive Server.

Sybase provides CSPs that can be defined to TRS with MainframeConnect for DB2 UDB. These CSPs correspond to transactions on the mainframe that access the DB2 UDB catalog and return information to a client application in a standard format.

CSPs are implemented as CICS transactions and must be configured as RPCs to TRS. See Chapter 4, "Accessing Catalog Information with CSPs," for configuration instructions.

The following table outlines the functions provided by CSPs and the four-character CICS transaction name that each procedure name maps to on the host.

Table 3-7: CSP functions

Procedure name	Related CICS transaction name	Function
sp_capabilities	SYBP	Returns information about the capabilities of the TRS
sp_columns	SYB3	Describes the columns of a table
sp_column_privileges	SYBA	Describes the column permissions of an object
sp_databases	SYB1	Lists the databases available
sp_datatype_info	SYBC	Describes the datatypes available
sp_fkeys	SYB8	Describes the primary key/foreign key relationships
sp_pkeys	SYB7	Describes the primary key for a table
sp_server_info	SYBB	Lists the configuration and capabilities
sp_special_columns	SYBD	Lists the optimal columns to uniquely identify rows and list columns that are automatically updated
sp_sproc_columns	SYB5	Describes the input/output of executable objects
sp_statistics	SYB6	Lists the index and statistics information about a table
sp_stored_procedures	SYB4	Lists the executable procedures
sp_table_privileges	SYB9	Describes the *table permissions*
sp_tables	SYB2	Lists the tables
sp_thread_props	SYBT	Returns minimal information at this time

For complete information about the mainframe installation, see the Mainframe Connect *Installation and Administration Guide* for DB2 UDB. For complete information about the syntax and operation of CSPs, see Chapter 4, "Accessing Catalog Information with CSPs," in this guide.

CSP scripts

Sybase provides three scripts for you to use with CSPs:

- addcat - adds the CSPs to TRS.
- dropcat - drops the CSPs from TRS.
- testcat - tests the CSPs (requires that the AMD2 transaction be installed at the mainframe).

Installing CSPs

The addcat script executes the sgw_addrpc procedure automatically for each CSP (see "Adding an RPC" on page 50). Before you run addcat, modify the script to suit your installation.

Use your text editor to specify the value of these parameters:

- *region* parameter – name of the region you want the CSPs to execute against.
- *security* parameter – value you can change to meet the security requirements at your installation. If you do not change it, the value is none.
- *rpc_name* parameter – name or value must be coordinated with any change to the RPC names with the mainframe system programmer. If you are using ODBC applications, do not change the RPC names.
- *tran_id* parameter – value or name of this parameter must be coordinated with any change to the transaction ID with the mainframe system programmer.

After you edit the script to suit your installation, run the addcat script as input to your TRS. The following isql example shows how to run the addcat script with a TRS named new_TRS:

```
isql -Snew_TRS -Usa -P < addcat
go
```

This script automatically executes the sgw_addrpc procedure for each CSP.

Testing CSPs

The testcat script uses the AMD2 transaction to create temporary tables and execute each CSP. At least one row is returned for each CSP and the testcat script then drops the temporary tables.

Example

Run the testcat script as input to your TRS. The following isql example shows how to run the testcat script with a TRS named new_TRS:

```
isql -Snew_TRS -Usa -P < testcat
go
```

This script automatically tests each of the CSPs.

Dropping CSPs

The dropcat script drops the CSPs from TRS. Run the dropcat script as input to your TRS.

Example

The following isql example shows how to run the dropcat script with a TRS named new_TRS:

```
isql -Snew_TRS -Usa -P < dropcat
go
```

This script automatically drops the CSPs.

CHAPTER 4

Accessing Catalog Information with CSPs

To obtain information about database objects, you need to access the database catalog. Catalog Stored Procedures (CSPs) provide this catalog access. This chapter describes how to use CSPs to access the DB2 UDB catalog.

This chapter contains the following topics:

Using CSPs

This section describes the use of CSPs, coding instructions that apply to CSPs, and the use of wildcard-character search patterns.

Why use CSPs?

The catalog structures for DB2 UDB and Adaptive Server are different. If you have client applications written to access the SQL Server catalog, you may need to re-code the client application queries to send those queries directly to the DB2 UDB system tables. To avoid modifying your database-specific applications, you can use CSPs to access catalog information. CSPs are compatible with the catalog interface for the Open Database Connectivity (ODBC) Application Program Interface (API).

You need to install and configure CSPs in TRS for the proper functioning of the following clients:

- ODBC
- ASE/CIS

Coding instructions

This section includes general coding information that applies to all CSPs.

Parameters

CSPs have optional and required parameters. Required parameters must have values supplied; optional parameters default to predefined values.

The following rules apply to CSP parameters:

- Both positional and named parameters are supported, but not in the same statement.
- Parameter values can be enclosed in double quotes. Parameter values enclosed in quotes must be in the correct case for the target.
- Object names (table names, column names, and index names) can be created using lowercase letters. The target database automatically converts object names to uppercase unless the object names are enclosed in double quotes. However, when using CSPs, these object names must be referred to using upper-case names.

Syntax

A client application can initiate a CSP by issuing any of the following statements:

```
exec rpc_name parm1, parm2, . . .
execute rpc_name parm1, parm2, . . .
```

where:

- *rpc_name* is the name of the stored procedure (for example, sp_columns).
- *parm1* and *parm2* are parameter values required or desired for that stored procedure.

Coding examples

You can execute CSPs with a language command or through an RPC event.

You can specify the parameters for a CSP in one of the following forms:

- Supply all of the parameters:

  ```
  sp_columns publishers, "dbo", "pubs2", "pub_id"
  ```

- Use "null" or a comma as a placeholder:

  ```
  sp_columns publishers, null, null,"pub_id"
  sp_columns publishers, , , "pub_id"
  ```

- Supply one or more parameters in the following form:

  ```
  @parameter_name = value
  ```

  For example, to find information about a particular column, issue the following statement:

  ```
  sp_columns @table_name = publishers, @column_name =
  "pub_id"
  ```

  The parameter names in the syntax statement must match the parameter names defined by the CSP.

  You can use the named parameter form if you process a CSP as an RPC event.

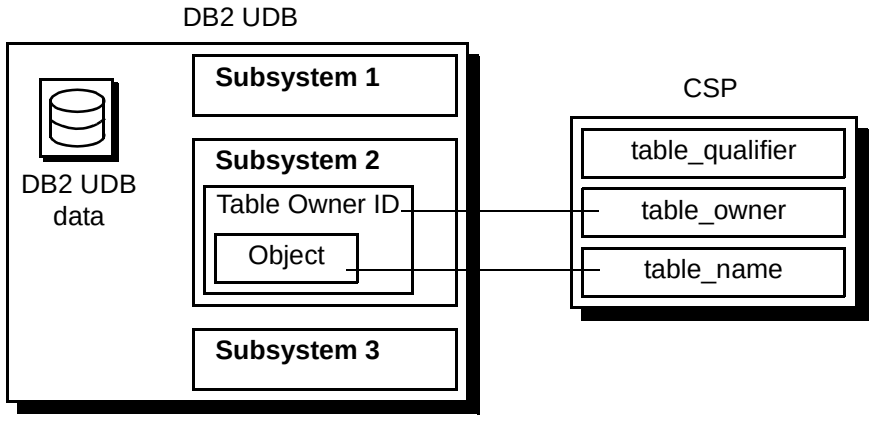
Table name, owner, and qualifier parameters

This section explains how the parameters *table_name*, *table_owner,* and *table_qualifier* are used in this product.:

- *table_name* is the name of the database object about which you want to retrieve catalog information.
- *table_owner* is the owner of the database object about which you want to retrieve catalog information.

The following shows how CSP parameters relate to the DB2 UDB subsystem.

Figure 4-1: Relationship of CSP parameters and DB2 UDB



Wildcard-character search patterns

The percent (%) wildcard character can be used in parameters that allow wildcard-character search patterns. This wildcard represents any string of zero or more characters. When using CSPs, the wildcard expression must be enclosed in quotation marks.

If the percent (%) character is used in parameters that do not allow wildcard-character search patterns, you will receive a syntax error.

The following table shows some examples of the percent (%) wildcard character and its use:

Table 4-1: Wild card character examples

Sample string	Matches
“%A%”	All names that contain the letter “A”; for example, A, AT, CAT
“%”	All names

Escape character

To use a wildcard character as a literal, precede it with an "@" (at) sign. If the parameter normally accepts the wildcard character, you can mix the percent (%) wildcard character with escaped wildcard characters (@ and %) interpreted as literals. If the parameter does not accept the wildcard character, an @ (at) sign must precede the wildcard character to use the character as a literal.

Supported CSPs

The following table shows the supported CSPs and the information that each CSP retrieves.

Table 4-2: Supported CSPs

CSP	Information retrieved by the CSP
sp_capabilities	Returns the SQL capabilities of a DB2 access service
sp_column_privileges	Column privilege information for one table
sp_columns	Column descriptions for a table
sp_databases	List of available databases
sp_datatype_info	Datatype descriptions
sp_fkeys	Foreign and primary key relationships
sp_pkeys	Primary key information for a single table
sp_server_info	Server terms, limits, and capabilities
sp_special_columns	Additional column information
sp_sproc_columns	Attributes of procedures input and return parameters
sp_statistics	Statistics and indexes for one table
sp_stored_procedures	List of available procedures
sp_table_privileges	Table privilege information for one table
sp_tables	List of aliases, synonyms, tables, views, and system tables

The following sections provide descriptions, syntax, parameters, and usage for the supported CSPs.

sp_capabilities

Description

Returns the SQL capabilities of a DB2 access service.

Syntax

sp_capabilities

Parameters

None.

This procedure does not allow parameters.

Usage

The result set contains information that allows applications to successfully interact with an DB2 access service during normal query processing.

Results

The following table shows the result set:

Table 4-3: Result set for sp_capabilities

Column	Datatype	Description
ID	int	Capability ID
CAPABILITY_NAME	char(30)	Capability name
VALUE	int	Capability value
DESCRIPTION	char(128)	Capability description

The following table shows the ID and values for several DB2 access service functional capabilities:

Table 4-4: sp_capabilities information

ID	Capability	Value description
101	SQL syntax	1=Sybase T-SQL supported 2=DB2 SQL supported
102	Join handling	0=Unsupported 1=No outer join supported 2=T-SQL support 3=Oracle supported
103	Aggregate handling	0=Unsupported 1=ANSI supported 2=All functions
104	AND predicates	0=Unsupported 1=Supported
105	OR predicates	0=Unsupported 1=Supported
106	LIKE predicates	0=Unsupported 1=ANSI-style supported 2=T-SQL supported
107	Bulk insert handling	0=Unsupported 1=Supported

ID	Capability	Value description
108	Text and image handling	0=Unsupported 1=Text, no textptr 2=Text and textptr
109	Transaction handling	0=Unsupported 1=Local supported 2=Two-phase commit supported
110	Text pattern handling	0=Unsupported 1=Pattern (text) supported
111	order by	0=Unsupported 1=Supported
112	group by	0=Unsupported 1=ANSI supported 2=T-SQL supported
113	Net password encryption	0=Unsupported 1=Supported
114	Object case sensitivity	0=Case insensitive 1=Case sensitive
115	distinct	0=Unsupported 1=Supported
116	Wild card escape	0=Unsupported Non-zero=Escape_char(s)
117	Union handling	0=Unsupported 1=Supported
118	String functions	0=Unsupported 1=Substring supported 2=Oracle subset supported 3=T-SQL supported
119	Expression handling	0=Unsupported 1=ANSI supported 2=T-SQL supported
120	Character truncation	0=Fixed length character parameters may contain trailing blanks 1=Fixed length character parameters will not contain trailing blanks
121	Language events	0=Unsupported 1=T-SQL DML without datetime in the where clause supported 2=T-SQL DML supported
122	Date functions	0=Unsupported 1=T-SQL date functions supported

ID	Capability	Value description
123	Math functions	0=Unsupported 1=Oracle functions supported 2=T-SQL math functions supported
124	T-SQL convert functions	0=Unsupported 1=Supported
125	T-SQL delete/update	0=Sybase extensions not supported 1=Sybase extensions supported
126	Insert/select handling	0=Unsupported 1=Supported
127	Subquery handling	0=Unsupported 1=Supported
128	IN/NOT IN support	0=Unsupported 1=Supported
129	CASE support	0=Unsupported 1=Supported

sp_column_privileges

Description

Returns column privilege information for a single database object.

Syntax

sp_column_privileges *table_name* [, *table_owner*]
[, *table_qualifier*] [, *column_name*]

Parameters

table_name
is the name of the table. Wildcard-character search patterns and aliases are not supported. Views are supported but do not include alter or index privileges.

table_owner
is the name of the table owner. Wildcard-character search patterns are not supported.

table_qualifier
is ignored. Leave blank or set to NULL.

column_name
is the name of the column for which you want privilege information. Use wildcard-character search patterns to request information about more than one column. Leave blank or set to NULL to request information about all columns in the table or tables.

Usage

- This function corresponds to the ODBC function SQLColumnPrivileges.

- Information is based on the SYSCOLAUTH, SYSCOLUMNS, and SYSTABAUTH system catalog tables.

Results

sp_column_privileges returns one row for each privilege a user has on a column in a table. Results are ordered by the following columns:

- TABLE_OWNER
- TABLE_NAME
- COLUMN_NAME
- PRIVILEGE

The lengths for varchar columns shown in the result set tables are maximums; the actual lengths depend on the target database.

The following table shows the result set for sp_column_privileges.

Table 4-5: Result set for sp_column_privileges

Column name	Datatype	Description
TABLE_QUALIFIER	varchar (128)	Always NULL.
TABLE_OWNER	varchar (128)	Authorization ID.
TABLE_NAME	varchar (128) NOT NULL	Name of the object about which privilege information is returned.
COLUMN_NAME	varchar (128) NOT NULL	Column name.
GRANTOR	varchar (128)	Identifies the user who granted this privilege.
GRANTEE	varchar (128) NOT NULL	Identifies the user to whom this privilege was granted.
PRIVILEGE	varchar (128) NOT NULL	Identifies the privilege granted to the grantee on this column as one of the following values: • SELECT if the grantee is authorized to select rows in the associated object. • UPDATE if the grantee is authorized to insert and update rows in the associated object.
IS_GRANTABLE	varchar (3)	Indicates whether the grantee is authorized to grant privilege on this column to other users; always NULL.

sp_columns

Description

Returns information about the type of data that can be stored in one or more columns.

Syntax

sp_columns *table_name* [, *table_owner*]
[, *table_qualifier*] [, *column_name*]

Parameters

table_name
is the table name. Use the wildcard character to request information about more than one table. Aliases are not supported.

table_owner
is the owner of the database object about which column information is requested. Use the wildcard character to request information about tables owned by more than one user. If you do not specify a table owner, sp_columns looks first for tables owned by the current user and then for tables owned by the database owner.

table_qualifier
is ignored. Leave blank or set to NULL.

column_name
is the name of the column for which you want information. Use the wildcard character to request information about more than one column. Leave empty or set to NULL to request information about all columns in the table or tables.

Usage

- If *column_name* is provided, sp_columns returns information only for the column or columns that match.
- This function corresponds to the ODBC function SQLColumns.
- Information is based on the SYSCOLUMNS and SYSSYNONYMS system catalog tables.

Results

sp_columns returns one row containing a description of each column in a table. Results are ordered by the following columns:

- TABLE_OWNER
- TABLE_NAME

The lengths for varchar columns shown in the result set tables are maximums; the actual lengths depend on the target database.

The following table shows the result set for sp_columns.

Table 4-6: Result set for sp_columns

Column	Datatype	Description
TABLE_QUALIFIER	varchar(128)	Always NULL
TABLE_OWNER	varchar(128)	Table owner identifier
TABLE_NAME	varchar(128) NOT NULL	Table name
COLUMN_NAME	varchar(128) NOT NULL	Column name
DATA_TYPE	smallint NOT NULL	Integer code for the ODBC datatype
TYPE_NAME	varchar(128) NOT NULL	String representing the datatype name in the target database
PRECISION	int	Number of significant digits of the column on the target database
LENGTH	int	Length of the column in bytes
SCALE	smallint	Number of digits to the right of the decimal point
RADIX	smallint	Base for numeric types
NULLABLE	smallint NOT NULL	Indicates whether the column accepts NULL values: 0 SQL_NO_NULLS if the column does not accept NULL values 1 SQL_NULLABLE if the column accepts NULL values 2 SQL_NULLABLE_UNKNOWN if it is not known if the column accepts NULL values
REMARKS	varchar(254)	A description of the column
SS_DATA_TYPE	smallint	The SQL Server datatype name
COLID	smallint	The column ID number
REMOTE_DATA_TYPE	int	An integer representing the underlying target database datatype (composite value)

ODBC Datatypes

The following table describes the DB2 UDB datatypes and matching ODBC integer identifiers that are returned in the TYPE_NAME and DATA_TYPE columns of the sp_columns, sp_datatype_info, sp_special_columns, and sp_sproc_columns result sets.

Table 4-7: ODBC datatypes

DB2 UDB datatype	Target datatype maximum physical length	ODBC type	ODBC integer ID	DB2 UDB datatype description
CHARACTER() FOR BIT DATA	254	SQL_BINARY	-2	Fixed length character for bit data
VARCHAR() FOR BIT DATA	254	SQL_VARBINARY	-3	Variable length character for bit data
LONG VARCHAR FOR BIT DATA	32714	SQL_LONGVARBINARY	-4	Variable length character for bit data
CHARACTER()	254	SQL_CHAR	1	Fixed length character
VARCHAR()	254	SQL_VARCHAR	12	Variable length character
LONG VARCHAR()	32714	SQL_LONGVARCHAR	-1	Variable length character
CHARACTER() FOR MIXED DATA	254	SQL_BINARY	-2	Fixed length character (DBCS or SBCS)
VARCHAR() FOR MIXED DATA	254	SQL_VARBINARY	-3	Variable length character (DBCS or SBCS)
LONG VARCHAR() FOR MIXED DATA	32714	SQL_LONGVARBINARY	-4	Variable length character (DBCS or SBCS)
GRAPHIC()	127	SQL_BINARY	-2	Fixed length graphic (DBCS)
VARGRAPHIC()	127	SQL_VARBINARY	-3	Variable length graphic (DBCS)
LONG VARGRAPHIC	16357	SQL_LONGVARBINARY	-4	Variable length graphic (DBCS)
SMALLINT	2	SQL_SMALLINT	5	2-byte binary integer
INTEGER	4	SQL_INTEGER	4	4-byte binary integer
REAL	4	SQL_REAL	7	4-byte floating point
FLOAT()	4	SQL_REAL	7	4-byte floating point with a precision less than 22
FLOAT()	8	SQL_DOUBLE	8	8-byte floating point with a precision equal to or greater than 22
DOUBLE PRECISION	8	SQL_DOUBLE	8	8-byte floating point

DB2 UDB datatype	Target datatype maximum physical length	ODBC type	ODBC integer ID	DB2 UDB datatype description
DECIMAL()	31	SQL_DECIMAL	3	Packed decimal number
NUMERIC	31	SQL_NUMERIC	2	Zoned decimal number
DATE	10	SQL_DATE	9	Date
TIME	8	SQL_TIME	10	Time
TIMESTAMP	26	SQL_DATETIME	11	Timestamp

REMOTE_DATATYPE

The REMOTE_DATATYPE column contains a 32-bit composite datatype value that represents the target database datatype. The following table describes the datatype value.

Table 4-8: REMOTE_DATATYPE value

Bit(s)	Description
Bits 0-7	ODBC (target) datatype (can be extended for types not defined in ODBC)
Bit 8	Returns 1 if nullable, 0 if not nullable
Bit 9	Returns 1 if case sensitive, 0 if not case sensitive
Bits 10, 11	Always returns 10 (binary) meaning updatability unknown
Bits 12, 13	Reserved, always returns 00 (binary)
Bits 14, 15	Returns the following: 01 (binary) meaning NEWODBCDATATYPE (used for all except REAL) 10 (binary) meaning NEWUSERTYPE (used for REAL)
For numeric types: Bits 16–23 Bits 24–31	 Precision Scale
For non-numeric types: Bits 16–31	 Length

sp_databases

Description Returns a list of databases on a target DBMS.

Syntax sp_databases

Parameters None.
This procedure does not allow parameters.

Usage Information is based on the SYSDATABASE system catalog table.

Results

sp_databases returns a list of databases available to the client. Results are ordered by DATABASE_NAME.

The lengths for varchar columns shown in the result set tables are maximums; the actual lengths depend on the target database.

The following table shows the result set for sp_databases.

Table 4-9: Result set for sp_databases

Column	Datatype	Description
DATABASE_NAME	varchar(32) NOT NULL	Name of an available database
DATABASE_SIZE	int	Size of the named database in kilobytes, otherwise NULL
REMARKS	varchar(254)	Always NULL

sp_datatype_info

Description Returns information about a particular datatype or about all supported datatypes.

Syntax sp_datatype_info [*data_type*]

Parameters *data_type*
is the ODBC code number for the specified datatype about which sp_datatype_info returns information. See Table 4-7 on page 72 for a description of these codes.

Usage
- The *data_type* parameter specifies the ODBC datatype for which information is requested. If this parameter is not provided, sp_datatype_info returns information about all supported datatypes.
- This function corresponds to the ODBC function SQLGetTypeInfo.

Results

sp_datatype_info returns a list of datatypes with information about each. Results are ordered by the following columns:

- DATA_TYPE
- TYPE_NAME

The lengths for varchar columns shown in the result set tables are maximums; the actual lengths depend on the target database. The following table shows the result set for sp_datatype_info.

Table 4-10: Result set for sp_datatype_info

Column	Datatype	Description
TYPE_NAME	varchar(128) NOT NULL	Name of the T-SQL datatype or the target database datatype that corresponds to the ODBC datatype in the DATA_TYPE column.
DATA_TYPE	smallint NOT NULL	ODBC datatype to which all columns of this type are mapped.
PRECISION	int	Maximum precision allowed for this datatype. (NULL is returned for datatypes where precision is not applicable.)
LITERAL_PREFIX	varchar(128)	Character(s) used to prefix a literal; NULL is returned for datatypes where a literal prefix is not applicable.
LITERAL_SUFFIX	varchar(128)	Character(s) used to mark the end of a literal; NULL is returned for datatypes where a literal suffix is not applicable.
CREATE_PARAMS	varchar(128)	Description of the creation parameters required for this datatype, for example; precision and scale; NULL is returned if the datatype does not have creation parameters.
NULLABLE	smallint NOT NULL	Indicates whether the datatype accepts NULL values: • 0 – the column does not accept NULL values. • 1 – the column accepts NULL values.
CASE_SENSITIVE	smallint NOT NULL	Indicates whether the datatype distinguishes between uppercase and lowercase characters: • 0 – the datatype is not a character type or is not case sensitive. • 1 – the datatype is a character type and is case sensitive.
SEARCHABLE	smallint NOT NULL	Indicates how this datatype is used in where clauses: • 0 – the datatype cannot be used in a where clause. • 1 – the datatype can be used in a where clause.

Column	Datatype	Description
UNSIGNED_ATTRIBUTE	smallint	Indicates whether this attribute is unsigned: • 0 – the datatype is signed. • 1 – the datatype is unsigned. • NULL – the datatype is not numeric.
MONEY	smallint NOT NULL	Indicates whether this is a money datatype: • 0 – it is not a money datatype. • 1 – it is a money datatype.
AUTO_INCREMENT	smallint	Indicates whether this datatype automatically increments: • 0 – columns of this datatype do not automatically increment. • 1 – columns of this datatype automatically increment. • NULL – the column is not numeric and does not have a sign.
LOCAL_TYPE_NAME	varchar(128)	The database name or the T-SQL name for the datatype.
MINIMUM_SCALE	smallint	Minimum scale for the datatype; NULL if scale is not applicable.
MAXIMUM_SCALE	smallint	Maximum scale for the datatype; NULL if scale is not applicable.

sp_fkeys

Description

Returns primary and foreign key information for the specified table or tables. Foreign keys must be declared using the ANSI integrity constraint mechanism.

Syntax

sp_fkeys *pktable_name* [, *pktable_owner*]
[, *pktable_qualifier*] [, *fktable_name*]
[, *fktable_owner*] [, *fktable_qualifier*]

Parameters

pktable_name

is the name of the table containing the primary key. Views, aliases, and wildcard-character search patterns are not supported. You must specify either this parameter or the fktable_name parameter, or both.

pktable_owner
is the owner of the table containing the primary key. Wildcard-character search patterns are not supported. If you do not specify this parameter, sp_fkeys looks first for a table owned by the current user and then for a table owned by the database owner.

pktable_qualifier
is ignored. Leave blank or set to NULL.

fktable_name
is the name of the table containing the foreign key. Views, aliases, and wildcard-character search patterns are not supported.

fktable_owner
is the owner of the table containing the foreign key. Views, aliases, and wildcard-character search patterns are not supported. If you do not specify this parameter, sp_fkeys looks first for a table owned by the current user and then for a table owned by the database owner.

fktable_qualifier
is ignored. Leave blank or set to NULL.

Usage

- This function corresponds to the ODBC function SQLForeignKeys.
- Information is based on the SYSCOLUMNS, SYSFOREIGNKEYS, SYSINDEXES, SYSRELS, and SYSSYNONYMS system catalog tables.
- For information about creating a foreign key, see the appropriate *IBM DATABASE 2 SQL Reference* manual.

Results

sp_fkeys returns a row for each column that is part of the foreign key or primary key in a primary key/foreign key relationship.

Results are ordered by the following columns:

- PKTABLE_OWNER
- PKTABLE_NAME
- KEY_SEQ

The lengths for varchar columns shown in the result set tables are maximums; the actual lengths depend on the target database.

The following table shows the result set for sp_fkeys.

Table 4-11: Result set for sp_fkeys

Column	Datatype	Description
PKTABLE_QUALIFIER	varchar(128)	NULL
PKTABLE_OWNER	varchar(128)	Primary key table owner
PKTABLE_NAME	varchar(128) NOT NULL	Primary key table name
PKCOLUMN_NAME	varchar(128) NOT NULL	Primary key column name
FKTABLE_QUALIFIER	varchar(128)	NULL
FKTABLE_OWNER	varchar(128)	Foreign key table owner
FKTABLE_NAME	varchar(128) NOT NULL	Foreign key table name
FKCOLUMN_NAME	varchar(128) NOT NULL	Foreign key column name
KEY_SEQ	smallint NOT NULL	Column sequence number in key (starting with 1)
UPDATE_RULE	smallint	Action to be applied to the foreign key when the SQL operation is update: • 0 means cascade • 1 means restrict • 2 means set null • NULL means not applicable to the target database
DELETE_RULE	smallint	Action to be applied to the foreign key when the SQL operation is delete: • 0 means cascade • 1 means restrict • 2 means set null • NULL means not applicable to the target database
FK_NAME	varchar(128)	Foreign key identifier; NULL if not applicable to the target database
PK_NAME	varchar(128)	Primary key identifier; NULL if not applicable to the target database

sp_pkeys

Description — Returns primary key information for the specified table or tables.

Syntax — sp_pkeys *table_name* [, *table_owner*]
[, *table_qualifier*]

Parameters

table_name
is the name of the table. Wildcard-character search patterns are not supported. Views and aliases are not supported.

table_owner
is the owner of the table. Wildcard-character search patterns are not supported. If you do not specify this parameter, sp_fkeys looks first for a table owned by the current user and then for a table owned by the database owner.

table_qualifier
is ignored. Leave blank or set to NULL.

Usage

- This function corresponds to the ODBC function SQLPrimaryKeys.
- Information is based on the SYSINDEXES, SYSKEYS, and SYSSYNONYMS system catalog tables.
- For information about creating a foreign key, see the appropriate *IBM DATABASE 2 SQL Reference*.

Results

sp_pkeys returns a row for each column in the primary key. Results are ordered by:

- TABLE_OWNER
- TABLE_NAME
- KEY_SEQ

The lengths for varchar columns shown in the result set tables are maximums; the actual lengths depend on the target database.

The following table shows the result set for sp_pkeys.

Table 4-12: Result set for sp_pkeys

Column	Datatype	Description
TABLE_QUALIFIER	varchar(128)	NULL
TABLE_OWNER	varchar(128)	Primary key table owner (authorization ID)
TABLE_NAME	varchar(128) NOT NULL	Primary key table name
COLUMN_NAME	varchar(128) NOT NULL	Primary key column name
KEY_SEQ	smallint NOT NULL	Sequence number of the column in a multi-column primary key
PK_NAME	varchar(128)	Primary key identifier; NULL if not applicable to the target database

sp_server_info

Description

Returns a list of attribute names and matching values for the target DBMS.

Syntax

sp_server_info [*attribute_id*]

Parameters

attribute_id

is the integer ID of the attribute. Wildcard-character search patterns are not supported.

Usage

- If the *attribute_id* parameter is not provided, sp_server_info returns information about all attributes.
- This function does not correspond to any ODBC function, but returns some of the information returned by SQLGetInfo.

Results

sp_server_info returns a list of the requested attributes and their values.

The lengths for varchar columns shown in the result set tables are maximums; the actual lengths depend on the target database.

The following table shows the result set for sp_server_info.

Table 4-13: Result set for sp_server_info

Column	Datatype	Description
ATTRIBUTE_ID	int NOT NULL	Numeric identifier of the attribute
ATTRIBUTE_NAME	varchar(60)	Attribute name
ATTRIBUTE_VALUE	varchar(254)	Attribute value

sp_special_columns

Description

Retrieves the following information about columns within a specified table or view:

- The optimal set of columns that uniquely identify a row in the table or view
- A list of the columns that are automatically updated when any value in the row is updated

Syntax

sp_special_columns *table_name* [, *table_owner*]
[, *table_qualifier*] [, *col_type*]

Parameters

table_name
is the name of the table. Views, aliases, and wildcard-character search patterns are not supported.

table_owner
is the owner of the table. Wildcard-character search patterns are not supported. If you do not specify this parameter, sp_special_columns looks first for a table owned by the current user and then for a table owned by the database owner.

table_qualifier
is ignored. Leave blank or set to NULL.

col_type
is a value that requests information about columns of a specific type as follows:

- R returns information about columns with values that uniquely identify any row in the table.
- V returns information about columns with values that are automatically generated by a target each time a row is inserted or updated.

Usage

- This function corresponds to the ODBC function SQLSpecialColumns.

- Information is based on the SYSINDEXES, SYSKEYS, and SYSCOLUMNS system catalog tables.

Results

sp_special_columns returns information about the columns that uniquely identify a row in a table.

The result set consists of a row for each column of an index that uniquely identifies each row of the table. If there are multiple unique indexes on a table, the one that is described by the result set is the first that exists in the following list:

- A primary key with clustered index
- A primary key without clustered index
- A unique, clustered index
- A unique, non-clustered index

The result set is ordered by the column name in the index.

The lengths for varchar columns shown in the result set tables are maximums; the actual lengths depend on the target database.

The following table shows the result set for sp_special_columns.

Table 4-14: Result set for sp_special_columns

Column	Datatype	Description
SCOPE	smallint NOT NULL	Actual scope of the row ID: • 0 SQL_SCOPE_CURROW • 1 SQL_SCOPE_TRANSACTION
COLUMN_NAME	varchar(128) NOT NULL	Column name
DATA_TYPE	smallint NOT NULL	ODBC datatype to which all columns of this type are mapped
TYPE_NAME	varchar(128) NOT NULL	Name of the target database datatype that corresponds to the ODBC datatype in the DATA_TYPE column
PRECISION	int	Maximum precision for the datatype in the target database; NULL if precision is not applicable
LENGTH	int	Length of the column in bytes
SCALE	smallint	Number of digits to the right of the decimal point; NULL if scale is not applicable
PSEUDO_COLUMN	smallint	Indicates whether the column is a pseudo-column; the access service always returns 0 SQL_PC_UNKNOWN

sp_sproc_columns

Description

Returns descriptive information for the input and return parameters for stored procedures in the current environment.

Syntax

sp_sproc_columns *sp_name* [, *sp_owner*]
[, *sp_qualifier*] [, *column_name*]

Parameters

sp_name
is the name of the stored procedure. Use the wildcard character to request information about more than one stored procedure.

sp_owner
is the owner of the stored procedure. Use the wildcard character to request information about stored procedures owned by more than one user. If you do not specify this parameter, sp_sproc_columns looks first for a procedure owned by the current user and then for a procedure owned by the database owner.

sp_qualifier
is ignored. Leave blank or set to NULL.

column_name
is the set of columns to be included in the result set. Use the wildcard character to request information about more than one column. If you do not supply a *column_name* parameter, sp_sproc_columns returns information about all columns for the stored procedure.

Usage

- The access service selects information from the SYSPROCCOLUMNS table. The *cspdb2.sql* script creates this table during installation of DirectConnect. However, you need to update the SYSPROCCOLUMNS table manually.
- This function corresponds to the ODBC function SQLProcedureColumns.

Results

sp_sproc_columns returns a list of available procedures. Results are ordered by the following columns:

- PROCEDURE_OWNER
- PROCEDURE_NAME
- COLUMN_TYPE

The lengths for varchar columns shown in the result set tables are maximums; the actual lengths depend on the target database.

The following table shows the result set for sp_sproc_columns.

Table 4-15: Result set for sp_sproc_columns

Column	Datatype	Description
PROCEDURE_QUALIFIER	varchar(128)	Always NULL
PROCEDURE_OWNER	varchar(128)	Value from the corresponding column of SYSPROCCOLUMNS table
PROCEDURE_NAME	varchar(128) NOT NULL	Name of the stored procedure
COLUMN_NAME	varchar(128) NOT NULL	Name of the input parameter or result set column
COLUMN_TYPE	smallint NOT NULL	Type of data in this procedure column: • 1 SQL_PARAM_INPUT – the procedure column is an input parameter • 3 SQL_RESULT_COL – the procedure column is a result set column
DATA_TYPE	smallint NOT NULL	Integer code for the ODBC SQL datatype equivalent of the target database datatype for this procedure column
TYPE_NAME	varchar(128) NOT NULL	String representing the datatype name in the target database
PRECISION	int	Precision of the procedure column on the target database; NULL if precision is not applicable
LENGTH	int	Length of the column in bytes
SCALE	smallint	Number of digits to the right of the decimal point; NULL if scale is not applicable
RADIX	smallint	Base for numeric types; NULL if radix is not applicable
NULLABLE	smallint	Indicates whether the procedure column accepts NULL values: • 0 – the column does not accept NULL • 1 – the column accepts NULL • 2 – it is not known if the column accepts NULL values
REMARKS	varchar(254)	Description of the procedure column

sp_statistics

Description

Returns statistics information for a single table and the indexes associated with that table.

Syntax

sp_statistics *table_name* [, *table_owner*]
[, *table_qualifier*] [, *index_name*] [, *is_unique*]

Parameters

table_name
is name of the table. Views, aliases, and wildcard-character search patterns are not supported.

table_owner
is the owner of the database object about which column privilege information is requested. Wildcard-character search patterns are not supported. If you do not specify this parameter, sp_statistics looks first for a table owned by the current user and then for a table owned by the database owner.

table_qualifier
is ignored. Leave blank or set to NULL.

index_name
is the name of the index. Wildcard-character search patterns are not supported.

is_unique
is one of the following values:
"Y" if unique indexes are to be returned
"N" if unique indexes are not to be returned

Usage

- If *index_name* is specified, sp_statistics returns only information about that index.
- This function corresponds to the ODBC function SQLStatistics.

Results

sp_statistics returns information about the named table. Results are ordered by the following columns:

- NON_UNIQUE
- TYPE
- INDEX_QUALIFIER
- INDEX_NAME
- SEQ_IN_INDEX

The lengths for varchar columns shown in the result set tables are maximums; the actual lengths depend on the target database.

The following table shows the result set for sp_statistics.

Table 4-16: Result set for sp_statistics

Column	Datatype	Description
TABLE_QUALIFIER	varchar(128)	Always NULL
TABLE_OWNER	varchar(128)	Table owner authorization ID
TABLE_NAME	varchar(128) NOT NULL	Name of the table or view
NON_UNIQUE	smallint	Indicates whether the index permits duplicate values: • 0 (FALSE) means the index prohibits duplicate values • 1 (TRUE) means the index allows duplicate values • NULL is returned if TYPE is SQL_TABLE_STAT
INDEX_QUALIFIER	varchar(128)	Always NULL
INDEX_NAME	varchar(128)	Index name; NULL is returned if TYPE is SQL_TABLE_STAT
TYPE	smallint NOT NULL	Type of information returned: • 0 SQL_TABLE_STAT – statistics for a table • 1 SQL_INDEX_CLUSTERED – a clustered index • 2 SQL_INDEX_HASHED – a hashed index • 3 SQL_INDEX_OTHER – another type of index
SEQ_IN_INDEX	smallint	Sequence of the column in the index (the first column is 1); NULL is returned if TYPE is SQL_TABLE_STAT
COLUMN_NAME	varchar(128)	Column name; NULL is returned if TYPE is SQL_TABLE_STAT.
COLLATION	char(1)	Sort sequence for the column: • A – ascending • D – descending • NULL – returned if TYPE is SQL_TABLE_STAT
CARDINALITY	int	Cardinality of the table or index: • Number of rows in the table if TYPE is SQL_TABLE_STAT • Number of unique values in the index if TYPE is not SQL_TABLE_STAT • NULL if the value is not available from the target database

Column	Datatype	Description
PAGES	int	Number of pages used to store the index or table: • Number of pages used to store the table if TYPE is SQL_TABLE_STAT • Number of pages used to store the index if TYPE is not SQL_TABLE_STAT • NULL if this information is not available from the target database
FILTER_CONDITION	varchar(128)	If the index is a filtered index, this is the filter condition; if the filter condition cannot be determined, this is an empty string NULL is returned if the index is not a filtered index or TYPE is SQL_TABLE_STAT

sp_stored_procedures

Description

Returns a list of available procedures.

Syntax

sp_stored_procedures [*sp_name*] [, *sp_owner*]
[, *sp_qualifier*]

Parameters

sp_name
is the stored procedure name. Use the wildcard character to request information about more than one stored procedure. If left blank, sp_stored_procedures returns information for all procedures.

sp_owner
is the owner of the stored procedure. Use the wildcard character to request information about procedures owned by more than one user.

sp_qualifier
is ignored. Leave blank or set to NULL.

Usage

- This function corresponds to the ODBC function SQLProcedures.

Results

sp_stored_procedures lists and describes stored procedures. Results are ordered by the following columns:

- *PROCEDURE_QUALIFIER*
- *PROCEDURE_OWNER*
- *PROCEDURE_NAME*

The lengths for varchar columns shown in the result set tables are maximums; the actual lengths depend on the target database.

The following table describes the result set for sp_stored_procedures.

Table 4-17: Result set for sp_stored_procedures

Column name	Datatype	Description
PROCEDURE_QUALIFIER	varchar(128)	Always NULL
PROCEDURE_OWNER	varchar(128)	Procedure owner
PROCEDURE_NAME	varchar(128) NOT NULL	Procedure name
NUM_INPUT_PARAMS	int NOT NULL	Number of input parameters in the stored procedure -1 – the number of input parameters is unknown
NUM_OUTPUT_PARAMS	int NOT NULL	Number of return parameters in the stored procedure -1 – the number of return parameters is unknown
NUM_RESULT_SETS	int NOT NULL	Number of result sets returned by the stored procedure -1 – the number of result sets is unknown
REMARKS	varchar(254)	Describes the procedure
PROCEDURE_TYPE	smallint	Defines the procedure type: • 0 SQL_PT_UNKNOWN – it cannot be determined whether the procedure returns a value • 1 SQL_PT_PROCEDURE – the returned object is a procedure; it does not have a return value • 2 SQL_PT_FUNCTION – the returned object is a function; it has a return value

sp_table_privileges

Description — Returns privilege information for one or more database objects.

Syntax — sp_table_privileges *table_name* [, *table_owner*] [, *table_qualifier*]

Parameters

table_name
is the name of the table. Use the wildcard character to request information about more than one table. Aliases are not supported.

table_owner
is the owner of the database object about which column privilege information is requested. Use the wildcard character to request information about tables owned by more than one user. If you do not specify this parameter, sp_table_privileges looks first for a table owned by the current user and then for a table owned by the database owner.

table_qualifier
is ignored. Leave blank or set to NULL.

Usage

- The access service selects information from the SYSTABAUTH system catalog table.
- This function corresponds to the ODBC function SQLTablePrivileges.

Results

sp_table privileges returns a list of one or more database objects with privilege information about each. Results are ordered by the following columns:

- TABLE_OWNER
- TABLE_NAME
- PRIVILEGE

The lengths for varchar columns shown in the result set tables are maximums; the actual lengths depend on the target database.

The following table shows the result set for sp_table_privileges.

Table 4-18: Result set for sp_table_privileges

Column name	Datatype	Notes
TABLE_QUALIFIER	varchar (128)	Always NULL
TABLE_OWNER	varchar (128)	Table owner identifier (authorization ID)
TABLE_NAME	varchar (128) NOT NULL	Name of the database object about which privilege information is returned
GRANTOR	varchar (128)	Identifies the user who granted this privilege; NULL if not applicable to the target database
GRANTEE	varchar (128) NOT NULL	Identifies the user to whom this privilege was granted

Column name	Datatype	Notes
PRIVILEGE	varchar (128) NOT NULL	Identifies the privilege granted to the grantee on this object as one of the following values: • SELECT – the grantee is authorized to select rows in the associated object. • INSERT – the grantee is authorized to insert rows into the associated object. • UPDATE – the grantee is authorized to update rows in the associated object. • REFERENCES – the grantee is authorized to refer to one or more columns of the table within a constraint (for example: unique, referential, or table check constraint).
IS_GRANTABLE	varchar (3)	Indicates whether the grantee is authorized to grant privilege on this object to others users with one of the following values: • YES – the grantee can grant this privilege to others. • NO – the grantee cannot grant this privilege to others. • NULL – it is unknown or not applicable to the target database.

sp_tables

Description

Returns a list of objects stored in the database.

Syntax

sp_tables [*table_name*] [, *table_owner*]
[, *table_qualifier*] [, *table_type*]

Parameters

table_name
is the name of the table. Use the wildcard character to request information about more than one table.

table_owner
is the owner of the table. Use the wildcard character to request information about tables owned by more than one user.

table_qualifier
is ignored. Leave empty or set to NULL.

table_type
is a list of values, separated by commas, requesting information about all objects of a specific type(s) as follows:

"'TABLE', 'SYSTEM TABLE', 'VIEW', 'ALIAS', 'SYNONYM'"

Note You must enclose each table type with single quotation marks, and enclose the entire parameter with double quotation marks. Enter table types in uppercase.

Usage

- This function corresponds to the ODBC function SQLTables.

Results

sp_tables returns a list of database objects. Results are ordered by the following columns:

- *TABLE_TYPE*
- *TABLE_OWNER*
- *TABLE_NAME*

The lengths for varchar columns shown in the result set tables are maximums; the actual lengths depend on the target database.

The following table shows the result set for sp_tables.

Table 4-19: Result set for sp_tables

Column	Datatype	Description
TABLE_QUALIFIER	varchar(128)	Always NULL
TABLE_OWNER	varchar(128)	Table owner
TABLE_NAME	varchar(128)	Name of the object about which information is returned
TABLE_TYPE	varchar(128) NOT NULL	One of the following: • 'ALIAS' • 'SYNONYM' • 'SYSTEM TABLE' • 'TABLE' • 'VIEW'
REMARKS	varchar(254)	A description of the table or NULL

sp_thread_props

Description	Enables the client to retrieve and set various thread properties.
Syntax	sp_thread_props [*property_name* [, *property_value*]]
Parameters	*property_name* is the name of the property to be set or shown. *property_value* is the value to which the property is to be set.
Usage	If you do not provide any parameters, or if you provide only *property_name*, the access service returns a single result set consisting of every instance of *property_name* and the value for each.

CHAPTER 5

Configuring a TRS Library for Security

This chapter explains how to configure TRS to control client access to the following:

- TRS
- Specific host connections
- Mainframe transactions

Note If you do not enforce security at TRS (that is, if you set the TRS Security configuration property to no), there are still topics in this chapter that may be helpful. For example, if you defined RPCs to send a user ID and password to your mainframe security, the mainframe must recognize the user ID and password, even if you set the Security property to no.

This chapter contains the following topics:

Security overview

TRS provides client access security, identifies security considerations and responsibilities, and uses existing security procedures to enforce security.

Security features

You can restrict client access to a mainframe processing environment in the following ways:

- Require client identification for access to TRS. Only clients specifically defined to a TRS are allowed to send requests through TRS.
- (*For LU 6.2 only*) Restrict access to mainframe connections. Each client login is assigned a group of connections it can use.
- Restrict access to mainframe transactions. Each client login is assigned a group of permitted mainframe transactions.

By default, TRS security is automatically enabled when you start TRS. You can specifically override it by setting the TRS Security configuration property to no.

Security considerations

When you plan security, you must consider security requirements at each of the following network nodes: client, TRS, and mainframe. Your security plan for TRS must address the following issues:

- *Client permissions.* Does the client have permission to log into the network? Can the client's login information be stored and passed along to TRS for permission checking at that level? Can it be passed to the mainframe to support security systems in use there?
- *Adaptive Server permissions*. If client requests are routed to TRS through Adaptive Server, which commands, data objects, stored procedures, and views does the client have permission to use? Will the client use long running transactions? (Long-running transactions can be sent through ASE/CIS.)
- *(LU 6.2 only) Mainframe connection permission.* Does the client have permission to use a given LU 6.2 connection to the mainframe?
- *Mainframe transaction permission.* Does the client have permission to execute a given mainframe transaction?
- *Mainframe data resource permission.* Does the client have permission to access or modify the data in a particular file or database?

For information on client login and Adaptive Server security, see the Adaptive Server and Open Client and Open Server documentation. Sybase security at the mainframe is described in the Open ServerConnect *Installation and Administration Guide for IBM CICS/MVS* and MainframeConnect *Installation and Administration Guide for DB2 UDB*. You can find additional information about mainframe security in your vendor documentation.

Security responsibilities

Each instance of a TRS LU62 or TRS TCP/IP Library has its own responsibilities for security. The following section discusses security responsibilities peripheral to TRS.

Client workstation

Most sites on the network have a secure login procedure that verifies the user's identity and authorization by requiring a unique user ID and password. The user ID, password, and profile information can be passed to Adaptive Server and to TRS.

Adaptive Server

Adaptive Server can grant or deny a user permission to call a particular remote procedure. Requests routed to TRS through Adaptive Server undergo security checks. The TRS administrator can apply this security mechanism to all TRS requests by setting the TRS DirectPrevent configuration property to yes, which requires all client requests to pass through Adaptive Server before they are routed to TRS.

There are two ways to get to TRS from ASE:

- ASE/CIS
- ASE site handler

Network level

The vendor's SNA support software allows login information to be sent to the mainframe in FMH-5 fields along with client requests. This facility allows you to use external security products that require client login information.

TCP/IP sends login information to the CICS Listener Transaction when the CICS transaction starts.

Security quick-start

Here are brief, step-by-step instructions for setting up security for TRS. This section assumes that mainframe security is already configured to match the values you will specify as you go through these steps. See the complete description of each procedure that follows in this chapter for details.

1 Set the TRS Security configuration property to yes.

2 Start TRS.

3 Assign a password to the “sa” account.
(See “Changing user passwords and logins” on page 102.)

```
exec sgw_chpwd sa, password
```

Note Remember this password. If you forget passwords for all TRS logins with administration privileges, you will have to reconfigure all of TRS security.

4 *(LU 6.2 only)* Use the following sgw_addcon procedure to define the connections your TRS uses. Specify LUs that use a mode entry that supports conversation level security. Talk to your VTAM system programmer and verify the PSERVIC property has a value of “x'12'” or “x'10'” in the tenth byte.

```
exec sgw_addcon con_name, region, mode,
 "max_sessions"
```

See “Adding a connection configuration” on page 46.

5 (*LU 6.2 only*) Use the following sgw_addcongrp procedure to add a connection group.

```
exec sgw_addcongrp group_name
```

See “Adding a connection group” on page 106.

6 For LU 6.2 or TCP/IP do the following:

- (*LU 6.2 only*) Use the sgw_addcontogrp procedure to add connections to the connection group.

```
exec sgw_addcontogrp group_name, con_name
```

See “Adding connections to a connection group” on page 107.

- *(TCP/IP only)* Use the sgw_addregion procedure to specify the regions.

```
exec sgw_addregion region, hostname,
"port_number"
```

See “Defining regions to TRS” on page 48.

7 Use the sgw_addrpc procedure to add RPCs. Use one of the following security parameters to specify the login information to send to the mainframe for each RPC:

```
exec sgw_addrpc rpc_name, tran_id, region, security
```

In the sgw_addrpc procedure, the *security* parameter can have any of the following values to specify the information to send:

- none – do not send login information to the mainframe.
- userid – send only the user ID to the mainframe.
- both – send both the user ID and the password to the mainframe. (Use values that your mainframe security recognizes.)

See “Adding an RPC” on page 50.

8 Use the sgw_addtrngrp procedure to add a transaction group:

```
exec sgw_addtrngrp tran_group, GROUP_LOGIN,
 GROUP_PWD, langrpc, langpwdlevel
```

See “Adding a transaction group” on page 111.

Note Be sure that the values of GROUP_LOGIN and GROUP_PWD are in uppercase.

---

9 Use the sgw_addrpctogrp procedure to add RPCs to the transaction group. For each RPC you add to the group, specify the source of the mainframe login using one of the following rpcpwdlevel parameters:

- none – do not send login information to the mainframe.
- user – send the host login and password specified in the sgw_addlog procedure (see the next step) to the mainframe.

- group – send the login and password specified in the sgw_addtrngrp procedure (see "Adding a transaction group" on page 111) to the mainframe.

  ```
  exec sgw_addrpctogrp tran_group, rpc_name,
   rpcpwdlevel
  ```

  See "Adding RPCs to a transaction group" on page 112.

10 Use the sgw_addlog procedure to add a login. Specifying the transaction group and connection group that you added in the previous steps.

   ```
   exec sgw_addlog login, pwd, HOST_LOGIN, HOST_PWD,
   tran_group, con_group, gwctrl
   ```

   See "Adding a login" on page 101.

Note Be sure the values of HOST_LOGIN and HOST_PWD are in uppercase. For LU 6.2, use the con_group parameter. For TCP/IP, include a comma as a placeholder.

TRS Administrator's security tasks

Under TRS security, every client login must be defined to TRS. This login definition specifies the client login ID and password, as well as an optional mainframe login ID and password for each. A login definition also includes an assignment to a connection group (LU 6.2 only) and mainframe transaction group. Clients using that login can only access connections and transactions in their assigned groups.

A transaction group lists RPCs that are defined to TRS. Each RPC in the group corresponds to a specific mainframe transaction. When a client calls a remote procedure, the corresponding mainframe transaction executes.

The TRS Administrator's basic responsibilities are outlined in "Security quick-start" on page 96, which is an overview of steps to set up TRS security.

Overriding security

If you do not want to enforce security at TRS, you can disable TRS security by setting the TRS Security configuration property to no. This option tells TRS not to verify logins (except for "sa") or access to verify to transactions and connections.

When you set the Security property to no, user IDs and passwords used to log in to TRS are forwarded transparently to the mainframe on each RPC. This method uses mainframe security only. See "Adding an RPC" on page 50 for information about RPC security definitions.

User IDs

When you enforce security at TRS, you can choose to assign a single mainframe ID to all clients that use a certain transaction or group of transactions rather than have all individual user IDs and passwords defined. This group ID is specified as part of the transaction group definition with the sgw_addtrngrp procedure. See "Adding a transaction group" on page 111 for more information.

System Administrator's account

When first installed, TRS has a single client login defined as "sa" (system administrator). This login has permission to use all control and security features of TRS. Initially, a password is not required to log in as "sa." You should define your own password for the "sa" login as soon as you begin setting up TRS.

Use this procedure to change the password:

```
exec sgw_chpwd login, gateway_pwd, HOST_PWD
```

- Replace login with "sa," and gateway_pwd with the password for TRS.
- You can omit the HOST_PWD parameter unless you defined the "sa" account at the mainframe as well.
- You do not need to include the comma as a placeholder, because it is the last parameter in the procedure.
- If you include a password for the transaction processing region at the mainframe (host), enter it in uppercase.

For more information, see “Changing user passwords and logins” on page 102.

Note Remember the password of the TRS “sa.” If you forget the passwords for all TRS logins with administrator privileges, you will have to reconfigure security.

Defining logins to TRS

When TRS security is enabled, a login definition must be defined for every client that wants to access TRS. This definition includes the login ID and password and groups of transactions and connections (LU 6.2 only) that are available to clients using this login.

When you define a login to TRS, you can specify a mainframe ID and password for that login. This feature enables a TRS client attempting access to mainframe resources to use IDs and passwords that the mainframe recognizes.

If security is enforced at TRS, when TRS receives a client request, it checks the client’s login ID and password against its list of login definitions. If the client’s login information matches a login definition entry, TRS accepts the login request. If it does not recognize the login information, it rejects the request. Only clients with IDs defined to TRS are allowed to login to TRS.

See “Adding a login” on page 101 for more information about defining a login.

User-level security

When security is enforced at TRS (the Security configuration property is set to yes), every user who sends requests to a transaction processing region through TRS must be defined to that TRS.

A user definition includes the following information:

- The user’s login ID and password
- The transaction processing region (host) login ID and password in uppercase
- (*LU 6.2 only*) The assigned connection group that the user is permitted to use to access a mainframe

- The assigned transaction group defining the collection of RPCs the user is permitted to use
- The permission to perform TRS control operations

Displaying current logins

To display a summary of all existing logins, use this procedure:

```
exec sgw_dsplog
```

The sgw_dsplog procedure displays the login and host login name, the transaction group name, the connection group name (LU 6.2 only), and indicates whether the login can access the control procedures. All users can execute the status procedures.

Adding a login

To add a login definition to TRS, use this procedure:

```
exec sgw_addlog login, pwd, HOST_LOGIN,
  HOST_PWD, tran_group, con_group, gwctrl
```

where:

- *login* is the login ID of the user, sent from the client application.
  For example, this would be the value provided in the -U flag specified in isql.
  Length: maximum of 30 characters.
- *pwd* is the login password.
- *HOST_LOGIN* is the login ID by which this user is known to the mainframe. Leave this field blank only if you are also not specifying a HOST_PWD. The value for this field must be in uppercase.
  Length: maximum of eight characters.
- *HOST_PWD* is the password for the HOST_LOGIN. The value for this field must be in uppercase. Leave this field blank only if you are also not specifying a HOST_LOGIN.
  Length: maximum of eight characters.
- *tran_group* is the name of the collection of RPCs this user can access. This collection must be defined to TRS, and a user can be assigned to only one transaction group (see “Adding a connection group” on page 106).
  Length: maximum of eight characters.

- *con_ group* (LU 6.2 only) is the name of the collection of connections this user can access. This connection group must be defined to TRS, and a user can be assigned only one connection group (see "Adding a connection group" on page 106).

  For TCP/IP only, include a comma or null as a placeholder, but do not provide a value for the con_group parameter.
  Length: maximum of eight characters.

- *gwctrl* is the TRS administration procedures permission indicator. Choose one of the following values:

  - yes grants the user permission to access and make changes using control, configuration, and security procedures.
  - no means the user has status-querying permission only.

  Note If you type something other than *yes* or *no*, the *gwctl* parameter defaults to *no*.

Example

To add the user named BERTHA to an LU 6.2 TRS, use the sgw_addlog procedure:

```
exec sgw_addlog bertha, BIGBLUE, BIG, BLEUBRT, TGROUP1,
FINANCE, yes

go
```

This isql example adds TRS user named BERTHA with a password of BIGBLUE, and a host login and password of BIG and BLEUBRT, respectively. BERTHA can use RPCs defined to the transaction group named TGROUP1, and connections included in the connection group named FINANCE. BERTHA has permission to administer TRS.

Changing user passwords and logins

Users can change their own passwords. Users with control authority can change other users' passwords. (Control authority is defined by a yes value for the gwctrl parameter of the sgw_addlog procedure.)

Changing passwords

To change the TRS password or the TRS record of this user's password for a login, use this procedure:

```
exec sgw_chpwd login, pwd, HOST_PWD
```

where:

- *login* is the name of the TRS login for which you intend to change the password.
- *pwd* is the password for TRS.
- *HOST_PWD* is the password for the mainframe. The value for this parameter must be in uppercase.

Note If you do not have a value for a parameter, (that is, if you only want to change one password) include the comma or null as a placeholder.

Example

To change the mainframe password for a user named BERTHA and keep the same TRS password, use this procedure:

```
exec sgw_chpwd BERTHA,null,BLUEBRT
go
```

The TRS password BERTHA is unchanged, and her new mainframe password is BLUEBRT.

Changing logins

To change a user's login ID for TRS or for the mainframe (the HOST_LOGIN parameter of the sgw_addlog procedure), drop the login and add it again with the new ID.

For information about dropping a login, see "Deleting a user definition" on page 103.

Deleting a user definition

You can remove user definitions from the TRS list of logins. To delete a user from the list, use this procedure:

```
exec sgw_droplog login
```

where: login is the TRS login name of the user you intend to drop.

Example

Use this procedure to remove the user named BERTHA from the TRS list of logins:

```
exec sgw_droplog BERTHA
go
```

Conversation-level security

For LU 6.2, conversation-level security occurs when TRS passes client login information to the mainframe in the conversation-level security fields of the Function Management Header (FMH)-5 along with the client's request. The mainframe uses this login information to determine whether the client has permission to use the requested resources. For TCP/IP, TRS sends the user ID and password to the Sybase Listener Transaction when the transaction starts.

When configuring RPCs and TRS security, you need to make decisions about:

- When to pass login information to the mainframe
- What login information to pass to the mainframe

When to forward login information

The mainframe may or may not require a full user ID and password complement for every requested transaction. When defining an RPC to TRS even when security is not enabled, you can specify the level of security information that best matches its mainframe component. Your choices are:

- none – TRS passes the request to the mainframe without any user ID or password.
- userid – TRS passes the user ID to the mainframe along with the request.
- both (user ID and password) – TRS passes the user ID and the password to the mainframe along with the request.

What login information to forward

Because user ID and password requirements at the mainframe can be different from those at the client workstation, you can specify a separate mainframe ID and password in the login definition (these values must be in uppercase). When mainframe values are specified, TRS forwards these mainframe values with the client request. If mainframe values are not specified, TRS does not forward the login information.

You can specify an alternate mainframe ID and password for a transaction group. When you add a transaction to the group, specify whether the login definition ID and password or the transaction group ID and password are passed to the mainframe with requests for that transaction.

Connection-level security (LU 6.2 only)

When connection-level security is enforced at TRS (the Security configuration property is set to yes), a user must have explicit permission to use a particular host connection. You assign a connection group to each user defined to TRS. A connection group is a list of connections that are defined to your SNA support and TRS.

Connection groups

Assigning a connection group to a user gives that user permission to use any connection belonging to that group. A user can belong to only one connection group and can use only the connections in that group. If a user login definition does not have a connection group assigned to it, and that user sends a request when security is enforced at TRS, then TRS rejects that request.

Use the connection group procedures to:

- Define the connections that make up a connection group
- Modify that list by adding or deleting connections
- Query connection groups to determine the connections that belong to them
- Add or delete entire connection groups

All connections listed in a connection group must be defined to TRS and to your SNA support. When a connection is defined, you can assign it to any number of connection groups. Likewise, you can assign a connection group to any number of users.

Connection-level security enables you to:

- Dedicate a single specific connection to a particular user. To do this, define a connection group to include a single connection, then assign that connection group to a single user.
- Dedicate a group of connections to a particular user. To do this, define a connection group to include the desired connections, then assign that connection group to a single user.
- Dedicate a group of connections to a specific group of users. To do this, define a connection group to include the desired connections, then assign that connection group to all users in the group.

To add new connection groups to TRS and to modify and delete existing connection groups, use the procedures described in the following sections.

Displaying current connection groups

To display all connection groups currently defined to TRS, use this procedure:

```
exec sgw_dspcongrp
```

Displaying one connection group

To display detail about a particular connection group, use this procedure:

```
exec sgw_dspcongrp group_name
```

where: *group_name* is the name of a connection group you want to display.

Example

```
exec sgw_dspcongrp FINANCE
go
```

This procedure returns a list of the connections in the connection group named FINANCE.

Adding a connection group

To define a new connection group, use this procedure:

```
exec sgw_addcongrp group_name
```

where: *group_name* is the name of the connection group you intend to add. The connection group name can be a maximum of eight characters.

Example

To add the FINANCE connection group, use this procedure:

```
exec sgw_addcongrp FINANCE
go
```

Add connections to the new group as shown in the next section.

Adding connections to a connection group

After you add the new connection group, specify the connections that belong to it. For each connection you add, use this procedure:

```
exec sgw_addcontogrp group_name, con_name
```

where:

- *group_name* is the name of the connection group to which you intend to add a connection.
- *con_name* is the name of the connection you intend to add.

Re-execute the sgw_addcontogrp procedure for each connection you want to add to the group.

Example

To add the connection named SYBLU01 to the FINANCE connection group, use this procedure:

```
exec sgw_addcontogrp FINANCE, SYBLU01
go
```

Dropping connections from a connection group

To remove connections from a connection group, use this procedure:

```
exec sgw_dropconfromgrp group_name, con_name
```

where:

- *group_name* is the name of the connection group from which you intend to drop a connection.
- *con_name* is the name of the connection you intend to drop.

Example

To delete the connection named SYBLU01 from the connection group named FINANCE, use this procedure:

```
exec sgw_dropconfromgrp FINANCE, SYBLU01
go
```

Dropping a connection group

To delete an existing connection group, use this procedure:

```
exec sgw_dropcongrp group_name
```

where:

group_name is the name of the connection group you intend to drop.

Transaction-level security

When security is enforced at TRS (the Security configuration property is set to yes), a user must have explicit permission to use a particular RPC. To grant a user access to an RPC, assign a transaction group to the user's login in the sgw_addlog procedure.

Assigning transaction groups

A transaction group is a collection of RPCs defined to TRS. Assigning a transaction group to a user gives that user permission to invoke a remote procedure, causing the corresponding mainframe transaction to execute. A user can belong to only one transaction group and can execute only the transactions in that group.

If a user request specifies an RPC that is not included in the user's transaction group, TRS rejects the request and returns an error message to the user.

A transaction group can include any number of RPC names. It can also include one RPC name for which the associated mainframe transaction processes SQL language requests dynamically, called the language RPC. An RPC can exist in many transaction groups.

Defining a default SQL language handler

If you do not enforce security at TRS, the default RPC name for a SQL language handler is SYRT. To define the SYRT RPC to TRS, use the sgw_addrpc procedure. If security is enforced at TRS, a default language RPC name does not exist.

See “Adding an RPC” on page 50 and “Configuring a default SQL language handler for TRS” on page 53 for more information.

Defining group logins

Each user login has an associated mainframe login user ID and password, which are passed to the transaction processing region along with the client request. You can override this login for certain client requests with a group login that applies to all users who are assigned to the same transaction group. A group login and its password is defined when the transaction group is defined. (See “Adding a transaction group” on page 111.)

Specifying login ID levels

When you add a transaction to a transaction group, you must specify the login ID level passed to the transaction processing region whenever that transaction is requested:

- user – the user’s transaction processing region login information.
- group – the transaction group login information.
- none – no login information.

The transaction group login allows you to use a single transaction processing region login for multiple users (for example, everyone in the Accounts Receivable Department).

Transaction group procedures

The transaction group administration procedures allow you to add, modify, and delete transaction groups. Use these procedures to:

- Define the list of RPCs that belong to a group
- Modify that list by adding and deleting RPCs
- Add or delete entire transaction groups
- Specify a group login for the transaction group
- Specify the login, if any, to pass to the transaction processing region with a request

- List the following information about a transaction group:
  - The RPCs that belong to the group
  - The language transaction used by its users
  - The transaction processing region login information this group uses

All RPC names listed in a transaction group must be defined to TRS. They must map to transactions the names of which are defined to the mainframe transaction processing region.

After you define an RPC, you can assign it to any number of transaction groups. Also, you can define a transaction group to any number of users. Each user, however, can be associated with only one transaction group.

Displaying all transaction groups

You can add new transaction groups to TRS and modify and delete them. To display information about existing groups, use one this procedure

```
exec sgw_dsptrngrp
```

The sgw_dsptrngrp procedure, when entered without parameters, displays *all* transaction groups.

Displaying one transaction group

To display details about a particular transaction group, use this procedure:

```
exec sgw_dsptrngrp tran_group, rpc
```

where:

- *tran_group* is the name of the transaction group you want to display (see the following example).
- rpc is a keyword that you enter as a fixed-string, optional parameter to only display the RPCs that are members of that transaction group and the RPC password levels. If you omit rpc, the member RPCs are not included in the results.

Example

```
exec sgw_dsptrngrp TGROUP1
go
```

The results of this procedure list the following information:

- Group name

- Group login
- Group password
- Language handler
- Language password source

  Or, you can include the optional rpc fixed-string parameter, as shown:

  ```
  exec sgw_dsptrngrp TGROUP1, rpc
  go
  ```

  The results of this procedure list only the RPC name and the RPC password source.

Adding a transaction group

To define a new transaction group, use this procedure (replace the italicized parameters as shown):

```
exec sgw_addtrngrp tran_group, GROUP_LOGIN
 GROUP_PWD, langrpc, langpwdlevel
```

where:

- *tran_group* is the name of the transaction group.
  Length: maximum of eight characters.
- *GROUP_LOGIN* is the alternate transaction processing region login that member transactions can use. When langpwdlevel is set to group, the GROUP_LOGIN overrides the HOST_LOGIN of the user calling this procedure. This value must be in uppercase. Null is valid.
  Length: maximum of eight characters.
- *GROUP_PWD* is the alternate transaction processing region password that member transactions can use. When langpwdlevel is set to group, this password overrides the HOST_LOGIN of the user calling this procedure. This value must be in uppercase. Null is valid for TRS LU62 only.
  Length: maximum of eight characters.
- *langrpc* is the RPC name used to process SQL language requests. This is the name assigned to all language requests by users of this transaction group. Null is valid.
  Length: maximum of thirty characters.

- *langpwdlevel* is the source of the transaction processing region login information for language RPCs. It indicates whether transaction processing region login ID and password should be passed to the transaction processing region with this transaction request, and if so, whether the user's HOST_LOGIN or the transaction group's GROUP_LOGIN information should be used. This parameter can have one of the following values:
  - none – do not send login information to the transaction processing region.
  - user – send the user's HOST_LOGIN and HOST_PWD.
  - group – send the GROUP_LOGIN and GROUP_PWD defined here.

Example

This example creates the transaction group named TGROUP1:

```
exec sgw_addtrngrp TGROUP1,,,AMD2,user
go
```

This example gives the TGROUP1 transaction group the following characteristics:

- It does not use group logins or passwords.
- It uses the AMD2 language RPC.
- It forwards the HOST_LOGIN and HOST_PWD information of the users assigned to this group (in the sgw_addlog procedure) to the transaction processing region.

Adding RPCs to a transaction group

After you define a transaction group, you must specify the transactions that belong to it. A transaction group contains one language RPC and any number of standard RPCs.

To add an RPC to the transaction group, use this procedure:

```
exec sgw_addrpctogrp tran_group, rpc_name,
  rpcpwdlevel
```

where:

- *tran_group* is the name of the transaction group to which you want to add an RPC.
  Length: maximum of eight characters.

- *rpc_name* is the name of the RPC you want to add. This is the remote procedure called by the client.
  Length: maximum of 30 characters.
- *rpcpwdlevel* indicates whether user identification is passed to the transaction processing region with this transaction request and, if user identification is to be passed, indicates the origin of the identification. This parameter can have one of the following values:
  - none – do not send login information to the transaction processing region.
  - user – use the user ID and password from the HOST_LOGIN and HOST_PWD values of the user login definition.
  - group – use the user ID and password from the GROUP_LOGIN and GROUP_PWD values of the transaction group definition.

Specifying an RPC password level

Specify one of the following IDs to send to the mainframe with the request:

- The group ID for the transaction group, defined using the sgw_addtrngrp procedure.
- The client's mainframe login and password from the client's login definition (userid), defined using the sgw_addlog procedure.
- none, which indicates that login information should not be sent to the mainframe with that transaction. In combination with setting the TRS Security configuration property to yes, this means authorization checking does not occur.

Example

```
exec sgw_addrpctogrp TGROUP1, SYV2, user
go
```

This isql example adds a standard RPC named SYV2 to the transaction group named TGROUP1. The user's alternate transaction processing region ID (HOST_LOGIN and HOST_PWD) is sent to the transaction processing region.

Deleting RPC names from a transaction group

To remove an RPC name from a transaction group, use this procedure:

```
exec sgw_droprpcfromgrp tran_group, rpc_name
```

where:

- *tran_group* is the name of the transaction group from which you want to delete the RPC.
- *rpc_name* is the name of the RPC you want to delete.

Example

To make sure the RPC named SYV2 is no longer part of the TGROUP1 transaction group, use this procedure:

```
exec sgw_droprpcfromgrp TGROUP1, SYV2
go
```

Modifying a transaction group

To change values in an existing transaction group, use this procedure:

```
exec sgw_modtrngrp tran_group, GROUP_LOGIN,
  GROUP_PWD, langrpc, langpwdlevel
```

where:

- *tran_group* is the name of the transaction group.
- *GROUP_LOGIN* is the alternate transaction processing region login that member transactions can use. When langpwdlevel is set to group, the GROUP_LOGIN overrides the HOST_LOGIN of the client calling this procedure. This value must be in uppercase.
- *GROUP_PWD* is the alternate transaction processing region password that member transactions can use. When langpwdlevel is set to group, this password overrides the HOST_PWD of the client calling this procedure. This value must be in uppercase.
- *langrpc* is the RPC name used to process SQL language requests. This is the name assigned to all language requests by users who use this transaction group.
- *langpwdlevel* is the source of the transaction processing region login information for language RPCs. It indicates whether transaction processing region login ID and password should be passed to the transaction processing region with this transaction request, and if so, whether the user's HOST_LOGIN or the transaction group's GROUP_LOGIN information should be used. This parameter can be one of the following values:

  none, which means, do not send login information to the transaction processing region.
  user, which means, send the HOST_LOGIN and HOST_PWD.
  group, which means, send the GROUP_LOGIN and GROUP_PWD defined here.

Example

If the TGROUP1 transaction group langpwdlevel is currently set to user, this isql example sets it to group:

```
exec sgw_modtrngrp TGROUP1, JOE, MOE, AMD2, group
go
```

The GROUP_LOGIN and GROUP_PWD are now set to JOE and MOE, respectively. The language RPC remains AMD2, and the langpwdlevel is now group. If langpwdlevel is the only parameter you are changing the value of, you can enter this procedure as follows:

```
exec sgw_modtrnprp TGROUP1,,,,group
go
```

The commas serve as placeholders for the unchanged parameters.

Deleting a transaction group

To delete a transaction group from the TRS security system, use this procedure:

```
exec sgw_droptrngrp tran_group
```

where:

tran_group is the name of transaction group you want to delete.

Example

This procedure deletes the transaction group named TGROUP1:

```
exec sgw_droptrngrp TGROUP1
go
```

CHAPTER 6

Using Password Expiration Management (PEM) with TRS

This chapter describes how to implement and use the IBM Advanced Program-to-Program Communications (APPC) Password Expiration Management (PEM) with DirectConnect (TRS).

Note This chapter applies only to LU 6.2.

This chapter contains the following topics:

What is PEM?

PEM is a password management program that IBM provides with:

- CICS 3.3, through an optional PTF UN90057
- CICS versions 4.1 and later
- z/OS

Sybase provides support for PEM as a feature of TRS for LU 6.2. This feature is not available for TRS connections to the mainframe using TCP/IP.

PEM server capabilities

The PEM server provides capabilities for an APPC application to:

- Retrieve information regarding the success or failure of the host logon process
- Validate any supplied user ID and password
- Determine when the host password expires
- Update the host password for a specified user ID

Starting a host transaction

When you attempt to start a host transaction from TRS, the request may fail due to a host security violation. An expired password, incorrect password setup, or some other reason can cause the failure.

With PEM disabled, an LU 6.2 user cannot determine the exact cause of this security violation. SNA allows only a single error message to be returned to the error log, regardless of the cause.

With PEM enabled for TRS, if a host security violation occurs, TRS sends an error message to the client informing the user to execute a PEM RPC to obtain more information. The exact message depends on whether the request was made by an individual user ID or a transaction group's user ID. For example, TRS returns the following error message if a security violation occurs as a result of a request made by an individual user ID:

```
34331, "The requested host transaction could not be
started because of a host security violation. Please
execute sgw_peminfopwd for more information."
```

Changing the host password

LU 6.2 TRS support for PEM also allows you to execute procedure calls to change the host password for either an individual user or for a transaction group at both the mainframe and TRS security levels.

PEM returns the following information in response to any of these procedure calls:

- The current successful host login date and time

- The last successful host login date and time
- The date and time the current host password expires (can be null if the password never expires)
- The revoke count (number of unsuccessful host logins since last successful logon)

Note PEM does not display the actual password itself.

The following sections explain how to implement and use PEM functionality as an additional feature of TRS for LU 6.2.

Implementing PEM functionality for LU 6.2 TRS

This section assumes that PEM is already installed and all related host work is complete on the mainframe, as described in your IBM documentation.

CICS SIT table property

You may need to ask your CICS system programmer and the external security manager to change the setting of the CICS SIT table property, ISRDELAY=n. This property defines the intersystem refresh delay, which determines how long users remain signed on to the host when running transactions with the Inter System Communication (ISC) setting. Its setting may affect the ability of users to log in more than once or to run multiple host transactions from TRS within the defined time period. By default, the delay is set to 30 minutes. Sybase recommends setting ISRDELAY=0; for CICS version 4.1, this parameter is USRDELAY=0.

To implement TRS support for PEM after you install the TRS software, set the TRS PEMDest configuration property, which specifies the remote LU name (the name of the transaction processing region) in which the PEM server sign-on transaction resides on the host. See “PEMDest” on page 26 for more information.

Obtaining information about passwords

Use one of the following RPCs to obtain information about recent attempts to log onto the host and to determine the expiration date of a host password:

- sgw_peminfopwd – retrieves information about an individual user's host password expiration date and logon attempts.
- sgw_peminfogrppwd – retrieves information about a transaction group's host password expiration date and logon attempts.

The following sections describe syntax and usage notes for each procedure call.

User password information

To obtain information about an individual user's host password expiration date and recent logon attempts, execute the following RPC:

exec sgw_peminfopwd [*hostuserid, hostpwd*]

If you include the *hostuserid* and *hostpwd* parameters, TRS passes the specified user ID and password to the PEM server.

If you do not specify any parameters, TRS assumes you are requesting information about the client from which you are making the request. It passes one of the following to the PEM server, depending on whether security is enabled:

- If TRS security is enabled (the Security configuration property is set to yes), the client's *HOST_LOGIN* and *HOST_PWD*, as defined by sgw_addlog or by a previous sgw_pemchpwd procedure call
- If security is not enabled (the Security configuration property is set to no), the user ID and password that the client used to log onto TRS

Maximum length for the user ID and password is eight characters each.

Group password

To obtain information about a transaction group's host password expiration date and recent logon attempts, execute the following RPC:

exec sgw_peminfogrppwd *tran_group*

The *tran_group* parameter is required. It specifies the name of the transaction group for which you want logon and password information. TRS passes to the PEM server the transaction group's *GROUP_LOGIN* and *GROUP_PWD*, as defined by sgw_addtrngrp or by a previous sgw_pemchgrppwd procedure call.

Note You must have Gateway Control Access permission to execute this procedure call.

Changing passwords

With PEM enabled, you can change a user's or group's host password, using one of the following RPCs:

- sgw_pemchpwd to change an individual user's host password
- sgw_pemchgrppwd to change a transaction group's host password

Note You must have Gateway Control Access permission to execute the procedure call for group password changes.

If you successfully change the password, the following message appears on the client:

```
The password for host userid 'username' has been
successfully changed.
```

Syntax and usage notes for each procedure call are described in the following sections.

Changing an individual password

TRS clients can change their own host password by executing the following RPC, where *newpwd* is the new host password for the client:

exec sgw_pemchpwd *newpwd, newpwd*

You must be logged on as the user whose password you want to change. Depending on whether security is enabled, TRS passes one of the following to the PEM server:

- The client's *HOST_LOGIN* and *HOST_PWD*, as defined by sgw_addlog or by a previous sgw_pemchpwd procedure call, if security is enabled (the TRS Security configuration property is set to yes)
- The user ID and password that the client used to log on to TRS, if security is off (the TRS Security configuration property is set to no)

The user ID, current password, and new password must be up to eight characters. You must enter the new password twice, as shown in the preceding syntax example.

This operation updates a user's host password at the mainframe security system, and, when TRS security is enabled, it also updates the user's *HOST_PWD* at the TRS security level.

Only the individual user can change his or her password on the host; the TRS administrator cannot perform this task.

Note When security is not enabled, changing the host password does not change the password under which are currently logged in. When you change your host password, you cannot execute any RPCs until you log out of TRS and log in with the correct password.

Changing a group's password

To change a transaction group's host password, you must have Gateway Control Access permission. Execute the following RPC:

exec sgw_pemchgrppwd *tran_group newpwd*, *newpwd*

The *tran_group* parameter is required. It specifies the name of the transaction group you want to change the password for.

You must enter the new password (*newpwd*) twice, as shown.

This operation updates the host password of the group user ID at the mainframe security system, as well as the transaction group's *GROUP_PWD* at the TRS security level, which was last defined by sgw_addtrngrp or by a previous sgw_pemchgrppwd procedure call.

Setting up new users

You can use PEM procedure calls to access logon information or change a user's host password only if the user already has a valid host password that is known to the mainframe security system.

Note You cannot use the sgw_pemchpwd or sgw_pemchgrppwd procedure calls to set up the initial host password for a new user.

The TRS administrator coordinates host security setup for new users with the mainframe external security administrator:

- The TRS administrator uses the sgw_addlog or sgw_addtrngrp procedure to set up an individual or group user ID and initial host password at the TRS security level.
- The mainframe external security administrator implements the assigned user ID and host password at the mainframe security level.

After initial setup is complete, the new user should logon to the system and change the administrator-assigned password to a private one using the sgw_pemchpwd procedure call.

For more information about setting up new users, see "Adding a login" about using sgw_addlog.

For more information about setting up new transaction groups, see "Adding a transaction group" in Chapter 4 about using sgw_addtrngrp.

CHAPTER 7

Controlling a TRS

This chapter explains the controlling administration tasks a TRS may require while it is running.

This chapter contains the following topics:

If you are enforcing security at TRS, the procedures described in this chapter require administration permissions. See “Adding a login” on page 101 for information about TRS administration permissions.

Controlling connections (LU 6.2 only)

If you are using LU 6.2, this section describes how to start a single connection and all connections, how to prevent inactive connections, and how to stop a connection gradually and abruptly.

Activating connections

To reactivate a connection, use one of the following procedures. You can activate a single connection or restart all inactive connections.

By default, connections are active as a result of defining them. Connections may require reactivation if they have been made inactive, either as a result of use of the sgw_deactcon RPC or a problem on the SNA network while the sgw_deactcon property is set to *yes*.

Activating a single connection

To activate a single connection, use this procedure:

```
exec sgw_actcon "con_number"
```

"con_number"

where *"con_number"* is the number of the connection you intend to start. This is the *connect number* with the value displayed in the sgw_status connections procedure. Enclose numeric parameter values in quotation marks.

Example

To activate connection number 1, use this procedure:

```
exec sgw_actcon "1"
go
```

Restarting all connections

To restart all connections, use this procedure:

```
exec sgw_actcon all
```

where the all option activates all connections, allowing you to recover when your SNA support stops or connections become inactive for any reason.

Marking connections as inactive

To have TRS mark connections as "inactive" if it receives an unrecoverable error when trying to use the connection, set the DeactCon configuration parameter to yes. When the error that caused the connection to be marked "inactive" is corrected, reactivate the connection.

Preventing inactive connections

To prevent TRS from marking connections "inactive," you can set the TRS DeactCon configuration property to no. We recommend this option for remote sites that run unattended.

Deactivating a connection

To deactivate a connection, use either of these procedures:

```
exec sgw_deactcon "con_number"
```

or

```
exec sgw_deactcon "con_number", force
```

where:

- *"con_number"* is the number of the connection you intend to deactivate. This is the connection number value displayed in the sgw_status connection procedure. Enclose numeric parameter values in quotation marks.
- force is optional. If you use the force option, the connection you specify ends, even if it is currently executing. However, on some TRS platforms, even a forced deactivate allows the current request to complete before deactivating the connection.

  If you do not use the force option, TRS allows any transactions in progress to complete before it deactivates the connection. While these transactions finish processing, the connection is considered to be "draining."

Example

To deactivate connection number "1," use this procedure:

```
exec sgw_deactcon "1", force
go
```

The force option causes connection number "1" to deactivate even if it is currently executing.

Deactivating LU 6.2 connections

This section describes how to deactivate connections in an LU 6.2 environment before you disconnect clients.

If you need to disconnect a client that is waiting for transaction results, you or your system programmer can use one of the following methods to deactivate the connection before you disconnect the client:

- Using VTAM:

  ```
  VARY NET,INACT,ID=lu_name,FORCE
  ```

- Using isql:

  ```
  exec sgw_deactcon "con_number", force
  ```

Controlling regions (TCP/IP Only)

This section describes how to activate a single region or all regions in a TCP/IP environment and how to deactivate a region.

Activating regions

To activate a region, use one of the following procedures. You can restart all inactive regions or just activate a single region.

Restarting all regions

To restart all regions, use this procedure:

```
exec sgw_actregion all
```

where the *all* option activates all regions, allowing you to recover when your TCP/IP support stops or regions become inactive for any reason.

Activating a single region

To activate a single region, use this procedure:

```
exec sgw_actregion region
```

where *region* is the name of the region you intend to activate.This is the name you assigned to the region in the sgw_addregion procedure.

Example

To activate the region named TESTREG, use this procedure:

```
exec sgw_actregion TESTREG
go
```

Deactivating a region

Deactivating a region prevents users from using that region.
To deactivate a region, use this procedure:

```
exec sgw_deactregion region
```

where *region* is the name of the region you intend to deactivate. This is the name you assigned to the region in the sgw_addregion procedure.

Example

To deactivate the region named TESTREG, use this procedure:

```
exec sgw_deactregion TESTREG
go
```

Disconnecting a client

You can force a particular client to disconnect. Generally, you use this command when you want to disconnect idle clients or clients having network problems. To disconnect a client, use this procedure:

```
exec sgw_disclient "client_number"
```

where *"client_number"* is the number of the client you intend to disconnect. Obtain the client number from the sgw_status clients procedure. Enclose numeric parameter values in quotation marks.

If you disconnect a client that invoked a long running transaction before the transaction ends, TRS deallocates the conversation and disconnects the client.

Example

To disconnect client number 7, use this procedure:

```
exec sgw_disclient "7"
go
```

If a transaction is in process, this command disconnects clients that are actively reading and processing results.

Controlling RPCs

You can take an RPC out of service by declaring it inactive. TRS rejects any client call to an inactive RPC name. A typical reason to deactivate an RPC is that the associated mainframe transaction is temporarily off line.

Activating an RPC

To make a defined RPC available (activate), use this procedure:

```
exec sgw_actrpc rpc_name
```

where *rpc_name* is the name of the RPC you intend to activate.

Example

To activate the SYV2 RPC, use this procedure:

```
exec sgw_actrpc SYV2
go
```

Deactivating an RPC

To make a defined RPC unavailable (deactivate), use this procedure:

```
exec sgw_deactrpc rpc_name
```

where *rpc_name* is the name of the RPC.

Example

To deactivate the SYV2 RPC, use this procedure:

```
exec sgw_deactrpc SYV2
go
```

Controlling tracing

The TRS tracing facility provides *entry/exit* tracing, tracing of the TRS interface with the back-end transport protocol, and TDS header and data tracing. When you enable tracing, tracing information is written to a set of error logs.

Ordinarily, you do not need to trace TRS activity. The tracing facility is provided to help Sybase Technical Support assist you if you call about certain errors. Tracing can also be useful for diagnosing local area network (LAN) and client application problems. For more information about tracing, see the sections describing the TRS TraceTRS, TraceProtocol, ProtocolTraceFile, and TDSTraceFile configuration properties in Chapter 2, “Creating a TRS”.

Mainframe-based tracing is described in the Open ServerConnect *Programmer’s Reference* guides. COBOL and PL/1 versions of this guide are available.

To enable or disable *entry/exit* tracing, set the servers TraceEntryExit property. TRS entry/exit tracing accesses the following file:
For UNIX:

```
$SYBASE/$SYBASE_ECON/srvname/log/srvname.trc
```

For Windows:

```
%SYBASE%/%SYBASE_ECON%/srvname/log/srvname.trc
```

To enable or disable TDS tracing before TRS starts running, set the appropriate properties in the TRS configuration file. See the sections describing the TRS TraceTRS and TDSTraceFile configuration properties in Chapter 2, “Creating a TRS”.

To enable or disable protocol tracing before TRS starts running, set the appropriate properties in the TRS configuration file. See the sections describing the TRS TraceProtocol and ProtocolTraceFile configuration properties in Chapter 2, “Creating a TRS”.

You can also use DirectConnect Manager to enable and disable tracing while TRS runs.

Starting tracing

To start *TDS* tracing, use the following procedure:

```
exec sgw_starttrace TDS
```

where *TDS* activates TDS tracing. TDS tracing accesses the following directory:

```
$SYBASE/$SYBASE_ECON/srvname/log
```

To start *protocol* tracing, use the following procedure:

```
exec sgw_starttrace PROT
```

where *PROT* activates tracing of the DirectConnect interface with the backend transport protocol layer, for either TCP/IP or LU 6.2.

- On Windows, back-end TCP/IP tracing goes into

```
$SYBASE/$SYBASE_ECON/srvname/log/trstcp.ngtcp
```

- On UNIX, back-end TCP/IP tracing goes into

```
$SYBASE/$SYBASE_ECON/srvname/log/ngtcp.trstcp
```

- On Windows, back-end LU 6.2 tracing goes into

```
$SYBASE/$SYBASE_ECON/srvname/log/trslu62.nglu62
```

- On UNIX, back-end LU 6.2 tracing goes into

```
$SYBASE/$SYBASE_ECON/srvname/log/nglu62.trslu62
```

If no parameter is entered, the default is *TDS*.

Stopping tracing

To stop TDS tracing, use the following procedure:

```
exec sgw_stoptrace TDS
```

where *TDS* tracing is disabled.

To stop protocol tracing, use the following procedure:

```
exec sgw_stoptrace PROT
```

where *PROT* tracing is disabled for either LU 6.2 or TCP/IP.

If no parameter is entered the default is *TDS*.

Controlling accounting

TRS allows you to record accounting information. This section describes how to record accounting at TRS. Mainframe-based accounting is explained in the Open ServerConnect documentation.

The TRS accounting facility records the following information:

- The name by which TRS is known.
- The RPC the named client calls.
- The connection name or mainframe name relevant to this RPC.
- The date and time that TRS sent the request to the transaction processing region.
- The time elapsed since the request was sent.

  The time elapsed count starts when TRS receives the request and continues until the final result row is sent to the client. Some applications, such as Data Workbench, read a few rows at a time, and then request more rows as the user requests them to be displayed, allowing the user to read the results. This time is included in the total duration.
- The total number of bytes sent and received with this RPC.
- The total number of Sybase TDS packets sent and received with this RPC. A packet is 512 bytes or less.

To turn on accounting before TRS starts running, set the appropriate properties in the TRS configuration file. See the sections describing the Accounting and AccountFile configuration properties in Chapter 3, “Configuring a TRS”.

Note You can also use DirectConnect Manager to enable and disable accounting while TRS is running.

Activating and deactivating accounting

To start and stop the TRS accounting facility while TRS is running, use these procedures:

```
exec sgw_startact
exec sgw_stopact
```

Executing these procedures is equivalent to setting the Accounting configuration property to no.

Reading the accounting log

When you activate accounting, TRS writes the accounting records to the accounting log. See the AccountFile configuration property for the name of the accounting log file.

To display the accounting log, use this procedure:

```
exec sgw_dspact
```

Each accounting log record is returned in a row.

Stopping TRS

Generally, TRS runs continuously. If you need to deactivate TRS, use the following procedure to disconnect each client and allow conversations in progress to finish first:

```
exec sgw_shutdown
```

Use the following procedure to disconnect each client immediately without waiting for conversations in progress to finish:

```
exec sgw_shutdown now
```

With the preceding procedure, TRS does not accept any new client requests.

When you are ready to start TRS again, set the configuration properties described in Chapter 3, “Configuring a TRS”.

CHAPTER 8

Monitoring a TRS

This chapter explains how to obtain information about TRS users, connections, regions, and RPCs; how to obtain trace status; and how to determine the options specified when TRS starts.

This chapter contains the following topics:

Monitoring the status of TRS

You can use the sgw_status procedure to query the status of TRS. The status procedures tell you the following:

- The clients logged in to TRS
- The system on which they are running
- Remote procedure calls (RPCs) they call
- Connections they use
- Accounting information

The following procedure queries the status of TRS:

```
exec sgw_status options
```

The following are values for *options* in the sgw_status procedure, which are described in this chapter:

- clients

- connections (LU 6.2 only)
- regions (TCP/IP only)
- rpc
- parameters
- trace
- sum

Monitoring clients

To query the status of clients, use this procedure:

```
exec sgw_status clients
```

This procedure displays the information in the following table for all active clients.

Table 8-1: Description of sgw_status clients results

Field	Description
Login	The login name of the user.
Client_Number	TRS issues a unique client number each time a user logs in. A user logged in more than once has the same *Login* and a different *Client_Number* for each connection to TRS. **Note** For LU 6.2, this number identifies the user's logins in the connections status display.
RPC_Name	The RPC called by the client. • If the request is a direct call from an Open Client DB-Library application, this field contains the RPC name specified in the dbrpcinit statement. • If the request is an indirect call from a Adaptive Server stored procedure, this is the RPC name that the stored procedure used when it called TRS.
Host_Tran	The name of the mainframe (host) transaction being invoked. This is the mainframe transaction associated with the RPC name. If a transaction is not in progress, this field is blank.
Client_Machine	The name of the machine on which the client program is running.
Con_Number (LU 6.2 only)	The connection number. TRS uses this number to represent the client's current SNA connection. If the client is not using any connections, this field is blank.

Field	Description
State	The state of the transaction. Valid values for this two-character field are: • AL (allocation) – TRS is allocating a conversation (LU 6.2 only) to the displayed mainframe (host) transaction or opening a socket (TCP/IP only) to the mainframe transaction. • CQ (connection queue) – TRS (LU 6.2 only) is waiting for an available connection to the mainframe. • GC (TRS administration) – the user is executing TRS administration procedures or is using the Gateway Control Program. • ID (idle) – the client is connected to TRS, but a transaction is not in progress. • IT (idle in transaction) – TRS is invoking a long-running transaction. The client is between procedure calls but a conversation is active. • RS (reading server – TRS is waiting for the mainframe transaction to return results. • SH (site handler) – the client is Adaptive Server. • WA (waiting) – the conversation is allocating, and TRS is waiting for the first set of results. • WC (writing to client) – TRS is writing data to the client program.
Count	The number of buffers being written to the client program as part of the result set of the current transaction. Each buffer contains approximately 512 bytes of data.
Time	The length of time, in seconds, that the transaction has been running.
SPID	TRS uses this number internally.

You may find an entry in this screen with SH listed under the State field but without an associated Login field. This entry represents the site handler for a remote Adaptive Server.

To display the name of the remote server in the Login field, you add the following configuration command at Adaptive Server, and then restart Adaptive Server:

```
sp_addserver servername, local
```

Replace *servername* with the name of the remote Adaptive Server.

Monitoring connections (LU 6.2 only)

To query the status of the connections that TRS uses, use this procedure:

```
exec sgw_status connections
```

This procedure displays the defined connections currently known to TRS and the status of each.

The following table shows the connection information that returns.

Table 8-2: Description of sgw_status connections results

Field	Description
Con_Number	This number represents the connection being described.
Status	The connection availability, which indicates whether the connection is currently available for use. Valid values are: • A (active) – the connection is available. • I (inactive) – the connection is not available. • D (draining) – the connection is not available. A connection is considered to be "draining" if you deactivated it while it was in use. It remains in draining status until the request completes, then becomes inactive.
Connection	The name of the SNA connection as defined in the sgw_addcon procedure.
Mode	The name of the mode used with this connection as defined in the sgw_addcon procedure.
Destsys	The name of the transaction processing region accessed by the connection as defined in the sgw_addcon procedure.
Host_Tran	The name of the mainframe transaction being invoked as defined in the sgw_addrpc procedure. If a transaction is not being invoked, this field value is Null.
Client_Number	The client currently using this connection. This is the same number used to identify the login of each client in the result of the sgw_status clients command. If the client is not using a connection, this field is blank.

Monitoring regions (TCP/IP only)

To query the status of the regions that TRS uses, use this procedure:

```
exec sgw_status region
```

The information displayed is shown in the following table.

Table 8-3: Description of sgw_status region results

Field	Description
Region	The name of the transaction processing region as specified in the sgw_addregion procedure.
Host Name	The TCP/IP network host name as specified in the sgw_addregion procedure.
Port	The number of the port as specified in the sgw_addregion procedure.
Status	The region availability, which indicates whether the named region is currently available for use. Valid values are: • A (active) – the region is available for use. • I (inactive) – the region is unavailable for use.

Monitoring RPCs

To see if an RPC is defined, as well as the transaction processing region (destination subsystem) it is associated with, use this procedure. (To see the RPCs in use, use the sgw_status clients procedure.) The following statement displays the defined RPCs in TRS.

```
exec sgw_status rpc
```

The information displayed is shown in the following table.

Table 8-4: Description of sgw_status rpc results

Field	Description
RPC	The name of the RPC being called.
Status	The availability of the RPC, which indicates whether the named RPC is currently available for use. Valid values are: • A (active – the RPC is available for use. • I (inactive) – the RPC is unavailable for use.
Host_Tran	The name of the mainframe transaction to be invoked.
Security_Fields	The mainframe access permission requirements. This field specifies the administration procedure parameter values that TRS passes to the mainframe. Valid values are: • U (login ID) – the login ID is passed to the mainframe. • B (both) – both the ID and password are passed to the mainframe. • N (none) – login information is not passed to the mainframe.
Destsys	The name of the transaction processing region with which this RPC is associated as defined in the sgw_addrpc procedure.

Displaying TRS configuration properties

To display the current property settings in the TRS configuration file, use this procedure:

```
exec sgw_status parameters
```

Note See Chapter 3, “Configuring a TRS” for complete information about setting up the TRS configuration file.

This procedure displays the properties shown in the following table.

Table 8-5: Description of sgw_status parameters results

Field	Description
Version	The version/release level of the current TRS and the platform and operating system on which it is running.
Server name	The name of the DirectConnect server.
Protocol type	The network protocol used by this TRS, either LU 6.2 or TCP/IP.
National language	The default language for TRS. (This is also set at the mainframe in SYGWMCST, which is the global customization module.)
Char set	The default character set for TRS. (This is also set at the mainframe in SYGWMCST, which is the global customization module.)
Direct RPCs disabled	Indicates whether TRS will accept an RPC directly from a client or whether all RPCs must be indirect, that is, routed through Adaptive Server. Valid values are: • Yes – indirect routing is required. • No – indirect routing is not required; direct routing is permitted.
Max users	The maximum number of users allowed to use TRS at one time.
Max site handlers	The maximum number of site handlers allowed. A site handler controls the network connection to a remote server.
Truncate longvarchar	The truncation flag for MainframeConnect for DB2 UDB. (This is also set at the mainframe in SYGWMCST, which is the global customization module.) This indicates whether the data in fields of the datatype long varchar are to be truncated to 255 bytes and passed to the client. If the truncation flag is not used, varchar data is sent as text and image datatypes for 4.*x* TDS clients, or as long varchar datatype for 5.0 TDS clients. Valid values are: • Yes. The data is truncated. • No. Other datatypes are returned.

Field	Description
Security enforced	This indicates whether TRS security is enabled or overridden. Valid values are: • Yes. Security is enforced at TRS. • No. Security is not enforced at TRS, except for the "sa" account. (The RPC security definition is sent to the mainframe, if specified in the RPC definition.)
Interfaces file	The complete path and filename of the *interfaces* file for this TRS.
RPC file	The complete path and filename of the file that contains RPC information for this TRS.
Security grp file	The complete path and filename of the file that contains security information for this TRS.
Accounting	Indicates if accounting is activated for this TRS. Valid values are: • Yes – accounting is on. • No – accounting is off
Connection file (LU 6.2 only)	The complete path name of the file that contains connection information for this TRS.
Con wait q (secs) (LU 6.2 only)	The number of seconds that the connection request waits in the queue for an available LU 6.2 connection.
Region file (TCP/IP only)	The complete path and file name of the file that contains region information for this TRS.

Requesting trace information

The TRS tracing facility provides TDS header and data tracing. When you enable tracing, TRS writes tracing information to the trace file name specified in the TDSTraceFile configuration property.

Ordinarily, you do not trace TRS activity. The tracing facility is provided to help Sybase Technical Support understand what occurred if you have to call about specific errors.

To request information about the status of the trace facility, use this procedure:

```
exec sgw_status trace
```

The following table shows the information that the procedure displays.

Table 8-6: Description of sgw_status trace results

Field	Description
Version	The version and release level of the current TRS and the platform and operating system on which it is running.
Trace	The trace indicator, which indicates whether tracing is enabled for this TRS. Valid values are: • Active – the trace facility is enabled. • Inactive – the trace facility is disabled.
Logfile	The name of the file for this DirectConnect server where TRS log records are written.
TDSlog	The name of the file for this TRS that contains trace data between TRS and the mainframe.

Summary of clients in each listed state

To request the summary of all clients and their current state use the following procedure:

```
exec sgw_status summary
```

This command tabulates the number of clients in each state as listed below:

Table 8-7: Summary of clients and their current state

State	Count	Description
ID	0	Connected; No transactions
AL	0	Allocating conversation
WA	0	Waiting for first results
RS	0	Reading from host
WC	0	Writing to client
SH	0	Site handler
GC	1	Gateway control
CQ	0	Queued; Awaiting connection
IT	0	Idle; Transaction active

APPENDIX A

Sending Requests to TRS

Clients using Sybase mainframe access products (see “Related products” on page 6) can send requests to TRS to access mainframe data. TRS forwards the requests to the mainframe and returns results in the same format as the results that Adaptive Server returns. Communication between TRS and the mainframe is transparent to the client. This appendix describes the types of requests a client can send to TRS.

This appendix contains the following topics:

Description of request types

Clients can send two types of requests to TRS:

- SQL language requests
- Remote procedure calls (RPCs)

Requests can be sent to TRS two ways, directly or indirectly:

- Direct requests are RPCs or SQL language statements that access TRS without an intermediary server.
- Indirect requests invoke an RPC on Adaptive Server, ASE/CIS or Replication Server, which then sends a request to TRS.

If you are using MainframeConnect for DB2 UDB, TRS directs requests to the AMD2 transaction at the mainframe. If you are using ASE/CIS Access Module for DB2 UDB for IMS and MVS, TRS directs requests to the SYRT transaction at the mainframe. (See “Configuring a default SQL language handler for TRS” on page 53.)

Clients can send SQL language requests and RPCs to the AMD2 transaction. TRS handles any request sent indirectly (that is, through Adaptive Server) as an RPC. Long-running transactions cannot be sent through Adaptive Server because Adaptive Server logs out of TRS after each request. This is not true for ASE/CIS.

Size of requests to AMD2

The AMD2 transaction can process language requests up to 32K. RPC parameters submitted to AMD2 must be *CHAR* parameters. The transaction concatenates multiple RPC parameters into one SQL statement for DB2 UDB. (Include sufficient blanks in each parameter to make a valid statement for DB2 UDB.)

Sending SQL statements to DB2 UDB

When sending SQL language requests to DB2 UDB, the client can send only SQL statements that are understood by DB2 UDB. See the MainframeConnect *Installation and Administration Guide* for DB2 UDB for information about SQL compatibility.

Accessing DB2 UDB data

Clients can send SQL statements that access DB2 UDB data to TRS directly or indirectly. TRS sends SQL language requests to the AMD2 mainframe transaction, which submits the SQL statements to DB2 using DB2's dynamic SQL facility. AMD2 performs the requested actions and returns results to TRS, which forwards them to the client.

Sending RPCs to TRS

As described in Chapter 3, "Configuring a TRS", TRS maps RPCs to mainframe transactions. If your site uses MainframeConnect for DB2 UDB, RPCs are mapped either to AMD2 or to the Catalog RPCs, which retrieve specific catalog information about DB2 UDB system tables.

Clients can use any of the following methods to send an RPC to TRS:

- Using isql or another SQL utility, send the RPC using the execute command.
- Include the RPC in an Open Client application, and send the RPC directly to TRS.
- Send an RPC indirectly. A client can call a stored procedure in Adaptive Server that in turn sends an RPC to TRS. (Do not use this method for long-running transactions unless you are using the functionality of ASE/CIS.)

Sending RPCs directly to TRS

To send RPCs directly to TRS, use the execute command, which is described in this section. See the *Sybase Adaptive Server Reference Manual* for detailed information about the execute command.

The syntax for the exec command is:

```
exec procedure_name [[@parameter_name=value]
 [,[@parameter_name=value...]]]
```

where

- *procedure_name* the name by which the RPC is defined to TRS.
- *@parameter_name=value* is the value assigned to one of the RPC parameters. Repeat this argument for each of the RPC parameters. The name is optional.

  @parameter_name=value allows you to enter the parameters in any order, as long as the mainframe program can recognize parameters by name. If you use this form for any parameter, you must use it for all parameters in the same exec statement.

Sending RPCs indirectly to the mainframe

To send an indirect request to the mainframe, a client application issues an RPC that resides on Adaptive Server.

After parsing and pre-processing the request, Adaptive Server sends the request and parameters to TRS for forwarding to a mainframe transaction. When the results return, they follow the same route in reverse.

If you set the TRS DirectPrevent configuration property to yes, TRS rejects all direct calls from client applications, requiring all requests to be sent indirectly. Routing all requests through Adaptive Server allows you to use additional front-end tools and provide additional security checks. You should not use this method if the client submits long-running transactions.

Stored procedures that call TRS

When Adaptive Server calls TRS, it follows the same procedure it does for any other call to a remote server. The stored procedure uses the exec statement to call the remote procedure and forward the parameters.

An example of a stored procedure is shown in Chapter 3, “Configuring a TRS”.

Unsupported calls

This section lists the Sybase Open Client DB-Library and CT-Library calls that are not supported in this release.

DB-Library calls

Routines designed to process results of COMPUTE calls:

dbadata	dbaltlen	dbaltbind_ps
dbadlen	dbaltop	dbanullbind
dbaltbind	dbalttype	dbbylist
dbaltcolid	dbaltutypex	

Browse mode routines:

dbequal	dbtsput	dbtabcount
dbfreequal	dbcolbrowse	dbtabname
dbtsnewval	dbcolsource	dbtabsource
dbtsnewlen	dbtabbrowse	

Registered procedure routines:

dbncreate	dbreghandle	dbregparam
dbnpdefine	dbreginit	dbregwatch
dbregdrop	dbregnowatch	dbregwatchlist
dbreglist	dbregparm	dbsetnotifs

Network routines:

dbrecvpassthru	dbsendpassthru

Bulk copy routines:

bcp_batch	bcp_columns	bcp_moretext
bcp_bind	bcp_control	bcp_sendrow
bcp_colfmt	bcp_done	BCP_SETL
bcp_collen	bcp_exec	
bcp_colptr	bcp_init	

Two-phase commit routines:

abort_xact	commit_xact	scan_xact
build_xact_string	open_commit	start_xact
close_commit	remove_xact	stat_xact

Routines that process options:

dbclopt	dbisopt	dbsetopt

Other disallowed routines:

dbchange	DBMORECMDS	dbreadpage
DBCMDROW	DBNUMORDERS	dbwritepage
DBCURCMD	DBOFFSET	dbuset
dbgetoff	dbordercol	

Client-Library calls

Routines designed to process results of COMPUTE calls:

ct_compute_info

Browse mode routines:

ct_br_column	ct_br_table

Network routines:

ct_sendpassthru	ct_recvpassthru

Bulk copy routines:

blk_alloc	blk_drop	blk_rowxfer
blk_bind	blk_getrow	blk_sendrow
blk_colval	blk_gettxt	blk_sendtext
blk_default	blk_init	blk_srvinit
blk_describe	blk_rowalloc	blk_textxfer
blk_done	blk_rowdrop	

APPENDIX B

Testing a TRS Installation with Sample Programs

This appendix describes the TRS sample programs. It provides instructions for testing TRS using LU 6.2 and TCP/IP network protocols.

This appendix contains the following topics:

This appendix describes the steps required to define a sample connection or region and RPC for testing only. The administration procedures for defining regions and RPCs to TRS are described in detail in Chapter 3, “Configuring a TRS” Also see Configuration quick-start in “Configuration quick-start” on page 43.

When to test your installation

Use the instructions in this appendix after all of the mainframe access product components are installed at the workstation and at the mainframe.

Where to find the sample programs

The sample programs are located in the following directories:

- For Windows: *%SYBASE%\sample\trs*

- For UNIX: *$SYBASE/sample/trs*

Note The samples require Open Client DB-Library on the workstation.

How to test your TRS installation

Follow the steps in this section to ensure that TRS is installed correctly. This section describes how to define a single region and RPC, and how to test them before you define other regions.

Starting TRS

Start DirectConnect with TRS enabled. Run the samples with security disabled by setting the TRS Security configuration property to no.

Defining the connection for Windows (LU 6.2 only)

Follow these instructions to define the test connection.

1 Log in to TRS as "sa" using isql or your preferred dynamic SQL utility. For example, enter:

```
isql -Sservice_name -Usa -P
```

where *service_name* is the unique name of this TRS.

2 At the prompt, enter a command similar to the following, replacing the parameter values shown here with values that are appropriate for your installation.

```
exec sgw_addcon con_name, region, mode,
"max_sessions"
```

where

- *con_name* is the name assigned to this connection. This is the name by which the connection is known to your SNA support. For different platforms, this parameter corresponds to different values. See the Mainframe Connect DirectConnect for z/OS Option *Installation Guide* for specific information about connection name parameter values.

- *region* specifies the remote LU name of the mainframe transaction processing region in this parameter. This is the Virtual Telecommunications Access Method (VTAM) APPLID name to which this connection is bound. An entry in this field is required.

  All RPCs that use this connection to access the mainframe must have this same value specified as the *region* in their RPC definitions. (See also "Adding an RPC" on page 50.)

- *mode* needs to match this value to the name of the mode defined to the mainframe and to the local SNA support for this connection (up to eight characters). For different platforms, this parameter corresponds to different values. See the Mainframe Connect DirectConnect for z/OS Option *Installation Guide* for specific information about the mode name parameter value.

- *"max_sessions"* is the maximum number of sessions that can run concurrently over this connection. If you use parallel sessions, enter a value between 2 and 254. If you do not use parallel sessions, this value can only be 1. Enclose numeric parameter values in quotation marks.

Note Check with your SNA System Administrator to make sure this number is not larger than the maximum number of sessions (for this mode) defined to the SNA subsystem.

Example

In the following isql example, SYBLU01 is the connection name, CICSQA is the region name, SYBMODE is the mode name, and "1" is the number of maximum sessions.

```
exec sgw_addcon SYBLU01, CICSQA, SYBMODE, "1"
go
```

Defining the test region (TCP/IP only)

Follow these instructions to define the test region.

1 Log in to TRS as "sa" using isql or your preferred dynamic SQL utility. For example, enter:

```
isql -Sservice_name -Usa -P
```

where *service_name* is the unique name of this TRS.

2 At the isql prompt, enter a command similar to the following, replacing the parameter values shown here with values that are appropriate for your installation.

```
exec sgw_addregion region, hostname, portnumber,
regiontype
```

where

- *region* is the value used within TRS only. The value you specify here must match the value you specify in the region parameter of the sgw_addrpc procedure. This name can be up to eight characters.
- *hostname* is the value you specify for the TCP/IP network host name. This is the name corresponding to the mainframe in your */etc/hosts* file or in your NIS map. This name can be up to 30 characters.
- *portnumber* is the number you specify that must match the port number on which the CSKL transaction listens. It can be any number between 1024 and 9996. (This is not the same as the port number used to configure the *interfaces* file.)
- *regiontype* is the type of the mainframe processing environment specified by the region parameter. Valid values are CICS, MVS, and IMS. If you do not specify a value, the region type defaults to CICS.

Example

In the following example, CICSQA is the region, BLUES is the host name, "3003" is the port number that the CICS Listener transaction is running on, and CICS is the region type.

```
exec sgw_addregion CICSQA, BLUES, "3003", CICS
```

Defining the test RPC

Define an RPC to execute in the specified region. The SYM2 transaction is a simple CICS transaction that fabricates data. It does not require external resources such as DB2 UDB.

- At the prompt, enter a command similar to the one shown below.

```
exec sgw_addrpc rpc_name, tran_id, region,
 security
```

where

- *rpc_name* is the name of the remote procedure. This is the name the client uses to call this RPC. The name can be up to 30 characters.

- *tran_id* is the name of the associated mainframe transaction. This is the mainframe transaction that is called when a client requests the named procedure. The value of this field must be in uppercase. For CICS, use four characters. For IMS, use up to eight characters.
- *region* (LU 6.2 only) specifies the remote LU name of the region in this parameter. Set this value to match the VTAM APPLID of the CICS or IMS region (the destination subsystem) in which the transaction (specified in tran_id) executes.

  At least one defined connection must have this value specified as its region. See also "Adding a connection configuration" on page 46. An entry in this field is required.
- *region* (TCP/IP only) is used within TRS only to represent the CICS region name. It must match the value you specify for the region parameter in the sgw_addregion procedure. See "Defining regions to TRS" on page 48. An entry in this field is required.
- *security* specifies the type of user login information to be passed to the transaction processing region.
  - Using LU 6.2, the information is passed in the conversation-level security fields of the SNA LU 6.2 Function Management Header 5 (FMH-5).
  - Using TCP/IP, these fields are sent to the CICS Listener Transaction when the CICS transaction is started.

  The security parameter can have any of the following values to specify which information is sent:
  - none – do not send login information to the mainframe.
  - userid – send only the user ID to the mainframe.
  - both – send both the user ID and the password to the mainframe.

  For example, if you use native CICS security, the none value corresponds to the CICS security option NONE, userid corresponds to IDENTIFY, and both corresponds to the security option VERIFY.

Example

```
exec sgw_addrpc SYM2, SYM2, CICSQA, none
```

where

- SYM2 (first entry) is the RPC name.
- SYM2 (second entry) is the transaction ID at the mainframe.
- *CICSQA* is the CICS region name.

- none indicates that user IDs are not passed to the mainframe.

The CICS region name (CICSQA in the preceding example) must match the following:

- For TCP/IP, the *region* name given in the sgw_addregion procedure.
- For LU 6.2, the *region* parameter in the sgw_addcon procedure.

Running the sample

Enter the following at the dynamic SQL utility prompt to run the SYM2 sample:

```
exec SYM2 a, 4
```

The output should be similar to the following:

```
TESTDATA

 ------------------------------------------------
          U6T42P01
 aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa

          U6T42P01
 aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa

          U6T42P01
aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa

          U6T42P01
aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa

 (4 rows affected, return status = 0)
```

Checking for error messages

The TRS request can return any of several types of error messages. Some messages are written to the error log at TRS, while others are returned to the client.

For more information, see the DirectConnect *Error Message Guide*.

Looking at additional sample programs

After you successfully run the SYM2 sample, continue with some of the other samples provided in the following directories and in the *README* file in that directory:

- For non-UNIX: *%SYBASE%\sample\TRS\sym2*
- For UNIX: *$SYBASE/sample/TRS/sym2*

Define the samples to TRS using the administration procedures described previously.

SYVn transactions

The SYVn transactions read a VSAM file and return the records.
The SYVn RPC passes two parameters: a starting and ending byte offset.

Add the RPC using the sgw_addrpc procedure described under "Defining the test RPC" on page 152. These transactions call the following programs:

- SYV1 calls the PL/I program, SYCASAV1.
- SYV2 calls a COBOL program, SYCASAV2.
- SYV3 calls an assembler program, SYCASAV3, which is supplied on the mainframe.

To execute the SYVn RPC you defined, do *one* of the following:

- Enter the following command at the dynamic SQL utility prompt: (Replace *SYVn* with SYV1, SYV2, or SYV3.)

```
exec SYVn 0,9999
```

- If the directory containing the samples is on the search path, enter this command at the server console prompt:

```
SYVn 0,9999
```

The output should be similar to the following:

```
SYGWLSA1
 ------------------------------------------------
 sample vsam rpc data rec 0 sample vsam rpc data rec 0
 sample vsam rpc data rec 1 sample vsam rpc data rec 1
 sample vsam rpc data rec 2 sample vsam rpc data rec 2
 .
 .
 .
 (10 rows affected, return status = 0)
```

SYDn Transactions

SYDn transactions execute a static DB2 UDB query to one of the DB2 UDB sample tables. The parameter is the department number. Add the RPC using the sgw_addrpc procedure described in "Defining the test RPC" on page 152.

To execute the SYDn RPC, do one of the following:

- Enter this command at the isql prompt (replace *SYDn* with SYD1 or SYD2):

```
exec SYDn D11
go
```

- If the directory containing the samples is on the search path, enter this command at the server console prompt:

```
SYDn D11
```

The output should be similar to the following:

```
LAST_NAME EMP_DEPT EMP_PHONE SALARY
 --------- -------- --------- -------------
 ADAMSON     D11      4510       25,280.00
 BROWN       D11      4501       27,740.00
 PIANKA      D11      3782       22,250.00
 STERN       D11      6423       32,250.00
 WALKER      D11      2986       20,450.00
 LUTZ        D11      0672       29,840.00
 SCOUTTEN    D11      1682       21,340.00
 YOSHIMURA   D11      2890       24,680.00
 JONES       D11      0942       18,270.00

 (9 rows affected, return status = 0)
```

The rest of the sample transactions demonstrate Open ServerConnect programming techniques.

Looking at catalog RPC scripts

If you plan to use the Catalog RPCs, see the appropriate section in this guide for instructions on running the addcat installation script.

The scripts that install, test, and delete the Catalog RPCs are provided in the following directories:

- For Windows: *%SYBASE%\scripts*
- For UNIX: *$SYBASE/scripts*

APPENDIX C

Localization

This appendix describes localization information for TRS. If you need more complete information about localization, refer to the *Open Client/Server Supplement* for your platform.

This appendix contains the following topics:

What is localization?

Localization is the process of setting up an application to run in a particular national language environment. A localized application:

- Generates messages in a local language and character set
- Uses local datetime formats

A *locale* name is a character string that represents a language, character set, and sort order combination. For example, the *locale* name "fr" might represent the following language, character set, and sort order combination:

```
french/iso_1/binary
```

Sybase predefines *locale* names, which are listed in the *locales* file. For information on the *locales* file.

How servers handle conversions

When a localized client application connects to TRS, Adaptive Server, or Open Server, the server checks to see if it supports the client's language and character set. If it does, then the server:

- Automatically handles all character set translation
- Issues server messages in the client's language and character set

If TRS does not support the language or character set sort of the client, it issues a warning message to this effect, and Client–Library fails the connection. However, DB-Library accepts the connection.

The following table describes these client and server behaviors:

Table C-1: Localization translation behaviors

Does server support client character set?	Does server support client language?	ASE server behavior	Open Server behavior	Client–Library behavior	DB-Library behavior
yes	yes	Performs all necessary message translation and character set conversion	Performs all necessary message translation and character set conversion	Operates normally	Operates normally
no	yes	N/A for Adaptive Server, because when Adaptive Server supports a language, it supports all character sets for that language	Uses the language and character set of the Open Server application	N/A for Adaptive Server; fails the connection for Open Server	N/A for Adaptive Server; accepts the connection for Open Server
yes	no	Uses the language us_english and the client's character set	Uses the language and character set of the Open Server application	Fails the connection	Accepts the connection

Does server support client character set?	Does server support client language?	ASE server behavior	Open Server behavior	Client–Library behavior	DB-Library behavior
no	no	Uses the language us_english and the character set ascii_7	Uses the language and character set of the Open Server application	Fails the connection	Accepts the connection

Environment variables for localization

TRS examines environment variables when determining which language, character set, sort order, and datetime formats to use for an application.

TRS uses standard POSIX localization environment variables.

Some systems automatically set environment variables when a user logs in. If your system does this, either reset the variables after logging in or make sure that their automatic values correspond to an entry in the Sybase *locales* file.

The following table lists the environment variables that are related to TRS localization:

Table C-2: TRS localization environment variables

Environment variable	Definition	When
LC_ALL	Indicates which language and character set to use for messages, datatype conversions, and datetime formats.	• The application calls cs_ctx_alloc. • The application calls cs_locale with type as *CS_LC_ALL* and buffer as NULL.
LC_CTYPE	Indicates which character set to use for datatype conversions.	The application calls cs_locale with type as *CS_LC_CTYPE* and buffer as NULL.
LC_COLLATE	Indicates which collating sequence (sort order) to use when sorting and comparing character data.	The application calls cs_locale with type as *CS_LC_COLLATE* and buffer as NULL.
LC_MESSAGE	Indicates which language and character set to use for messages.	The application calls cs_locale with type as *CS_LC_MESSAGE* and buffer as NULL.

Environment variable	Definition	When
LC_TIME	Indicates which language to use when converting between datetime and character datatypes. *LC_TIME* controls the following: • Month names and abbreviations • Datepart ordering • Whether the "am/pm" string is used	The application calls cs_locale with type as *CS_LC_TIME* and buffer as NULL. When an application calls cs_locale, Client–Library examines *LANG* if the cs_locale buffer is NULL and the *LC_ALL* variable corresponding to type is not defined.
LANG	Indicates which language, character set, and sort order to use for messages, datatype conversions, and datetime formats. **Note** Open Client/Server products search for *LANG* if they cannot find *LC_ALL*.	The application calls ct_ctx_alloc, Client-Library examines *LANG* if *LC_ALL* is not defined. When an application calls cs_locale, Client–Library examines *LANG* if the cs_locale buffer is NULL and the *LC_ALL* variable corresponding to type is not defined.

Localization files

This section contains information on Sybase files that are related to localization.

Note The directories shown in this appendix are for a Windows platform. For UNIX platforms, the directory path is *$SYBASE/locales* or *$SYBASE/charsets*.

Where localization files come from

Open Client/Server products, including TRS, come with the files to support one language and one or more character sets and sort orders.

At installation time, these files are automatically loaded into the *%SYBASE%* directory tree, in the locations illustrated in Table C-3.

The files to support additional languages are packaged as "Language Modules for Connectivity."

When you install a language module, the language, character set, and sort order files to support the new language are automatically loaded into the *%SYBASE%* directory tree in the correct locations.

Location of localization files

Two directories in the *%SYBASE%* directory tree contain files related to localization:

- *%SYBASE%\locales*, which contains the *locales* file (*locales.dat*) and a subdirectory for each available language.
- *%SYBASE%\charsets*, which contains a subdirectory for each available character set.

The following table shows where localization files are located in the *%SYBASE%* directory tree:

Table C-3: Location of localization files in the %SYBASE% directory

Subdirectory			
charsets	*charset_name*	*binary.srt* *charset.loc* *dictionary.srt* *noaccents.srt* *nocase.srt* *nocasepref.srt*	
locales	*language_name*	*charset_name*	*blklib.loc* *ctlib.loc* *common.loc* *cslib.loc* *oslib.loc* *trslu62.loc* *trdtcp.loc* *trstcp.loc*
	locales.dat		

The following table shows information about some localization files.

Table C-4: Files related to localization

File name	File location	What it contains
locales.dat	*%SYBASE%\locales*	Entries that map a locale name to a language and character set. This is the *locales* file. For more information, see "Locales file" on page 162.
common.loc	*%SYBASE%\locales\ language_name\charset_name*	Common information for the *language_name* language and *charset_name* character set, including date names and orders and money formats and symbols.
charset.loc	*%SYBASE%\locales\ language_name\charset_name*	Character set information for the *language_name* language and *charset_name* character set.
binary.srt	*%SYBASE%\ charset\charset_name*	The binary sort order for the *charset_name* character set.

*.loc files

The *%SYBASE%\locales\language_name\charset_name*.loc* files contain product error messages in the language and character set specified by their parent directories.

These files enable TRS to report errors in a specific language and character set.

Character set files

The *%SYBASE%\charsets\charset_name** files contain information related to a particular character set, including sort order, case, and accent information.

Locales file

The *locales* file associates *locale* names with languages, character sets, and sort orders. TRS uses the *locales* file when loading localization information.

The *locales* file is called *locales.dat* and is located in the *%SYBASE%\locales* directory.

The *locales* file directs TRS to language, character set, and sort order names, but does not contain actual localized messages or character set information.

Format of locales file entries

The *locales* file has platform-specific sections. An entry defines a locale as the combination of a language, character set, and sort order.

```
locale = locale_name, language_name, charset_name
[,sort_order_name]
```

If the sort order is not specified, it is "binary."

When the locale being defined is the default for the site, the locale_name is "default." For example, the following entry defines the default *locale* as us_english with the iso_1 character set and binary sort order:

```
locale = default, us_english, iso_1
```

How Client-Library and Server-Library set up default localization values

When a Client-Library or Server-Library application calls the CS-Library routine cs_ctx_alloc to allocate a context structure, CS-Library loads default localization information into the new context structure.

To load default localization information, CS-Library follows these steps:

1 CS-Library looks for a *locale* name, searching for the following environment variables, in order: *LC_ALL* and *LANG*.

- If *LC_ALL* is defined, CS-Library uses its value as the *locale* name. If *LC_ALL* is not defined but *LANG* is defined, CS-Library uses its value as the *locale* name.
- If neither *LC_ALL* nor *LANG* is defined, CS-Library uses a *locale* name of "default."

2 CS-Library looks up the *locale* name in the *locales* file to determine which language and character set are associated with it.

3 CS-Library loads localized messages and character set information appropriate to the language and character set determined in step 2.

This process provides the new context structure with all of the localization information that it needs.

APPENDIX D

TRS Process User Exits

This chapter describes the steps to implement and use the TRS process user exits for both LU 6.2 and TCP/IP. TRS allows you to create user exits that are invoked from the TRS application prior to executing the actual event.

This appendix contains the following topics:

Supported user exits

TRS supports user exits corresponding to Open Server defined Connect and Disconnect events. Within user exits you are able to manipulate *User ID* and *User Password* information prior to the event being executed by TRS. It is not necessary to modify any of this information to implement user exits. However, you may need to manipulate the password for security reasons for an application. For example, a user's password may be modified to become a time-restricted password for interpretation by an authentication server.

The following are the Open Server defined events for which *user exits* are supported:

- Connect
- Disconnect

Note The directories shown in this appendix are for UNIX platforms. For Windows platforms, the variable *%SYBASE%/%SYBASE_ECON%* is used.

Connect

The Connect user exits provides the ability to override both the User ID and User Password. The user exits is called at the end of all DirectConnect connection processing, but prior to the TRS connection processing. This allows the User ID and User Password to remain intact for Open Client and Open Server connections and change for connections from TRS to DB2 UDB.

The TRS connection handler will query the length of the user exits returned User ID and Password string buffers to determine data content. When data is present, it will be transferred to the TRS User ID and Password buffers.

Refer to the following directory for an implementation example:

`$SYBASE/$SYBASE_ECON/`*`servername`*`/sample/trs/ue/ue_connect.cpp`

Disconnect

The Disconnect *user exit* is called only when the client disconnects from TRS. All parameters are passed as constants and cannot be modified.

Refer to the following directory for an implementation example:

`$SYBASE/$SYBASE_ECON/`*`servername`*`/sample/trs/ue/ue_disconnect.cpp`

Implementing user exits

TRS user exits for Open Server Connect and Disconnect events should be written and tested using the sample exits and test harness provided at *$SYBASE/$SYBASE_ECON/serverName/sample/trs/ue*. Following is a description of the source, header, makefiles, libraries and executable files, many of which are dependent on your platform.

The source files are defined as:

- *ue_connect.cpp* – connection event sample user exit code.
- *ue_disconnect.cpp* – disconnect event sample user exit code.
- *ue_test.cpp* – test harness to invoke the Connect and Disconnect user exits.

The following header files, depending on your platform:

- *ue_platform.h* – platform required header for implementing user exits where <platform> is one of: aix, hpux, sol, nt.
- *ue_classes.h* – required by *ue_test.cpp*.
- *ue_global.h* – required user exit definitions.

The following makefiles, depending on your platform:

- *makeexe.platform*

  where *platform* is: aix, hpux, sol, or nt.

  Generates *ue_test <platform>*, the *user exit* test harness.

- *makefile.platform*

  where *platform* is: aix, hpux, sol, or nt.

  Generates required library *libtrsue_platform.ext*

  where *ext* is .so for AIX and Sun Solaris, .sl for HP-UX, and dll for Windows.

The following libraries, depending on your platform:

- *libue_platform.a*

  Required library for testing user exits with *ue_test.platform*,

  where *platform* is: aix, hpux, sol, or nt.

- *libtrsue_platform.ext*

  Library containing user exits generated by makefile.*platform*

  where *platform* is: aix, hpux, sol, or nt, and

  ext is .so for AIX and Sun Solaris, .sl for HP-UX, and .dll for Windows.

The following executable, depending on your platform:

*ue_test.platform*Test harness produced from *makeexe.platform*

where *platform* is: aix, hpux, sol, or nt.

One parameter is required by *ue_test.platform* which specifies the dynamic library to be loaded. Following is an example:

```
ue_test.<platform> ./libtrsue_<platform><ext>
```

where *platform* is: aix, hpux, sol, or nt and

ext is .so for AIX and Sun Solaris, .sl for HP-UX, and .dll for Windows.

Configuring TRS to implement user exits

To implement TRS user exits use the following properties:

- ProcessExitEnabled

  Set to *yes* to enable the use of user exits. Only the exits that you have defined and added to your user exit library will be invoked.

- ProcessExitFile

  Full path and name of the user exit shared library that you have created. From the sample code, *libtrsue_platform.ext* is its equivalent.

- TraceProcessUserExits

  Traces entry/exit points of function call to each of the user exits that you have defined. Normal setting is *no*; however, a setting of *yes* will assist you in determining execution through your exits.

Testing user exits

To test the provided samples, simply

```
execute makefile.platform
```

followed by

```
makeexe.platform
```

Continue by executing the following:

```
ue_test.platform ./libtrsue platform.ext
```

For example, on Solaris the following is required:

```
make -f makefile.sol
make -f makeexe.sol
ue_test.sol ./libtrsue.sol.so
```

Note Although exits other than Connect and Disconnect are provided in the sample *$SYBASE/$SYBASE_ECON/servername/sample/trs/ue*, these exits are not supported at this time.

Interface specifications

Following are the required interfaces and their descriptions for implementing the Connect and Disconnect user exits.

ue_connect

Description

Connects the event user exit defining what actions are to be performed prior to TRS connecting to DB2 UDB.

Syntax

TRS_RETCODE TRS_PUBLIC
ue_connect (status, serviceName, serviceNameLength, applicationName, applicationNameLength, userId, pUserIdLength, password, pPasswordLength, pOutUserId, pOutPwd)

TRS_STATUS	status;
const char*	serviceName;
const int	serviceNameLength;
const char*	applicationName;
const int	applicationNameLength
const char*	userId;
int*	pUserIdLength;
const char*	password;
int*	pPasswordLength;
char**	pOutUserId;
char**	pOutPwd;

Table D-1: TRS_RETCODE values

Value	Description
eTRS_FAIL	Indicates failure within *ue_connect( )*
eTRS_SUCCEED	Indicates success within *ue_connect( )*
eTRS_NOTIMPLEMENTED	Indicates stubbed out implementation of *ue_connect( )*
eTRS_DATAMODIFIED	Indicates that a pointer variable has been modified and implies eTRS_SUCCEED

Parameters

status
The state of the Service Library invoking *ue_connect( )*. The following table describes the legal value for status:

Table D-2: Legal status values

Value	Description
eGood_	Always used
eObjNotFound_	Reserved for future use
eObjNotValue_	Reserved for future use
eFatal_	Reserved for future use

serviceName
Name of the service to which the connection was made.

serviceNameLength
Length of the *serviceName*.

*applicationNam*e
Name of the application from which the connection was made.

applicationNameLength
Length of the *applicationName.*

userId
ID of the connecting user.

pUserIdLength
Pointer to length of *userId*.

password
Password associated with *userId.*

pPasswordLength
Pointer to length of *password*.

pOutUserId
A pointer to a character string that must be allocated by this routine and may contain a modified *userId*.

pOutPwd
A pointer to a character string that must be allocated by this routine and may contain a modified *password*.

Usage

See syntax.

Comments

- *ue_connect()* must return eTRS_DATAMODIFIED if either pOutUserId or pOutPwd has been allocated.
- pUserIdLength must be updated to reflect the length of pOutUserId when pOutUserId has been allocated.
- pPasswordLength must be updated to reflect the length of pOutPwd when pOutPwd has been allocated.
- malloc() should be used to allocate space for pOutUserId and pOutPwd

Warning! By granting control to this user exit, DirectConnect has temporarily forfeited the management of Open Server threads. The result is that DirectConnect cannot ensure against *ue_connect* monopolizing execution, nor the ability of *ue_connect* to create a deadlock. Please take precautions to prevent this.

Example

Refer to a sample implementation at the following location:

$SYBASE/$SYBASE_ECON/servername/sample/trs/ue/ue_connect.cpp

ue_disconnect

Description

Defines what actions are to be performed prior to a client disconnecting from TRS.

Syntax

```
TRS_RETCODE TRS_PUBLIC
ue_disconnect (status, serviceName, serviceNameLength, applicationName,
applicationNameLength, userId, pUserIdLength)

TRS_STATUS      status;
const char*     serviceName;
```

```
const int       serviceNameLength;
const char*     applicationName;
const int       applicationNameLength
ccnst char*     userId;
int*            pUserIdLength;
```

Table D-3: TRS_RETCODE values

Value	Description
eTRS_FAIL	Indicates failure within *ue_disconnect( )*
eTRS_SUCCEED	Indicates success within *ue_disconnect( )*
eTRS_NOTIMPLEMENTED	Indicates stubbed out implementation of *ue_disconnect( )*

Parameters

status
The state of the Service Library invoking *ue_disconnect( )*. The following table describes the legal value for status:

Table D-4: Legal status values

Value	Description
eGood_	Always used
eObjNotFound_	Reserved for future use
eObjNotValue_	Reserved f or future use
eFatal_	Reserved for future use

serviceName
Name of the service to which the connection was made.

serviceNameLength
Length of the *serviceName*.

*applicationNam*e
Name of the application from which the connection was made.

applicationNameLength
Length of the *applicationName*.

userId
ID of the connecting user.

pUserIdLength
Pointer to length of *userId*.

Usage

See syntax.

Comments

- *ue_disconnect* allows you to perform varying functions related to disconnects. Although *pUserIdLength* is defined as a pointer, its modification is meaningless with this release.

Warning! By granting control to this user exit, DirectConnect has temporarily forfeited the management of Open Server threads and DirectConnect cannot ensure against ue_disconnect monopolizing execution, nor ue_disconnect's ability to create a deadlock. Please use precautions to prevent this.

Example

Refer to a sample implementation at the following location:

$SYBASE/$SYBASE_ECON/servername/sample/trs/ue/ue_connect.cpp

APPENDIX E

Compatibility with MDI Database Gateway and Net-Gateway

This appendix provides information regarding the compatibility between DirectConnect and both the MDI Database Gateway and Net-Gateway.

This appendix contains the following topics:

Compatibility with MDI Database Gateway

If you have client applications for MDI Database Gateways, you can still use those applications with DB2 UDB access services.

Compatibility with Net-Gateway

If you have client applications for Net-Gateway, those applications will work with TRS. Simply follow the file-moving instructions in the next subsection.

Table E-1: Moving Net-Gateway files to TRS files

Move Net-Gateway files	To these TRS files
For UNIX: $SYBASE/ngcid.<msg_server_name>	$SYBASE/$SYBASE_ECON (UNIX) or %SYBASE_ECON% (NT) /*servername*/cfg/ngcid. <trs_service_library_name>
For TCP/IP on non-UNIX: %SYBASE%\ngcid.<msg_server_name>	%SYBASE%\$SYBASE_ECON (UNIX) or %SYBASE_ECON% (NT) *servername*\cfg\<trs>.ngcid
For LU 6.2 on non-UNIX: %SYBASE%\<msg_server_name>.cid	%SYBASE%\$SYBASE_ECON (UNIX) or %SYBASE_ECON% (NT) *servername*\cfg\<trs>.cid
For UNIX: $SYBASE/ngreg.<msg_server_name>	$SYBASE/$SYBASE_ECON (UNIX) or %SYBASE_ECON% (NT) /*servername*/cfg/ngreg.<trs_service_library_name>
For TCP/IP on non-UNIX: %SYBASE%\ngreg.<msg_server_\name>	%SYBASE%\$SYBASE_ECON (UNIX) or %SYBASE_ECON% (NT) *servername*\cfg\<trs>.ngreg
For LU 6.2 on non-UNIX: %SYBASE%\<msg_server_name>.reg	%SYBASE%\$SYBASE_ECON (UNIX) or %SYBASE_ECON% (NT) *servername*\cfg\<trs>.reg
For UNIX: $SYBASE/nggrp.<msg_server_name>	$SYBASE/$SYBASE_ECON (UNIX) or %SYBASE_ECON% (NT) /*servername*/cfg/nggrp.<trs_service_library_name>
For TCP/IP on non-UNIX: %SYBASE%\nggrp.<msg_server_name>	%SYBASE%\$SYBASE_ECON (UNIX) or %SYBASE_ECON% (NT) *servername*\cfg\<trs>.nggrp
For LU 6.2 on non-UNIX: %SYBASE%\<msg_server_name>.grp	%SYBASE%\$SYBASE_ECON (UNIX) or %SYBASE_ECON% (NT) *servername*\cfg\<trs>.grp

Move Net-Gateway files	To these TRS files
For UNIX: $SYBASE/ngrpc.<msg_server_name>	$SYBASE/$SYBASE_ECON (UNIX) or %SYBASE_ECON% (NT) /<*servername*>/cfg/ngrpc.<trs_service_library_name>
For TCP/IP on non-UNIX: %SYBASE%\ngrpc.<msg_server_name>	%SYBASE%\$SYBASE_ECON (UNIX) or %SYBASE_ECON% (NT) *servername*\cfg\<trs>.ngrpc
For LU 6.2 on non-UNIX: %SYBASE%\<msg_server_name>.rpc	%SYBASE%\$SYBASE_ECON (UNIX) or %SYBASE_ECON% (NT) *servername*\cfg\<trs>.rpc
For UNIX: $SYBASE/ngact.<msg_server_name>	$SYBASE/$SYBASE_ECON (UNIX) or %SYBASE_ECON% (NT) /*servername*/log/ngact.<trs_service_library_name>
For TCP/IP on non-UNIX: %SYBASE%\ngact.<msg_server_name>	%SYBASE%\$SYBASE_ECON (UNIX) or %SYBASE_ECON% (NT) *servername*\cfg\<trs>.ngact
For LU 6.2 on non-UNIX: %SYBASE%\<msg_server_name>.act	%SYBASE%\$SYBASE_ECON (UNIX) or %SYBASE_ECON% (NT)$SYBASE_ECON (UNIX) or %SYBASE_ECON% (NT) *servername*\cfg\<trs>.act
For UNIX: $SYBASE/ngtds.<msg_server_name>	$SYBASE/$SYBASE_ECON (UNIX) or %SYBASE_ECON% (NT) /*servername*/log/ngtds.<trs_service_library_name>
For TCP/IP on non-UNIX: %SYBASE%\ngtds.<msg_server_name>	%SYBASE%\$SYBASE_ECON (UNIX) or %SYBASE_ECON% (NT) *servername*\cfg\<trs>.ngtds
For LU 6.2 on non-UNIX: %SYBASE%\<msg_server_name>.tds	%SYBASE%\$SYBASE_ECON (UNIX) or %SYBASE_ECON% (NT) *servername*\cfg\<trs>.tds

Move Net-Gateway files	To these TRS files
For UNIX: $SYBASE/nglog.<msg_server_name>	$SYBASE/$SYBASE_ECON (UNIX) or %SYBASE_ECON% (NT) /*servername*/log/ *servername*.log
For TCP/IP on non-UNIX: %SYBASE%\nglog.<msg_server_name>	%SYBASE%\$SYBASE_ECON (UNIX) or %SYBASE_ECON% (NT) *servername*\log\ <dcon_server_name>.log
For LU 6.2 on non-UNIX: %SYBASE%\<msg_server_name>.log	%SYBASE%\$SYBASE_ECON (UNIX) or %SYBASE_ECON% (NT) *servername*\log\ <dcon_server_name>.log

Glossary

accept Establishment of a Open ServerConnect–DirectConnect SNA or TCP/IP connection.

access service The named set of properties, used with a DirectConnect Access Service Library, to which clients connect. Each DirectConnect server can have multiple services.

Access Service Library A service library that provides access to non-Sybase data contained in a database management system or other type of repository. Each such repository is called a "target." Each Access Service Library interacts with exactly one target and is named accordingly. See also **service library**.

ACSLIB See access service library.

Administrative Service Library A service library that provides remote management capabilities and server-side support. It supports a number of remote procedures, invoked as RPC requests, that enable remote DirectConnect management. See also **remote procedure call**, **service library**.

ADMLIB See **Administrative Service Library**.

Advanced Interactive Executive The IBM implementation of the UNIX operating system. The RISC System/6000, among other workstations, runs the AIX operating system. See also **UNIX**.

advanced program-to-program communication Hardware and software that characterize the LU 6.2 architecture and its implementations in products. See also **logical unit 6.2**.

AIX See **Advanced Interactive Executive.**

AMD2 The component of MainframeConnect for DB2 UDB that allows clients to submit SQL statements to DB2 UDB. It is a CICS transaction that receives SQL statements sent from DirectConnect and submits them to DB2 UDB, using the DB2 UDB dynamic SQL facility. It also receives the results and messages from DB2 UDB and returns them to DirectConnect.

API See **application program interface**.

APPC See **advanced program-to-program communication**.

application program interface
The programming language interface between the user and Open ClientConnect or Open ServerConnect. The API for Open ClientConnect is Client-Library. The API for Open ServerConnect is Gateway-Library.

ASE/CIS
Adaptive Server Enterprise / Component Integration Services (formerly OmniConnect).

batch
A group of records or data processing jobs brought together for processing or transmission.

bind
In the Sybase environment, this term has different meanings depending on the context:

- In CICS, it is an SNA command used to establish a connection between LUs, or a TCP/IP call that connects an application to a port on its system.
- In DB2 UDB, it compiles the Database Request Module, the precompiler product that contains SQL statements in the incoming request, and produces an access plan, a machine code version of the SQL statements that specifies the optimal access strategy for each statement.
- In the mainframe access product set, it establishes a connection between a TRS port and a CICS or IMS region.

bulk copy
The utility for copying data in and out of databases.

catalog
A system table that contains information about objects in a database, such as tables, views, columns, and authorizations.

catalog RPC
A component of the DB2 UDB Access Module that allows clients to access DB2 UDB system catalogs. It uses an interface compatible with the catalog interface for the ODBC API.

catalog stored procedure
A procedure, used in SQL generation and application development, that provides information about tables, columns, and authorizations.

character set
A set of specific (usually standardized) characters with an encoding scheme that uniquely defines each character. ASCII is a common character set.

CICS
See **Customer Information Control System**.

CICS region
The CICS area of the computer system in which an application is running.

client
In client/server systems, the part of the system that sends requests to servers and processes the results of those requests. See also **client/server**. Compare with **server**.

client application Software responsible for the user interface that sends requests to applications acting as servers. See also **client/server**.

Client-Library A library of routines that is part of Open ClientConnect. The Open ClientConnect Client-Library comprises a subset of the Open Client Client-Library routines.

client request An RPC or language request sent by a client to a server.

client/server An architecture in which the client is an application that handles the user interface and local data manipulation functions, and the server is an application providing data processing access and management. See also **client application**.

Client Services Application A customer-written CICS program initiated on the host that uses the Sybase API to invoke MainframeConnect for DB2 UDB as a client to DirectConnect or to SQL Server. See also **application program interface**, **Client Services for CICS**.

Client Services for CICS A Sybase host API that invokes Open ServerConnect as a client to an access service for DB2 UDB or SQL Server. See also **Application program interface**, **Customer Information Control System**, **Client Services Application**, **Open ServerConnect**.

commit A process that makes permanent all changes made to one or more database files since the initiation of the application program, the start of an interactive session, or the last commit or rollback operation. Compare with **rollback**.

connection A network path between two systems. For SNA, the path connects a logical unit (LU) on one machine to an LU on a separate machine. For TCP/IP, the path connects TCP modules on separate machines.

connection router A program provided with Open ClientConnect that directs requests to particular remote servers. Mainframe system programmers use the connection router to define remote servers and server connections to Open ClientConnect.

Connection Router Table A memory-resident table maintained by an Open ClientConnect system programmer that lists servers and the connections that a Client-Library transaction can use to access them.

conversation-level security The passing of client login information to the mainframe by TRS when it allocates a conversation.

CSA See **Client Services Application**.

CSP See **catalog stored procedure**.

cursor In SQL, a named control structure used by an application program to point to a row of data.

Customer Information Control System An IBM licensed program that enables transactions entered at remote terminals to be processed concurrently by user-written application programs. Open ServerConnect, MainframeConnect for DB2 UDB, and Open ClientConnect are available for CICS.

database management system A computer-based system for defining, creating, manipulating, controlling, managing, and using databases.

database operation A single action against the database. For DirectConnect, a database operation is usually a single SQL statement. One or more database actions can be grouped together to form a request. See also **request**.

Database 2 An IBM relational database management system.

datatype A keyword that identifies the characteristics of stored information on a computer.

DB-Library A Sybase and Microsoft API that allows client applications to interact with ODS applications. See also **application program interface**.

DB2 UDB See **Database 2**.

default language The language that displays a user's prompts and messages.

direct request A request sent directly from a client workstation through Transaction Router Service to DirectConnect without going through SQL Server. Contract with **indirect request**.

direct resolution A type of service name resolution that relies upon a client application specifying the exact name of the service to be used. See also **service name resolution**. Compare with **service name redirection**.

DirectConnect A Sybase Open Server application that provides access management for non-Sybase databases, copy management (transfer), and remote systems management. The name replaces the names MDI Database Gateway and OmniSQL Access Module. Compare with **Enterprise Connect**.

DirectConnect Manager A Sybase Windows application that provides remote management capabilities for DirectConnect products. These capabilities include starting, stopping, creating, and copying services.

DirectConnect for OS/390 A Sybase LAN-based solution that communicates with mainframe host components. It incorporates the functionality of the MDI Database Gateway and the Sybase Net-Library and includes LU 6.2 and TCP/IP support.

DirectConnect server — The component that provides general management and support functions to service libraries.

DirectConnect access service — The named set of properties, used with a DirectConnect Service Library, to which clients connect.

DirectConnect Service Library — The component that provides a set of functions within the DirectConnect Server environment.

dll — See **dynamic link library**.

dynamic link library — A file containing executable code and data bound to a program at load time or runtime, rather than during linking.

dynamic SQL — The preparation and processing of SQL source statements within a program while the program runs. The SQL source statements are contained in host-language variables rather than being coded directly into the application program. Compare with **static SQL**.

end user — A person who connects to DirectConnect using an application in order to access databases and perform transfers. See also **transfer**.

environment variable — A variable that describes how an operating system runs and the devices it recognizes.

External Security Manager — An add-on security package for the z/OS mainframe, licensed by Computer Associates.

gateway — Connectivity software that allows two or more computer systems with different network architectures to communicate.

Gateway-Library — A library of communication, conversion, tracing, and accounting functions supplied with Open ServerConnect.

host — The mainframe or other machine on which a database, an application, or a program resides. In TCP/IP, this is any system that is associated with at least one Internet address. See also **Transmission Control Protocol/Internet Protocol**.

host ID — In Open ServerConnect, the ID that the TRS passes to the mainframe with a client request. The host ID is part of the client login definition at the TRS.

host password — In Open ServerConnect, the password that the TRS passes to the mainframe with a client request The host password is part of the client login definition at the TRS.

host request library — A DB2 UDB table that contains host-resident SQL statements that can be executed dynamically. See also **host-resident request**.

host-resident request — A SQL request that resides on MainframeConnect in the host request library. See also **host request library**.

IMS — See **Information Management System**.

indirect request — A client request that is routed through a stored procedure on a SQL Server, which forwards the request to TRS as an RPC. Compare with **direct request**.

Information Management System — A database/data communication system that can manage complex databases and networks.

interfaces file — An operating system file that determines how the host client software connects to a Sybase product. An *interfaces* file entry contains the name of any DirectConnect server and a list of services provided by that server.

language RPC — The name TRS uses to represent a client's language request. TRS treats a language request as a remote procedure call (RPC) and maps it to a language transaction at the remote server.

Integrated Product Set (IPS) — The Sybase Integrated Product Set that provides heterogeneous data integration.

language transaction — The server transaction that processes client language requests. The MainframeConnect for DB2 UDB language transaction is AMD2, which uses the DB2 UDB dynamic SQL facilities to process incoming SQL strings. The OmniSQL Access module for DB2 for IMS and z/OS uses SYRT by default.

logical unit — A type of network addressable unit that enables a network user to gain access to network facilities and communicate remotely. A connection between a TRS and a CICS region is a connection between logical units.

logical unit 6.2 — A type of logical unit that supports general communication between programs in a distributed processing environment. See also **advanced program-to-program communication**.

login ID — In Open ServerConnect, the ID that a client user uses to log in to the system.

login packet — Client information made available to Open ServerConnect. The client program sets this information in a login packet and sends it to the TRS, which forwards it to the mainframe.

long-running transaction — A transaction that accepts more than one client request. Whereas short transactions end the communication after returning results to a client, a long-running transaction can await and process another request. Compare with **short transaction**.

LU 6.2 — See **logical unit 6.2**.

mainframe access products — Sybase products that enable client applications to communicate with mainframes in a client/server environment. See **client/server**.

Mainframe Connect IPS — The Sybase Integrated Product Set that provides access to mainframe data.

MainframeConnect for DB2 UDB — A Sybase mainframe solution that provides dynamic access to DB2 UDB data. It replaces the OmniSQL Access Module for DB2 (in CICS only) and the functionality in the MDI Access Server. See also **Customer Information Control System**, **Database 2**, **Multiple Virtual Storage**.

Multiple Virtual Storage — An IBM operating system that runs on most System/370 and System/390 mainframes. It supports 24-bit addressing up to 16 megabytes.

Net-Gateway — A Sybase product that provides communication between a mainframe and a LAN server. Net-Gateway is the predecessor of the DirectConnect TRS.

network protocol — A set of rules governing the way computers communicate on a network.

null — Having no explicitly assigned value. NULL is not equivalent to 0 or to blank.

ODBC — See **Open Database Connectivity**.

ODS — See **Open Data Services**.

OmniConnect — A variation of Sybase ASE Server that provides a Transact-SQL interface to various sources of external data. The name replaces the names OmniSQL Gateway and OmniSQL Server. The CIS functionality of ASE has incorporated the functionality of OmniConnect and is referred to as ASE/CIS. See **ASE/CIS.**

OmniSQL Access Module for DB2 — A Sybase mainframe solution that provides access to DB2 data. It is the predecessor of MainframeConnect for DB2 UDB.

Open Client — A Sybase product that provides customer applications, third-party products, and other Sybase products with the interfaces required to communicate with Open Client and Open Server applications.

Open ClientConnect A Sybase product that allows mainframe clients to send requests to SQL Server, Open Server, MainframeConnect for DB2 UDB and Open ServerConnect, using Client-Library. Open ClientConnect provides capability for the mainframe to act as a client to LAN-based resources.

Open ClientConnect for CICS/MVS The Sybase capability for the mainframe to act as a client to LAN-based resources in the CICS environment.

Open ClientConnect for IMS TM and MVS The Sybase capability for the mainframe to act as a client to LAN-based resources in the IMS TM and native MVS environments.

Open Data Services A product that provides a framework for creating server applications that respond to DB-Library clients.

Open Database Connectivity A Microsoft API that allows access to both relational and non relational databases. See also **application program interface**.

Open Server A Sybase product that provides the tools and interfaces required to create a custom server. Clients can route requests to DirectConnect through an Open Server configured to meet specific needs, such as the preprocessing of SQL statements.

Open ServerConnect A Sybase product that provides capability for programmatic access to mainframe data. It allows workstation-based clients to execute customer-written mainframe transactions remotely. See also **Gateway-Library**.

Open ServerConnect for CICS/MVS The Sybase capability to provide programmatic access to mainframe data in the CICS environment.

Open ServerConnect for IMS™ and MVS The Sybase capability to provide programmatic access to mainframe data in the IMS™ and native MVS environments.

parameter A variable that is given a constant value for a specified application and can denote the application. Compare with **property**.

Password Expiration Management An IBM password management program with CICS Version 3.3 through an optional program temporary fix, and as an integral part of CICS with version 4.1 and higher.

PEM See **Password Expiration Management**.

PL/1 See **Programming Language/1**.

Programming Language/1 A programming language designed for use in a wide range of commercial and scientific computer applications.

property A setting for a server or service that defines the characteristics of the service, such as how events are logged. Compare with **parameter**.

protocol The rules for requests and responses used to manage a network, transfer data, and synchronize the states of network components.

query A request for data from a database, based upon specified conditions.

Registry The part of the Windows operating system that holds configuration information for a particular machine.

relational database A database in which data is viewed as being stored in tables consisting of columns (data items) and rows (units of information).

remote procedure call A call to execute a stored procedure on a remote server. For Open ServerConnect, an RPC is a direct request from a client to TRS. For Open ClientConnect, a Client-Library transaction that calls a procedure on a remote server acts like an RPC.

remote stored procedure A customer-written CICS program that resides on the mainframe and communicates with MainframeConnect for DB2/MVS. See also **Customer Information Control System**, **stored procedure**. Compare with **Client Services Application**.

remote systems management A feature that allows a system administrator to manage multiple DirectConnect servers and multiple services from a client.

Replication Server A Sybase SQL Server application that maintains replicated data and processes data transactions received from a data source.

request One or more database operations an application sends as a unit to the database. Depending upon the response, the application commits or rolls back the request. See also **commit**, **rollback**, **unit of work**.

rollback An instruction to a database to back out of changes requested in a unit of work. Compare with **commit**.

RPC See **remote procedure call.**

RSP See **remote stored procedure**.

server A functional unit that provides shared services to workstations over a network. See also **client/server**. Compare with **client**.

service A functionality available to DirectConnect applications. It is the pairing of a service library and a set of specific configuration properties.

service library In DirectConnect applications, a set of configuration properties that determine service functionality. See also **access service library**, **administrative service library**, **transaction router service library**, **transfer service library**.

service name redirection A type of service name resolution that allows a system administrator to create an alternative mechanism to map connections with services. See also **service name resolution**. Compare with **direct resolution**.

service name resolution The DirectConnect server mapping of an incoming service name to an actual service. See also **direct resolution**, **service name redirection**.

session A connection between two programs or processes. In APPC communications, sessions allow transaction programs to have conversations between the partner LUs. See also **advanced program-to-program communication**.

short transaction A mainframe transaction that ends the communication when it finishes returning results to the client. Compare with **long-running transaction**.

SNA See **Systems Network Architecture**.

SQL See **structured query language**.

sql.ini The interfaces file containing definitions for each DirectConnect server to which a workstation can connect. The file must reside on every client machine that connects to SQL Servers.

SQL Server The server in the Sybase Client-Server architecture. It manages multiple databases and users, tracks the actual location of data on disks, maintains mapping of logical data description to physical data storage, and maintains data and procedure caches in memory.

static SQL SQL statements that are embedded within a program and prepared during the program preparation process before the program runs. Compare with **dynamic SQL**.

stored procedure A collection of SQL statements and optional control-of-flow statements stored under a particular name. Sybase SQL Server stored procedures are called "system procedures." See also **remote stored procedure**, **system procedure**.

structured query language An IBM industry-standard language for processing data in a relational database.

SYRT The component of OmniSQL Access Module for DB2 that allows clients to submit SQL language requests to DB2 through IMS TM or MVS (z/OS).

system procedures — A stored procedure that Sybase SQL Server supplies for use in system administration. System procedures serve as shortcuts for retrieving information from system tables, or a mechanism for accomplishing database administration. See also **stored procedure**.

Systems Network Architecture (SNA) — An IBM proprietary plan for the structure, formats, protocols, and operational sequences for transmitting information units through networks. See also **advanced program-to-program communication**.

table — An array of data or a named data object that contains a specific number of unordered rows. Each item in a row can be unambiguously identified by means of one or more arguments.

Tabular Data Stream — A Sybase application-level protocol that defines the form and content of relational database requests and replies.

target — A system, program, or device that interprets, rejects, satisfies, or replies to requests received from a source.

TCP/IP — See **Transmission Control Protocol/Internet Protocol**.

TDS — See **Tabular Data Stream**.

transaction — A unit of processing initiated by a single request. A transaction consists of one or more application programs that, when executed, accomplish a particular action. In Open ServerConnect, a client request (RPC or language request) invokes a mainframe transaction. In Open ClientConnect, a mainframe transaction executes a stored procedure on a remote server.

transaction processing — A sequence of operations on a database that is viewed by the user as a single, individual operation.

Transaction Router Service — The DirectConnect program that accepts requests from workstation-based clients and routes them to Open ServerConnect.

Transaction Router Service Library — A service library that facilitates access to remote transactions, allowing customers to execute transactions from virtually any mainframe data source. See also **service library**.

transfer — A DirectConnect feature that allows users to move data or copies of data from one database to another.

Transfer Service Library — A service library that provides copy management functionality. See also **service library**.

Transmission Control Protocol/Internet Protocol
A set of communication protocols that supports peer-to-peer connectivity functions for both local and wide area networks.

TRS
See **Transaction Router Service**.

TRS Library
See **Transaction Router Service Library**.

unit of work
One or more database operations grouped under a commit or rollback. A unit of work ends when the application commits or rolls back a series of requests, or when the application terminates. See also **commit**, **rollback**, **transaction**.

UNIX
An operating system that allows for multiple concurrent programs and users.

user ID
User identification. The ID number by which a user is known in a specific database or system.

variable
An entity that is assigned a value. DirectConnect has two kinds of variables: *local* and *global*.

Virtual Storage Access Method
An IBM licensed program that controls communication and the flow of data in an SNA network.

Virtual Telecommunications Access Method
IBM mainframe software that allows communication on an SNA network between mainframes and allows the mainframe to have multiple sessions per connection.

VSAM
See **Virtual Storage Access Method.**

VTAM
See **Virtual Telecommunications Access Method**.

Windows New Technology
A multi-tasking operating system from Microsoft Corporation.

workstation
A terminal, micocomputer, or personal computer, usually one that is connected to a mainframe or to a network, at which a user can perform tasks.

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