THOROUGHBRED®
SOFTWARE INTERNATIONAL, INC.

TS NETWORK DATASERVER™

Reference Manual

Version 8.9.1

Thoroughbred Software International, Inc.

7 Cedar Grove Lane, Suite 30 • Somerset, NJ 08873

115 N University Drive, Suite C • Nacogdoches, TX 75961

Telephone: 732-560-1377 • 800-524-0430 • **www.tbred.com**

Published by:
Thoroughbred Software International, Inc.
7 Cedar Grove Lane, Suite 30
Somerset, New Jersey 08873

Copyright © 2026 by Thoroughbred Software International, Inc.

All rights reserved. No part of the contents of this document
may be reproduced or transmitted in any form or by any means
without the written permission of the publisher.

Document Number: TN8.9.1M001

The Thoroughbred logo, Swash logo, and Solution-IV Accounting logo, OPENWORKSHOP, THOROUGHBRED, VIP FOR DICTIONARY-IV, VIP, VIPImage, DICTIONARY-IV, and SOLUTION-IV are registered trademarks of Thoroughbred Software International, Inc.

Thoroughbred Basic, TS Environment, T-WEB, Script-IV, Report-IV, Query-IV, Source-IV, TS Network DataServer, TS ODBC DataServer, TS ODBC R/W DataServer, TS DataServer for Oracle, TS XML DataServer, TS DataServer for MySQL,TS DataServer for MariaDB, TS DataServer for MS SQL Server, GWW Gateway for Windows, Report-IV to PDF, TS ReportServer, TS WebServer, TbredComm, Thoroughbred Web Terminal, WorkStation Manager, FormsCreator, T-RemoteControl, Solution-IV Accounting, Solution-IV Reprographics, Solution-IV ezRepro, Solution-IV RTS, and DataSafeGuard are trademarks of Thoroughbred Software International, Inc.

Other names, products and services mentioned are the trademarks or registered trademarks of their respective vendors or organizations.

INTRODUCTION

TS Network DataServer is an integral part of the Thoroughbred Software network solution. Server data can be made available across platforms for uses in Dictionary-IV file maintenance, Report-IV, Query-IV, Script-IV, and Basic applications.

With TS Network DataServer software:

- Applications can now be configured to access a Network DataServer.
- New or existing applications can access and share data across a network.

When you access a file on another computer there is a large amount of network communication associated with accessing keys and locking records. This network traffic is in addition to the communication necessary to transfer the data.

Current file sharing capabilities with NFS, Netware, and Microsoft Network provide low-level access to files on other systems. They do not, provide acceptable levels of performance or ensure data integrity.

TS Network DataServer allows much of the logic required for distributed file I/O to reside on the system that contains the data. This process minimizes network exchanges and provides improved performance.

This guide first describes the Client side of TS Network DataServer, which is provided with every TS Environment installation. It then provides specific information for Thoroughbred servers.

Requirements

Starting with release level 8.9.0, the TS Network DataServer is no longer compatible with previous versions of Thoroughbred Basic/Web Basic.

To run TS Network DataServer your system must meet the following requirements:

- Network communications with TCP/IP protocol.
- Enabled and compatible TS Environment.

Once the installation is complete, server access is enabled by the addition of a number of configuration items. Refer to the sections that follow for instructions about creating or modifying the SERVER.MAP and IPLINPUT file, TERM.MAP file, and executing the Server startup program.

TS Network DataServer Components

The TS Network DataServer for consists of three components:

- A Client enabled TS Environment,
- A Startup Program (tsmgr), and
- A Server Process (tsserv) for each connection.

Copyright © 2026 Thoroughbred Software International, Inc.

Client Enabled TS Environment

The client side is enabled in the standard TS Environment. When configured for data server access, it detects requests for data that reside on a server. When this event occurs, it sends the I/O request to the server for processing. The server responds with the resulting set and processing continues.

Startup Program (tsmgr)

The Startup Program (tsmgr) creates server processes for clients as needed. When the Startup Program detects a client attempting to connect, it tries to create a Server Process for the client. If a server process is created successfully, they can perform client/server communications.

NOTE: A server system must have the Startup Program running before clients attempt to connect to it.

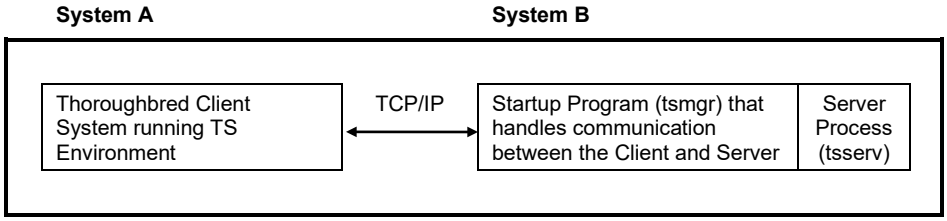
Server Process (tsserv)

The Server Process (tsserv) is triggered by requests from the client. Once a request is received, it is processed and the results returned to the client.

System Architecture

The following diagram describes the configuration of components for the Thoroughbred Client.

Client on System A and Server on System B.



Copyright © 2026 Thoroughbred Software International, Inc.

CLIENT ENVIRONMENT

To set up TS Network DataServer software you must configure network communications and server access for the client.

The following files must be created or modified:

- SERVER.MAP
- IPLINPUT
- TERM.MAP

SERVER.MAP

The SERVER.MAP text file establishes a relationship between a 2-character Server ID used by Thoroughbred and the server system. This file is a simple text file. The system searches the Basic directory first. If the file does not exist there, the system defaults to the **/usr/lib/basic** directory.

NOTE: For UNIX Clients, this file should be placed in the **/usr/lib/basic** directory.

Thoroughbred uses the Server ID to reference the server system. Enter a line in the file for each server.

The syntax for an entry is:

```
server-id:[host-name|TCP/IP address]:TCP/IP port[:PARENT][:SECURE]
```

server-id
is a 2-character alphanumeric string used within Basic to reference a particular server system.

host-name
is the host name for the server system. You can use the host-name or the TCP/IP address.

TCP/IP address
is either the TCP/IP address or the host name for the server system. You can use the TCP/IP address or the host name.

TCP/IP port
(optional) is the TCP/IP port number used to override the default port number (5680). In the event of a conflict with another process using TCP/IP, the transport protocol layer of the TCP/IP process uses the port number to deliver the packet data to the appropriate application.

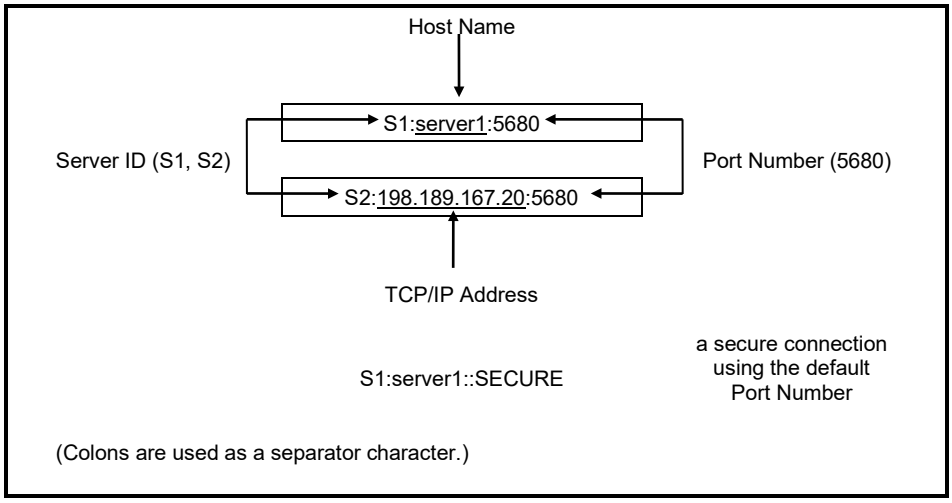
PARENT
(optional) is a keyword for designating a server as the host for TS Network Basic.

SECURE
(optional) is a keyword specifying that secure communications with the TS Network DataServer are required.

Copyright © 2026 Thoroughbred Software International, Inc.

The fields in a SERVER.MAP entry are separated by a colon (:). Fields are positional and consecutive colons must be used when necessary to indicate defaulted fields. The SECURE and PARENT keywords may be combined in any other order. The following are examples of valid SERVER.MAP entries:

Server ID or TCP/IP Address



NOTE: On UNIX systems the **/etc/services** file lists the port numbers used on a system. (This list may be a subset of the actual port numbers used on the system.) In the event of a conflict on a particular system add the port number to the SERVER.MAP file and execute the Server process using the port number as an argument. For more information see Server Process in the following section.

IPLINPUT

Once you establish the server ID you can make the required entries for the IPLINPUT file.

Each DEV line corresponds to a directory on the server. The syntax for a DEV line is:

```
DEV device-name,1,,server-flag,,,,server-id:path
```

device-name
is device ID used to reference logical disk directories. Valid values range from D0 through D9, DA through DZ, and Da through Dz.

server-flag
informs Basic that the disk directory is located on a server and defines the type of server. The value for the Thoroughbred server is 2.

server-id
is the two-character alphanumeric code assigned to this server. The server ID on the DEV line must match an entry in the SERVER.MAP file.

Copyright © 2026 Thoroughbred Software International, Inc.

path
is the directory (on the server) where the data resides. The path may or may not be a fully qualified path. If it is not a fully qualified path, it is interpreted as relative to the directory where the server executable resides.

Examples
The following are examples of valid DEV lines (using the SERVER.MAP entries defined previously):

Fully Qualified Path

```
DEV D1,1,,2,,,,S1:/home/data/user
```

In this example a fully qualified path has been specified. Therefore, files on device D1 are placed in the directory/home/data/user.

Relative Path

```
DEV D2,1,,2,,,,S2:data/user
```

In this example a relative path has been specified. If the server executable is located in the directory /usr/lib/basic, data files on device D2 will be placed in the directory /usr/lib/basic/data/user on the server S2 (IP Address = 198.189.167.20).

Hierarchical Disk on the Server

```
DEV D2,1,,2,,1,,S2:
```

The device-name and server-id are the same as previously defined.

Prior to the availability of TS Network DataServer, only one hierarchical disk could be specified in an IPLINPUT file. The Client Basic supports one hierarchical disk per server as well as one for the local client disk.

NOTE: An IPLINPUT file may contain DEV lines that point to directories on the Client system and DEV lines that point to directories on the Server system.

Copyright © 2026 Thoroughbred Software International, Inc.

TERM.MAP

The TS Environment and the Server Process (tsserv) uses terminal Ids to enforce data integrity (record and file locking). Terminal Ids must be unique not only with other client Basics but also with each server connection. The client and server(s) negotiate at startup to establish a terminal ID that is unique for the client Basic and all servers connected. Therefore, it is not recommended that client Basics be initiated as follows:

```
./b T5
```

Terminal table assignment is accomplished using TERM.MAP. See the Thoroughbred Basic Customization and Tuning Guide for information on creating and maintaining the TERM.MAP file.

NOTE: For Window clients, the SETUP installation creates a TERM variable in AUTOEXEC.BAT and sets it to WIN. The SETUP installation also creates a TERM.MAP file with the one entry listed below:

WIN:WINNTMON

Copyright © 2026 Thoroughbred Software International, Inc.

USING TS NETWORK DATASERVER

The following describes how to access and manage server connections.

Operating System Interface

The Thoroughbred server makes any Thoroughbred native file accessible to a client. This includes Programs and Object Libraries. Your entire application may reside on the server.

If your application does an operating system check, the results are based on the Client Basic. It is important to understand that instructions that are operating system specific may not generate expected results.

For example, even though your entire application resides on a UNIX Server, a Windows Client cannot use commands like the following: OPEN (OPT=SHELL), or SYSTEM “ls -1”, etc.

Server Process

Starting the Server Process

UNIX/Linux
Execute the **tsmgr** program with root privileges (UNIX Server). The Server Process must be running in order for any client to connect. This program is a daemon that continually checks for clients attempting to connect and attempts to create a Server Process for each client.

Windows 10/Windows 11/Windows Server 2016/Windows Server 2019/Windows Server 2022/ Windows Server 2025
The installation sets up the Thoroughbred Service. The server process is initiated each time the system is started.

You can manually start and stop the Server Process through **Services** in the **Control Panel**.

Managing the Server Processes

A server system that is running properly has one instance of the Startup Program (tsmgr) running and one instance of the Server Process (tsserv) running for every client that is connected.

For a given client machine and server system, there is a one-to-one correspondence between the client and server processes. When a client connects to a server, a Server Process is created for that client by tsmgr. When the client quits, the associated Server Process (tsserv) also terminates.

Copyright © 2026 Thoroughbred Software International, Inc.

UNIX/Linux
For UNIX operating systems the ps command can be used to produce a listing of processes that are currently running. You can pipe the output to grep to display only the relevant information. The output should be similar to the following:

List of Processes Currently Running - UNIX

UID	PID	PPID	C	STIMETTY	TIME	COMMAND
bcf	8118	8091	0	15:13:10	0:00	tsmgr
bcf	8065	8064	0	15:12:35	0:01	-ksh
bcf	8091	8090	3	15:12:55	0:01	-ksh
bcf	8145	8065	0	15:15:04	0:02	./tsserv iplserv
bcf	8147	8091	9	15:15:35	0:00	ps -ef

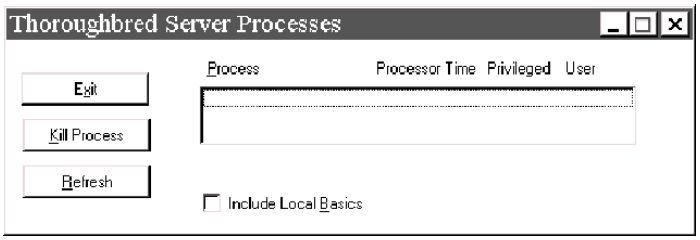
If you must stop a process, use the command:

```
kill -9 PID
```

The process id can be determined from the output of the ps command by looking under the PID column. This is the only way to stop the Startup Program (tsmgr).

Windows 10/Windows 11/Windows Server 2016/Windows Server 2019/Windows Server 2022/ Windows Server 2025
For Windows operating systems the Thoroughbred utility tbpview.exe can be used to produce a listing of processes that are currently running. This program can be found in the Thoroughbred folder. When tsmgr is not running, the (empty) output should be similar to the following dialog box.

List of Processes Currently Running



Server Authorization

The Server Process requires an Activation Process similar to Thoroughbred Basic. If any server defined in the IPLINPUT file has not been activated, the user will be given the option to authorize that server.

Client Connection

Once the Server Process is up and running, clients can begin to connect. For each DEV line in the IPLINPUT file that specifies a connection to a server, an attempt is made to connect to that server.

- If an existing connection already exists, the existing virtual circuit will be used for communication.
- If no existing connection exists, a virtual circuit to the server will be created.

Copyright © 2026 Thoroughbred Software International, Inc.

- If a connection cannot be made, an appropriate error message will be displayed. The device will be disabled.

NOTE: If there are no servers defined in the IPLINPUT file or the client could not connect the defined servers, the client can still operate accessing local files.

Reestablish a Connection

To reestablish a connection, use the following comment:

```
ENABLE disk-no,"RECONNECT"
```

Managing the Number of Connections

The server manages the number of connections. Each time a new connection is initialized, the user count will be incremented. When a user exits Basic (RELEASE), the user will be removed from the count.

OPENing Data Files

Thoroughbred client follows the same methodology as standard Basic when searching for files. The disk directories are searched in the order they are defined in the IPLINPUT file.

If the client Basic attempts to OPEN /home/data/filename, the search starts with the first hierarchical disk defined in the IPLINPUT file. The client and each server may have a hierarchical disk directory defined in the IPLINPUT file. Adding a server ID to the above path S1:home/data/filename does not force access to the server. In this example the server ID S1 is ignored and the search is done as if the server ID did not exist.

Data Security

The server Process (tsserv) is installed with the set-UID bit set. Therefore, the client has the same permissions as the owner of the Server Process (tsserv) when accessing files on the server.

TS Network DataServer provides additional security with an access restriction capability designed to prevent unauthorized access to your server and data.

When a remote Basic client attempts a DataServer connection, the dataserver process will validate the remote basic's IP address using the new file TCBSERV. If this file does not exist in the same directory as tsmgr/tsserv, Basic and DataServer will behave the same as in the past. The TCBSERV file contains IP addresses for allowed connections as well as accessible directories. If the IP address is not in this file, Basic will display the message that it could not connect to the dataserver. If any of the paths defined in the Client IPL file are not in the allow list:

- Current Basic will fail at startup with an error message
- Older Basics will fail with an ERR=13 during I/O attempts

Copyright © 2026 Thoroughbred Software International, Inc.

A sample TCBSERV text file looks like:

```
-----------------------------
[192.168.19.41]
[192.168.19.42]
/acct1/DATA
/acct1/IDL4
 [192.168.19.43]
/u1/DSG
----------------------------
```

In the above example only IP addresses 41,42 and 43 would be allowed to connect to this DataServer.

- 41 would have access to all the directories.
- 42 would have access to only the /acct1/DATA and /acct1/IDL4 directories.
- 43 only has access to /u1/DSG.

Communications

While TCP/IP is designed to provide reliable bi-directional communications, situations may occur where both the client and server are waiting for a response from the other. This may occur when the client and server are running different operating systems, as for example a Windows client and a UNIX server.

If the server does not respond to a client request after a specified period of time, the client will timeout. The client then starts sending special synchronization messages to the server in an effort to resynchronize with the server. Once the server responds with the proper synchronization sequence, the original request is retransmitted and processing continues.

The timeout value is initially set to one second. After each timeout, the timeout value is doubled. Therefore, the client will timeout after 1 sec., 2 sec., 4 sec., etc. A typical hang sequence might look like:

Timeouts - Hang Sequence

Client Sends Request	Action
After 1 second	No response from the Server. Timeout. Double timeout to 2 seconds. Log Level 1 timeout error. Send synchronization message.
After 2 seconds	----------
After 3 seconds	No response from the Server. Timeout. Double timeout to 4 seconds. Log Level 2 timeout error. Sent synchronization message.
After 4 seconds	----------
After 5 seconds	Server responds with proper synchronization sequence. Client resets timeout to 1 second. Re-sends request.

Copyright © 2026 Thoroughbred Software International, Inc.

NOTE: Some timeouts are normal for example, waiting for a locked record.

At this point the client and server resume normal communications.

The timeout errors are logged internally. You can get a listing of these errors with the command:

```
DUMP IPLDEVS "STATS=YES"
```

For more information see the *Troubleshooting* section later in this manual.

Copyright © 2026 Thoroughbred Software International, Inc.

ERROR MESSAGES

The following describes startup and Client Error Messages.

Startup Messages

`Unable to get host information for host name:`

Explanation: The host name in the SERVER.MAP file is not valid.

Action: Verify that the SERVER.MAP file contains valid host name entries for all the defined servers.

`Unable to get host information for host address:`

Explanation: The TCP/IP address in the SERVER.MAP file is not valid. Either the format is not correct or the address does not exist.

Action: Verify that the SERVER.MAP file contains valid TCP/IP addresses for all the defined servers.

`Invalid SERVER.MAP entry for Server:`

Explanation: The entry in the SERVER.MAP file is not valid.

Action: Verify that the entries in the SERVER.MAP file are not missing any fields.

`Unable to connect to Server:`

Explanation: The client was unsuccessful in its attempt to connect to the server.

Action: Verify that the Startup Program (tsmgr) is running on the server. Verify that the port number in the SERVER.MAP file is 5680. Verify that the network is up and functional. Try alternate methods of communicating with the Server (e.g., ping, telnet, rlogin, rcp, ftp) or notify your network administrator.

Client Error Messages

`Error 103`

Explanation: Operating system error. When running TS Network DataServer, there might be an error from a call made to the Socket API. The cause may be a broken or lost connection to the server.

Action: The client must exit Basic and restart.

Copyright © 2026 Thoroughbred Software International, Inc.

TROUBLESHOOTING

The following provides troubleshooting information for the Thoroughbred Server.

Server Crash

If the server crashes or the connection is lost, any attempt to access data on the server results in and Error 103. The client must exit Basic and restart.

Performance

Performance problems can be caused by network connection or by the hangs that occasionally occur in mixed operating system environments. Contact the network administrator to determine if network problems exist. To see if you are running into excessive "hang" conditions, type:

```
DUMP IPLDEVS "STATS=YES"
```

The listing shows the timeout errors for those servers to which the client is connected. The listing should look similar to:

Listing of Timeout Errors

*** IPL ENVIRONMENT INFORMATION

*** TCP TIMEOUT INFORMATION

	Level										
Server	1	2	3	4	5	6	7	8	9	10	Total
S1:Server1	1	0	0	0	0	0	0	0	0	0	1
S2:Server1	4	2	0	0	0	0	0	0	0	0	6

*** END OF DUMP2

Remember that a Level 1 error is a timeout after one second, a Level 2 error is a timeout after two seconds, a Level 3 error is a timeout after four seconds, etc.

You should also contact the Server System Administrator to verify that the server is fully functional.

Copyright © 2026 Thoroughbred Software International, Inc.