SYBASE®

POWER TRANSFER: A TOOL FOR MIGRATING DATA TO ADAPTIVE SERVER® ENTERPRISE

A TECHNICAL WHITE PAPER

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OVERVIEW

This paper introduces a tool available from Sybase designed to aid in database migration to Adaptive Server Enterprise.

Power Transfer allows data to be transferred from a wide variety of sources into Sybase Adaptive Server Enterprise. It was developed to complement PowerDesigner's reverse engineering and schema conversion features and uses ODBC to pull data from a source database and Sybase Bulk Library to insert it into the target. It has been tested with Microsoft® SQL Server, Oracle®, Sybase Adaptive Server Anywhere, and Microsoft Access. It is written to the ODBC 3.0 specification and should work with any compliant database driver. Power Transfer is available for download from the Sybase website for no charge and is also bundled with Sybase ASE's PC client disk.

In order to migrate a database to ASE, a database administrator would use PowerDesigner® to migrate the schema, followed by Power Transfer to copy over the data. The schema can be migrated using any method, however PowerDesigner is well suited for this task.

Although intended as a migration tool from third-party databases, Power Transfer can also be used to move data between different versions of ASE. This might be useful when moving data between ASE's of different machine architectures when dump files cannot be loaded.

SYSTEM REQUIREMENTS

The machine running Power Transfer must meet the following requirements:

- Windows 2000 or XP
- Microsoft .NET Framework
- Sybase Open Client 12.5 or above
- ODBC Drivers for the source database

MIGRATING THE SCHEMA

The first step is to migrate the schema from the source database to the target database. PowerDesigner has a powerful reverse engineering capability that can import a complete schema into a physical data model automatically. Once the schema is imported, change the database type of the model to Adaptive Server Enterprise 12.5. PowerDesigner will convert the schema to use Sybase ASE data types. The automatically chosen mappings should be correct, however the schema should be reviewed to make sure they make sense for your application. You may choose to change a data type in the target schema to a different, but similar data type than is in the source. Power Transfer can handle most conversions between types, however be aware that overflows may occur during the data transfer if an inappropriate conversion is selected. Power Transfer will allow you to change the names of columns in the target schema but you may not change the column ordering. The table names must be the same in the source and target database.

If you need to make significant changes to a table such as dropping columns or changing the table name, consider creating a view in the source database that matches your requirements.

Once the changes to the physical model are complete, use PowerDesigner to connect to the target database and push the schema out to it. It is recommended that the schema be pushed in two steps. Before the data is transferred, the target database should contain table definitions without indexes, triggers, referential integrity rules, constraints, or defaults. The presence of these items will slow the bulk insert process. Additionally, complicated referential integrity rules may make it difficult to move the data in the correct order that is required. After the data is transferred, use PowerDesigner to modify the target database by adding in these items.

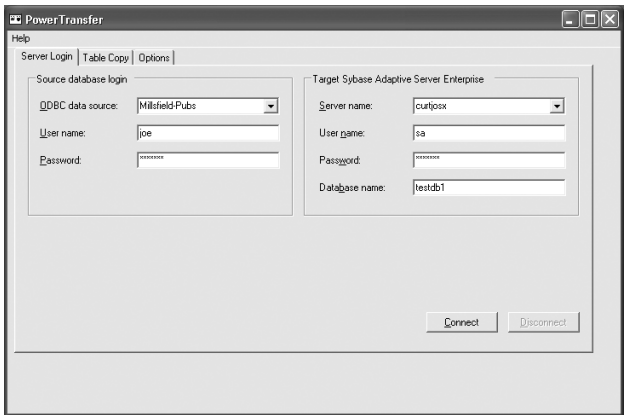
COPYING THE DATA

Once the database schema is present on the target server, you can use Power Transfer to copy the data. Before starting Power Transfer, Open Client 12.5 should be configured with an interfaces file entry for the target server. Power Transfer uses Sybase Bulk Library to insert data into ASE. Bulk Library allows data to streamed in large chunks giving significantly better performance than generating INSERT statements.

The target ASE database should also be configured to allow bulk operations. This can be done through the following command:

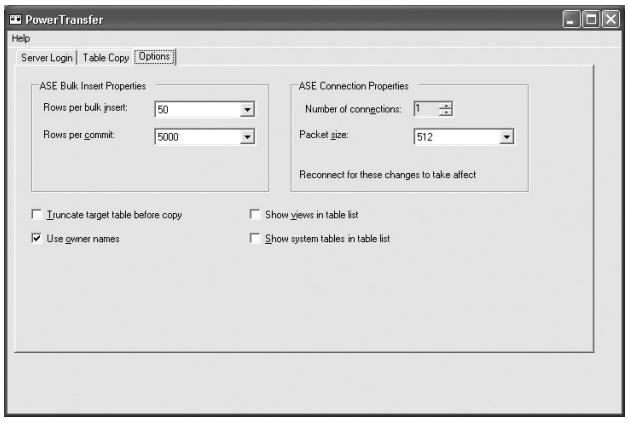
```
sp_dboption databasename,"select into",true
```

SERVER LOGIN



The first screen you will be presented with is the Server Login screen. From here, choose the ODBC data source and the target Adaptive Server Enterprise. The ODBC data sources listed are those that have been configured using the Windows ODBC administrator program. The target servers are those that are listed in the Sybase interfaces file. Fill in the login information and choose connect.

OPTIONS



At this point, you could move directly to the Table Copy screen, however you may want to review the transfer options that have been selected before starting the transfer. On the Options screen are several options:

- **Rows Per Bulk Insert**
  This value determines the number of rows that Power Transfer sends in a single bulk request. It corresponds to the array binding size in bulk library. Larger values will yield better performance by reducing network overhead, however this is probably not a large factor unless very small rows are being sent. The default of 100 is reasonable for most situations.

- **Rows Per Commit**
  This value determines the frequency that Adaptive Server Enterprise will commit the bulk-inserted data to disk. Performance will be better as this value is increased, but the ASE transaction log could fill up if the value is too large. Adjust this value up or down depending on the capacity of transaction log in the target ASE.

- **Number of Connections**
  Power Transfer can open more than one connection to the source and target database so that transfers are performed in parallel. This option can significantly improve performance, however if chosen, it is important that rules and triggers related to referential integrity not be present in the target database. When parallel transfers are selected, the order that the tables are transferred in is no longer guaranteed to be the order listed in the table copy screen. On a single CPU, a recommendation would be to use 6 connections. Assuming a server class machine is being used for ASE, this value should be increased until the Power Transfer machine is completely CPU bound.

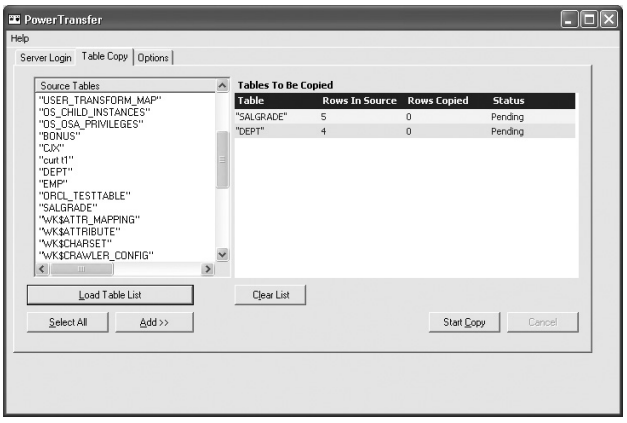
- **Packet Size**
  Increasing the packet size that Power Transfer uses to connect to ASE will significantly improve performance. This value must be less than or equal to the 'max network packet size' values set in `sp_configure`. It is recommended that this value be set to 8K or better.

- **Truncate Target Table Before Copy**
  Enabling this option causes a truncate table command to be issued to the target prior to the transfer.

- **Show Views In Table List**
  This option will allow you to transfer the results of a view in a source database into a table in the target ASE. This option is useful if you do not want to copy the entire contents of the original source table. A view could be set up that omits or reorders columns, or aggregates data from multiple tables.

- **Use Owner Names**
  Selecting this option will cause tables names to be fully qualified using the owner name. If this is not selected, owner names will not be used when referencing tables.

TABLE COPY



The Table Copy screen will show the list of tables that are located in the source ODBC database. Either select tables in the Source Tables list individually or choose “Select All” if you want to choose all tables. Then choose “Add” to queue up the selected tables for transfer. If you are using one connection, the tables will be transferred sequentially in the order shown in the “Tables To Be Copied” box. Select *Start Copy* to initiate the transfer.

PERFORMANCE

Performance of Power Transfer depends on three important factors: ASE host speed, Power Transfer host speed, and the speed of the network. Assuming the source and target database are running on server class machines, the performance limitation is most likely to be the CPU speed of the Power Transfer machine. On a 1.2 GHz PC, using 6 connections you will see transfer rates of about 8-10 Gigabytes/hour. The other critical performance factors include having at least 100 mbps Ethernet, large ASE packet sizes, and multiple connections to the source and target database server.

CONSIDERATIONS WHEN MIGRATING FROM MICROSOFT SQL SERVER

Because of Microsoft SQL Server and Sybase Adaptive Server's common original code base, converting from SQL Server is one of the easier migrations that can be made. SQL Server has several differences that should be kept in mind:

- SQL Server allows the identity attribute to be placed on integer data types. ASE prior to version 12.5.3 requires a numeric data type for identity.
- NCHAR and NVARCHAR are not the same data types between ASE and SQL Server. For SQL Server, these types are two-byte unicode data types that more appropriately map to Sybase UNICHAR and UNIVARCHAR.
- SQL Server supports 128 byte column names.

Application portability between SQL Server and ASE is an important goal for Sybase and several enhancements are being made to aid in that migration:

12.5.03 contains several new built-in functions supported by SQL Server:

- day()
- left()
- len()
- month()
- str_replace()
  This function is identical to SQL Server replace().
- square()
- year()
- newid()
  This function generates a globally unique identifier that can be used to generate "identity" like values.

12.5.1 will also contains several SQL Server compatibility enhancements:

- Bracketed Identifiers
- Set Assignment Operator
- Default keyword for insert operations
- Several XML related features including SELECT ... FOR XML
- cast()

12.5.3 further adds:

- Integer identity values
- SELECT TOP
- Getutc()

CONCLUSION

Power Transfer allows data to be transferred from a wide variety of sources into Sybase Adaptive Server Enterprise. It uses ODBC to pull data from a source database and Sybase Bulk Library to insert it into the target. It has been tested with Microsoft SQL Server, Oracle, Sybase Adaptive Server Anywhere, and Microsoft Access. It is written to the ODBC 3.0 specification and should work with any compliant database driver. Power Transfer is available for download from the Sybase website for no charge and is also bundled with Sybase ASE's PC client disk.

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