

Database
Management
System

LINTER[®]

Version 5.9

Data Conversion

Relational Expert Systems



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Introduction

This document describes Linters database converter, a Linter utility that runs under later MS Windows operating systems. Its primary function is to transfer table-structured data between different DBMSs. It is implemented with the ODBC driver and has a graphic user interface. The converter is also used to merge or separate data in source and target DBs where source and target may be in the same or different DBs.

Overview

The database converter transfers data from a source DB to a target DB. The source and target DBs may have been created under the same or different DBMSs. The DBMS for both source and target must have their own ODBC drivers.

During transfer, the following considerations are significant:

- Only data is converted. System level information, such as index and bitmap files, is not transferred to the target DB.
- During transfer, the program attempts to establish the highest level of data type compatibility. If the desired level is not achieved, data loss occurs. E.g., if the target DB does not support BLOB objects, all data containing BLOBs will be lost during transfer.
- During view conversion, the data itself is transferred instead of the view text, i.e., a table that corresponds to a particular view is created.
- During synonym conversion, the converter creates a table corresponding to the specific synonym.
- Link-integrity rules are transferred to the target DB with the fewest possible alterations.
- During the conversion process, the users privilege access level to both DBs, source and target, is checked.

Software Requirements

The Database Converter program runs under the Windows 95/98/NT environment, all of which include an ODBC driver manager.


ODBC drivers for each DBMS involved in a conversion are provided by the respective DBMS developers or by third-party developers.



Because the conversion process is based on the ODBC driver, any DBMS containing its own ODBC driver, not just Linter, may be used as a source or target!

Starting the Converter Program

Running Converter


To launch the program double-left-click on the  converter program icon in the Linter SQL Server program group.

Connecting to Databases

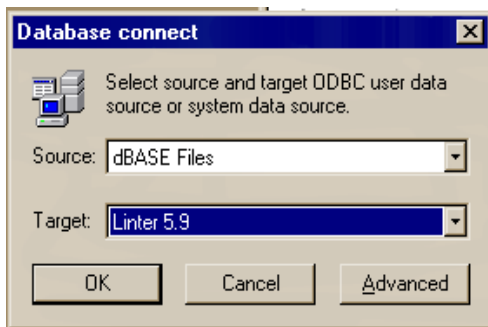
When the converter is first run, you will be presented with the Database Connections pop-up described below.

To perform the data transfer from the source DB to the target DB, the program must connect to both. These connections must be established after the program is launched.

To connect to the Source and Target DBs if the connections are lost or if you skipped the start-up connection:

- 1) press the F2 key,
- 2) click on the connect icon,  or
- 3) choose the **Database > Connect** menu option

to display the Database Connections pop-up.



Screen 1 – Connecting to Source and Target DBs


You connect to a DB by selecting the data resource. The defaults are the DBs used in the last session. When running the program for the first time the fields will be blank.

To choose the data resource:

1. Left click on the arrowhead button to the right of the Source box to drop down a list of all data resources. If the list contains the necessary data source, left-click on its name and go to step 2. Even if the list is empty or the source needed is not present, continue with step 2.
2. Left-click on the arrowhead button to the right of the Target box to drop down a list of all data resources. Left click the needed target name and click the OK button. Even if the list is empty or the needed target is not present, click the OK button.

To cancel the selection process click on the Cancel button.

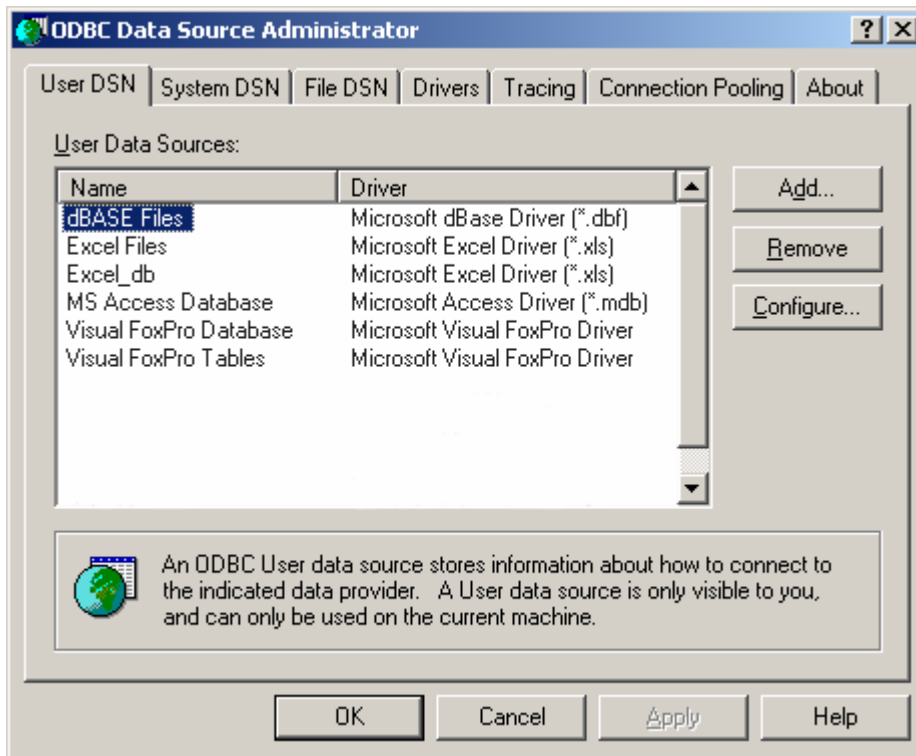
Both the Source and Target fields are required. If one or both are empty, the program will present you with the ODBC Data Source Administrator window. The tabs on this window allow you to search for needed data resources, possibly on network nodes. If the search fails, you will be able to create the needed data resource on the fly.

 Data resources are kept in the system registry.

The active tab in the ODBC Data Source Administrator window depends on which box(es), Source and/or Target, in the Database connect window were empty.

If both fields were left blank, the window will be presented twice: first with the User DSN tab for the Source, then with the System DSN for him Target. Both tabs show all presently existing data resources.

The window is displayed with the File Data Source tab active and the contents of the Data Sources folder displayed (if such is present on the computer).



Screen 2 – Select Source DB for Conversion

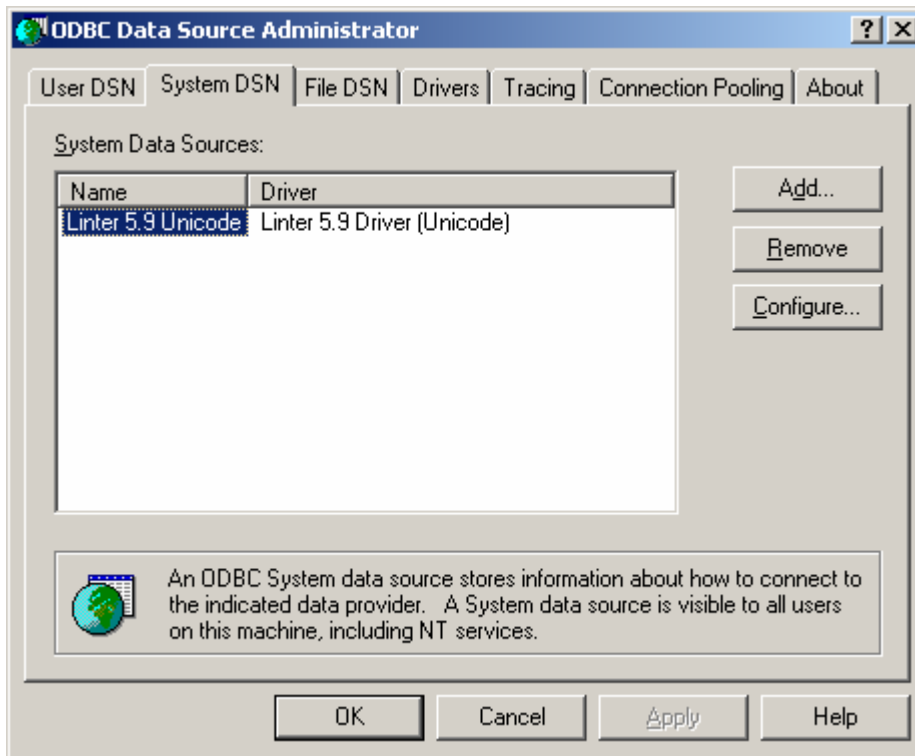
To select a file data source:

1. If the file data source needed is in the current folder left-click on it and its name will be displayed in the Name column. If the current folder does not contain the needed data source, use the standard tools to search for it in the local network.
2. If the search for a needed source is unsuccessful click on the Cancel button or initiate the creation process of a new data source (the Create button).

 File data sources usually have a .DSN extension.

To select a computer data source:

1. Click the System DSN tab.
2. If the data source needed is not listed, click the Add button to create a new data source with the ODBC driver manager.
3. The Cancel button quits.



Screen 3 – Select Target DB for Conversion

To create a new file or DSN data source:

1. Click on the Add button to launch the ODBC-driver manager.
2. Create the new data source with the ODBC driver manager.

The newly created data source(s) will then be available on the File and System DSN tabs.

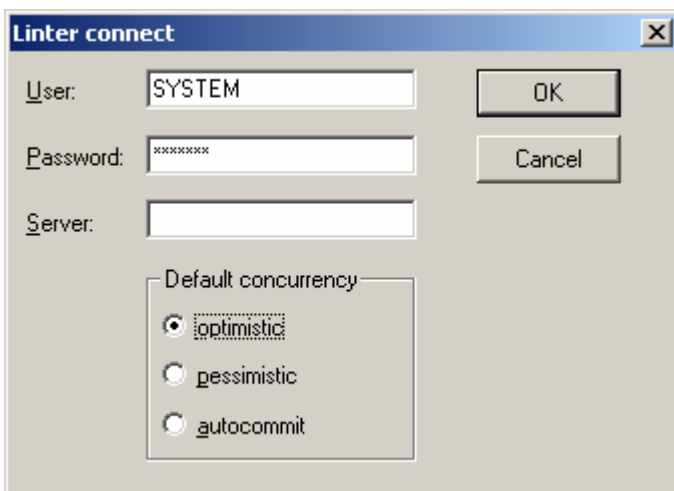
 If, when connecting to a DB, a computer data source was not chosen, even if it exists, it may be selected later by returning to the System DSN tab.

Logging on to the Databases

After defining the data resources, the program connects to the source and target DBs and checks for necessary access rights. If one or both DBs require the user to log in, the standard login window is displayed. See Screen 4.

To log into a DB under Linter:

1. Enter the username.
2. Enter the password.
3. Select the server which contains the DB.
4. Select the language be used.
5. Click the OK button.

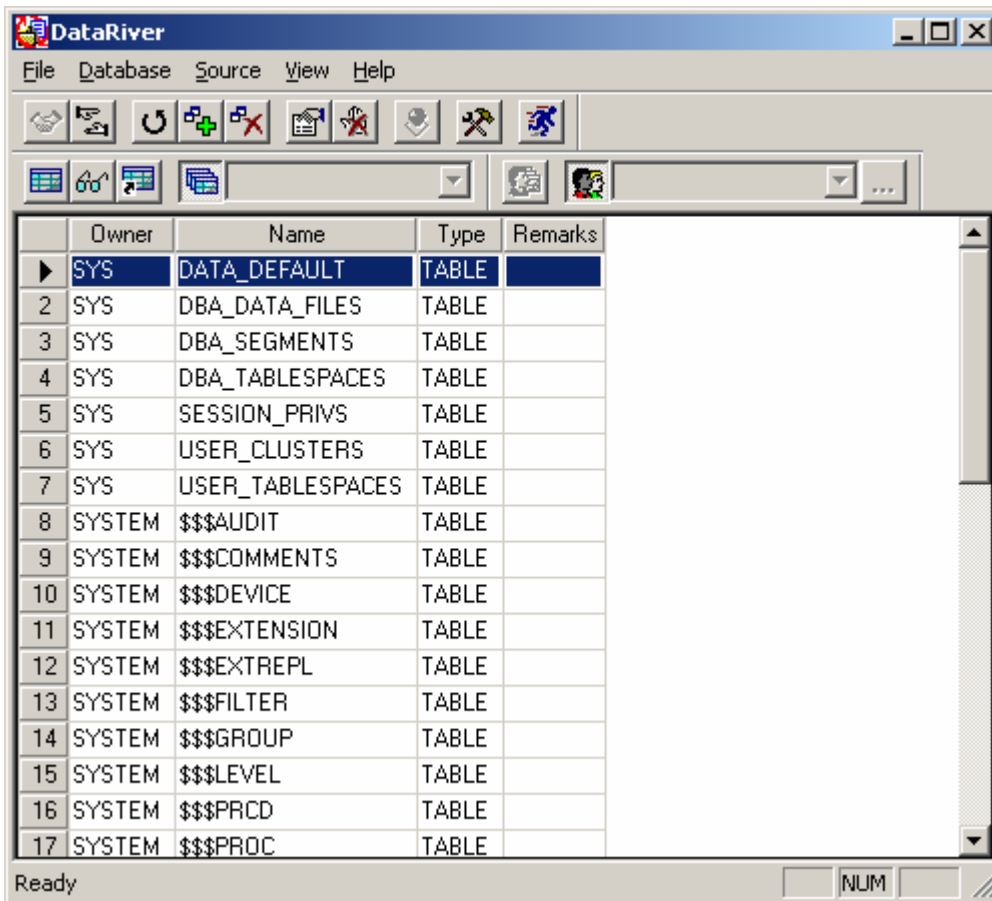


Screen 4 – DB Login Window

Selecting Tables to be Converted

The data converter allows selective data transfer. The table object selection may be performed according to two criteria: by object type and/or by object parent.

The root window for the converter program, is displayed automatically after a connection is established. Initially, it lists all user tables in the source DB.



Screen 5 – Converter Main Menu

To select objects to be converted:

1. Check the System tables checkbox if system tables are to be converted.
2. Check the Views checkbox if views are to be converted.
3. Check the Synonyms checkbox if synonyms are to be converted.
4. Check the All user tables checkbox if all user tables are to be converted.
5. If only some of the user tables need to be converted, uncheck the All user tables checkbox. The Like textbox in the Types of object window block will become available.
6. In that Like textbox, enter the name of the table(s) you want to convert. The SQL wild card symbols % and _ may be used to select groups of tables with similar substrings:
 - If %<string> is entered, the program will select all the tables whose names end with <string>; e.g., %ON will find all tables whose names end with ON.
 - If <string>% is entered, the program will select all the tables whose names begin with <string>; e.g., PB% will find all tables whose names begin with PB.
 - If %<string>% is entered, the program will select all tables whose names contain <string>; e.g., %P_B% will find the tables POBTAB, ARPPB, and CCPKB01. To select table objects by owner’s name, uncheck the All checkbox in the Owners window block. The Like textbox beneath the unchecked All box will become available. Enter the owner name(s) in the Like textbox. Wildcards may be used in the same manner as is described in step 6 in the table immediately above.

The search launched by both Like text boxes is case sensitive.

Refresh the data displayed in the Source objects window block by pressing F5, clicking on the refresh icon, or by selecting the **Source > Refresh** menu option.

After selecting your tables, the Source objects window block will contain a listing of selected objects. This listing is not final and may be modified later on.

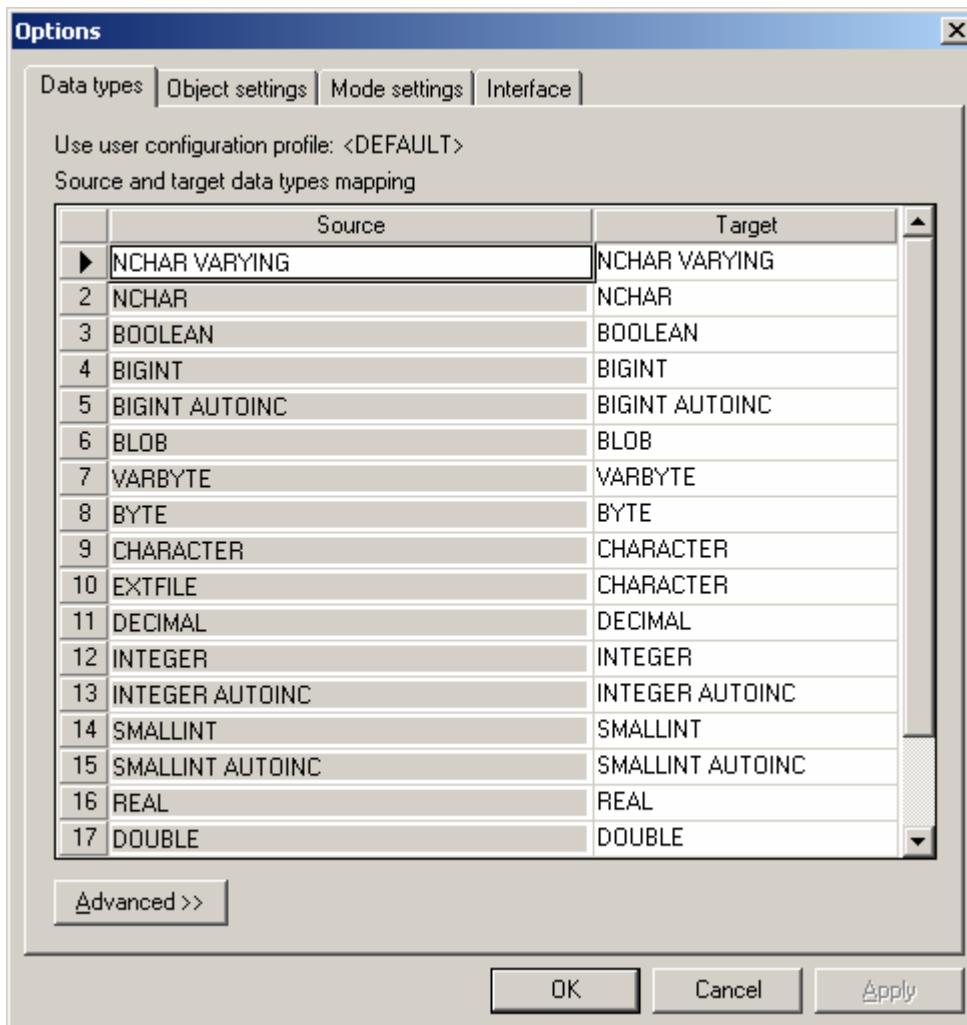
Data Type Compatibility

Data type compatibility problems may arise when transferring data from one DB to another. Data types may be incompatible in the following instances:

1. The target DB does not support one or more of the data types used in the source DB. E.g., FoxPro does not support BLOB data which is included in Linter;
2. Inconsistencies between lengths of data types ,e.g., Linter’s char data type may extend to 4000 symbols while other DBs may support only 256;
3. Incompatibility of fixed point number precision.

The converter compares the data types and creates the maximum level of compatibility. You may edit the derived compatibility list:


1. In the Converter Main Menu window, Screen 1, press F9 or choose the **Source > Options > Data types** menu option.
2. When editing is complete, click the OK button.



Screen 6 – Data Type Compatibility Window

Standard Data Conversion


To launch the standard conversion:

1. Select those tables in the Source object window block of the Converter Main Menu window, Screen 5, that are to be converted. To select an table, left-click on its name. The selected table object name will be highlighted in black.
2. To select all of the listed table objects, choose the **Source > Select all** menu option.
3. To cancel all selections, select the **Source > Deselect all** menu option.
4. Press F4, choose the **Database > Convert** menu option, or click on the properties icon 

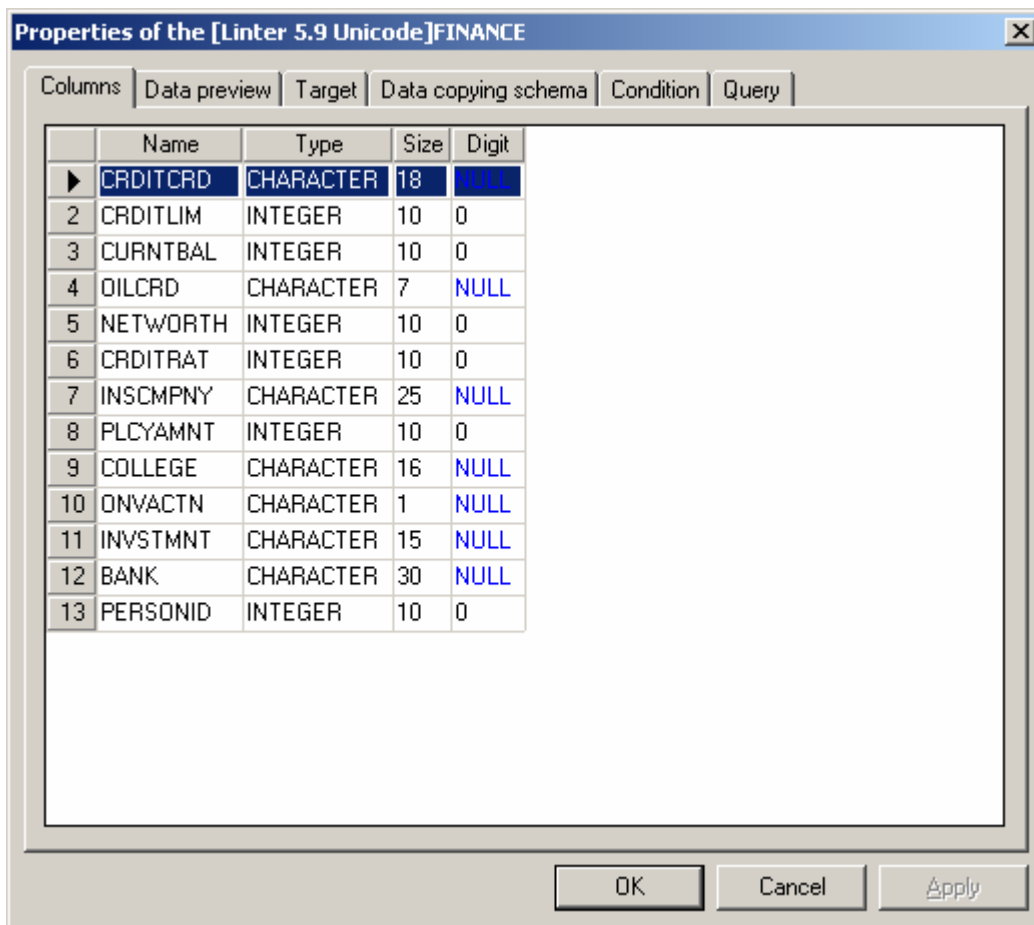
Tools and Options to Modify Conversion

If the conversion generated by the program is not satisfactory, specific column properties of both the source and target may be modified or any table being converted.

To edit or establish the conversion parameters:

1. Select the source table (even if you want to work on the target table) to be used in the transfer by clicking on the table name in the list in the Converter Main Menu window, Screen 5. The selected table will be highlighted in blue.
2. Press Alt+Enter, select the **Source > Properties** menu option, or click the  icon.

You will then have the Edit Table Properties window, Screen 7.



Screen 7 – Edit Table Properties

The functions available for the six tabs in this screen are explained in the following sections. In the example in Screen 7, the Columns tab has been selected.

View Source Table Structure

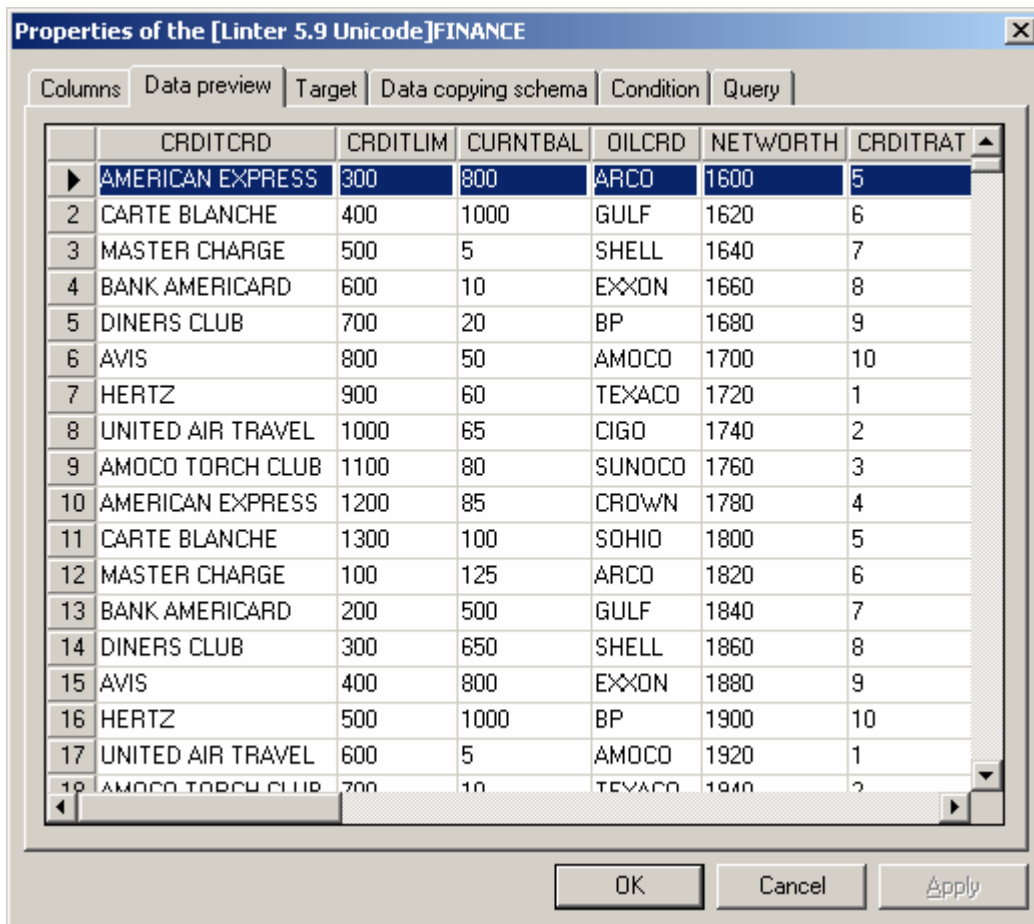
To view the source table's structure, select the Columns tab on the Edit Table Properties window, Screen 7. The following properties for each column in the table are displayed:

- 1) the name of the column;
- 2) its data type;
- 3) its length or precision;
- 4) its scale.

Preview Data to be Transferred

To preview the data being transferred, select the Data preview tab on the Edit Table Properties window, Screen 1.

A window containing column names and column data for each row of the selected table object will be displayed.



Screen 8 – Preview Data to be Transferred

Modifying the Target Table's Structure

In standard conversion mode, Linter generated compatibility data types are used to set the target table's data types. Integrity constraint properties are not transferred from the source DB to the target DB, except for AUTOINC.

To establish column properties for the newly created target table, you may set column properties in the target DB after the conversion process. In DBs other than Linter, this post-transfer technique is similar to Linters ALTER TABLE function.

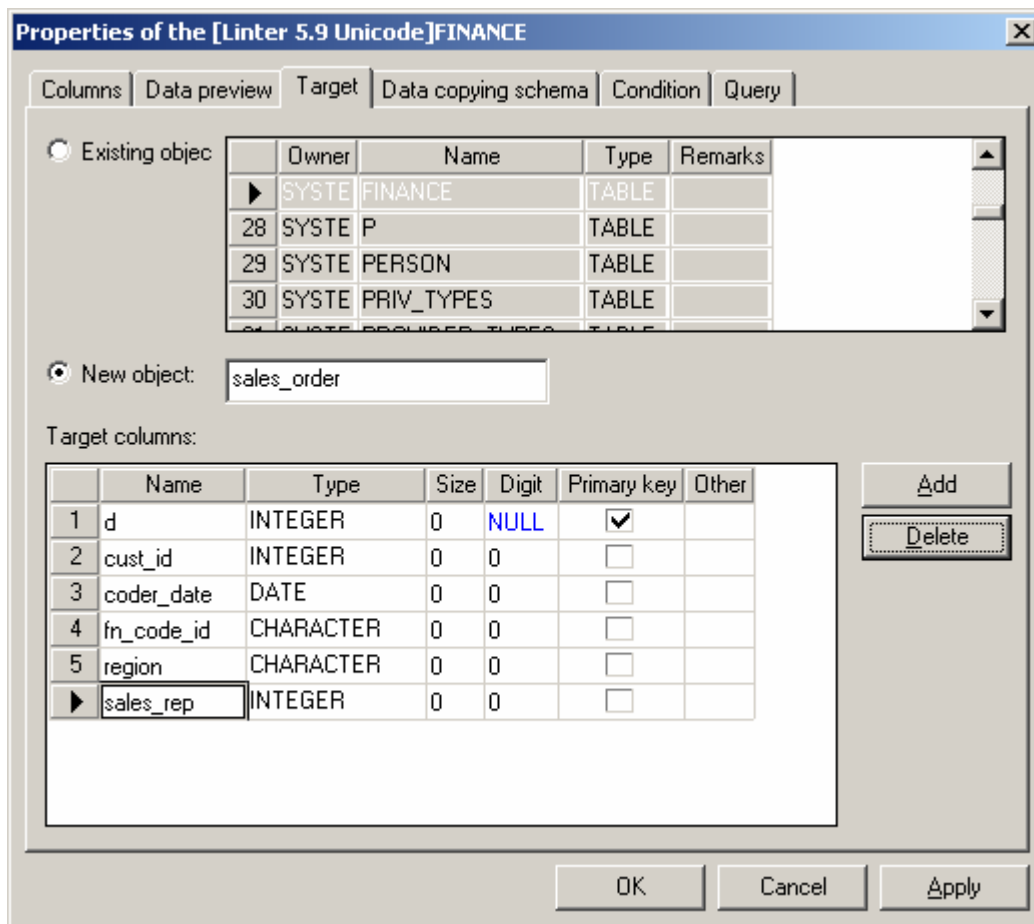
An alternative method is to set the target properties by declaring them in the conversion program.

If the target table is to be a new table, i.e., data is not to be written into a pre-existing table, you may change the target column properties initially created by the convert program.

In this context, a column property refers to those characteristics of this table that include the table name and, for any column:

- 1) column name;
- 2) data type;
- 3) precision or length of data, depending on data type;
- 4) the scale for scalable numeric data types;
- 5) primary key status;
- 6) the integrity constraints:
 - the optional default value for each column;
 - AUTOINC (automatic incrementing);
 - NULL | NOT NULL; and
 - UNIQUE.

To access these new-target-table editing functions, click the Target tab on the Edit Table Properties window, Screen 7.



Screen 9 – Edit New Target Table Properties

Note that the target's columns are listed in a column headed Name.

In the example in Screen 9, note that the New object radio button has been selected. If this button is not selected, the structure editing functions for a new target table are not available.

The Exist object button is selected for writing data into a preexisting table as described in “Paste Data into an Existing Table”.

Change Target Table Name

1. Select the Target tab on the Edit Table Properties window, Screen 7.
2. Select the radio button New option.
3. Click the cursor in the text box to the right of New option and edit the table name.
4. Click the Apply then OK buttons.

Change Column Names in Target Table

1. Select the Target tab on the Edit Table Properties window, Screen 8-7.
2. Select the radio button New option.
3. In the Target columns window block, click the cursor in the field with the column name you need to change.
4. Edit the column name.
5. Click the Apply then OK buttons.

Change Column Data Type

As described in “Standard Data Conversion” and “Tools and Options to Modify Conversion” sections, the converter uses either data type compatibility generated by the program or one defined by the user.

In either case, this function allows you to select a new data type for a target column:

1. Select the Target tab on the Edit Table Properties window, Screen 7, to display the column properties of the selected table in the target DB.
2. In the Target columns window block, select the TYPE_NAME field of a column for which a new data type is required.
3. Click on the arrowhead icon at the right of the TYPENAME field. From the drop down list of data types, choose the one you need to use in the conversion process.
4. Repeat steps 2 and 3 for all the columns that need to have their data type compatibility modified.

When you have finished all the changes, click Apply and then OK.

Change Column Length or Precision

To modify the length or precision of a target column:

1. Select the Target tab on the Edit Table Properties window, Screen 7, to display Column properties of the selected table in the target DB.
2. Select the Precision field of the column to have its length or precision changed in the Target columns window block.
3. Type in the new length or precision of the column.

When all necessary length and precision changes have been made, click the OK button.

Note that both length and precision are handled in the column headed Precision.

Change Column Scale

To modify a target column's scale:

1. Select the Target tab on the Edit Table Properties window, Screen 7, to display Column properties of the selected table in the target DB.
2. In the Target columns window block, select the Scale field of the DECIMAL data type column to have its scale changed.
3. Type in the new scale of the column.

When all columns have the necessary scale changes made, click he OK button.

Set or Unset a Primary Key Column

To modify a target primary key status:

1. Select the Target tab on the Edit Table Properties window, Screen 7, to display column properties of the selected table in the target DB.
2. A checkmark in the checkbox in the Primary key column of the Target columns window block indicates the selected target table's column is a primary key for the target table.
3. lick on a check box to toggle the checkmark on and off.

Click the OK button to complete the change.

Set Column Constraint Properties in Target

To set column constraints:

1. Select the Target tab on the Edit Table Properties window, Screen 7, to display column properties of the selected table in the target DB.
2. Click the Other column in the Target columns window block opposite the target file's column name for display column properties of the selected table in the target DB.
3. Type in the column constraint(s) being declared. If more than one, a space separates each constraint. The values entered must be in the declaration syntax of the target DB. For example, if the target DB is Linter, the following values are permitted: DEFAULT<value>, AUTOINC, NULL | NOT NULL, and UNIQUE.



The column constraints must be declared in the vocabulary of the target DB. An error will only be discovered when the conversion files.

Change Number of Columns in a Target Table

You may add columns to or exclude columns from the target table.

To add new columns during transfer:

1. Select the Target tab on the Edit Table Properties window, Screen 7, to display column properties of the selected table in the target DB.
2. Click the Add button to the right of the Target columns window block. A new, blank row will be appended to the list of columns.
3. In this blank row, type in the properties of the new column.
4. Repeat steps 3 and 4 as many times as necessary.
5. Click Apply and OK.

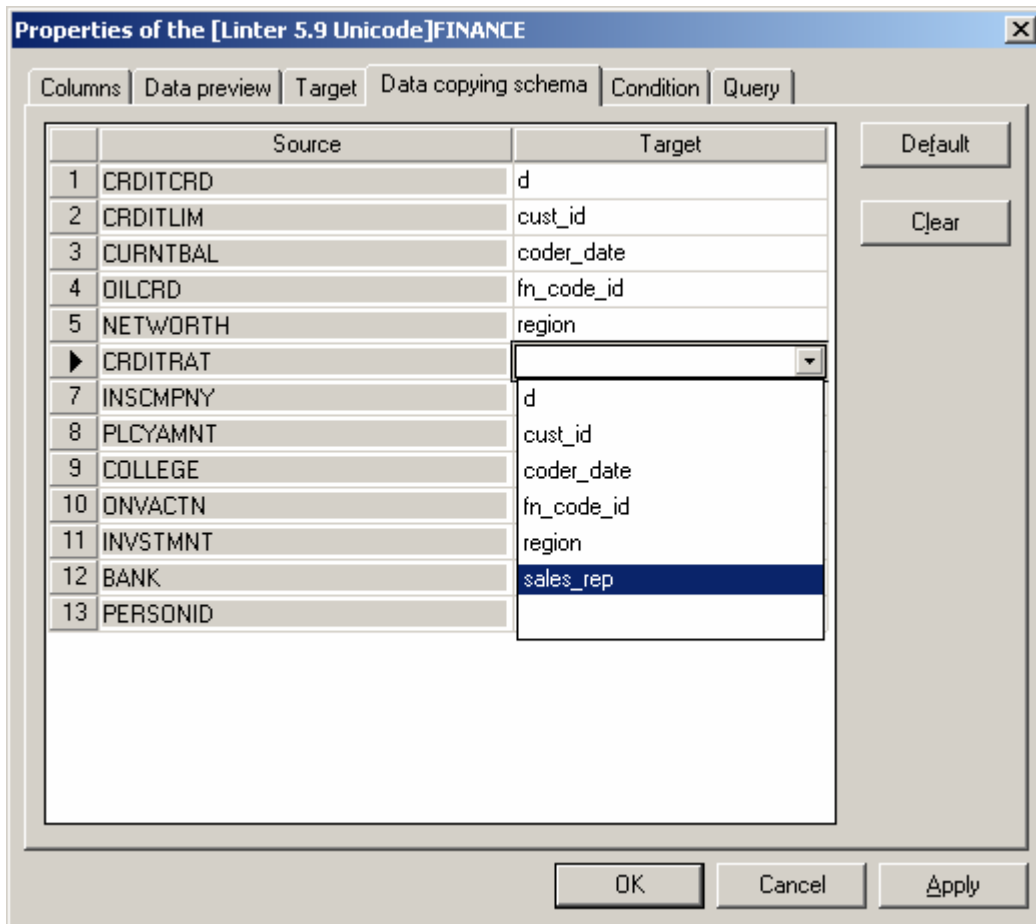
To exclude columns from the transfer process:

1. Select the Target tab on the Edit Table Properties window, Screen 7, to display column properties of the selected table in the target DB.
2. Select the column to be excluded and click the Delete button.
3. Repeat step 2 as many times as necessary.
4. Click Apply and OK.

Change Column Transfer Scheme

Unless changed with this function, a source table column is always copied to a target table column with the same name. You may wish to change this pattern if, for example, you are adding new columns to the target table, and all or some of the columns from the source table can be copied to the newly added columns.

To modify the transfer scheme, select the Data copying scheme tab on the Edit Table Properties window, Screen 7 to bring up this function.



Screen 10 – Change Transfer Scheme

The Source column lists the columns of the source table. The Target column lists the columns of the target table. Initially, they correspond to each other.

To exclude a column from the transfer, select the column in question in the Target list and click Clear.

To specify a source column for a specific target column, select a column name in the Target column list. Click on the icon that appears to the right of the target column name after you have selected it. Select the desired source column from the drop down list.

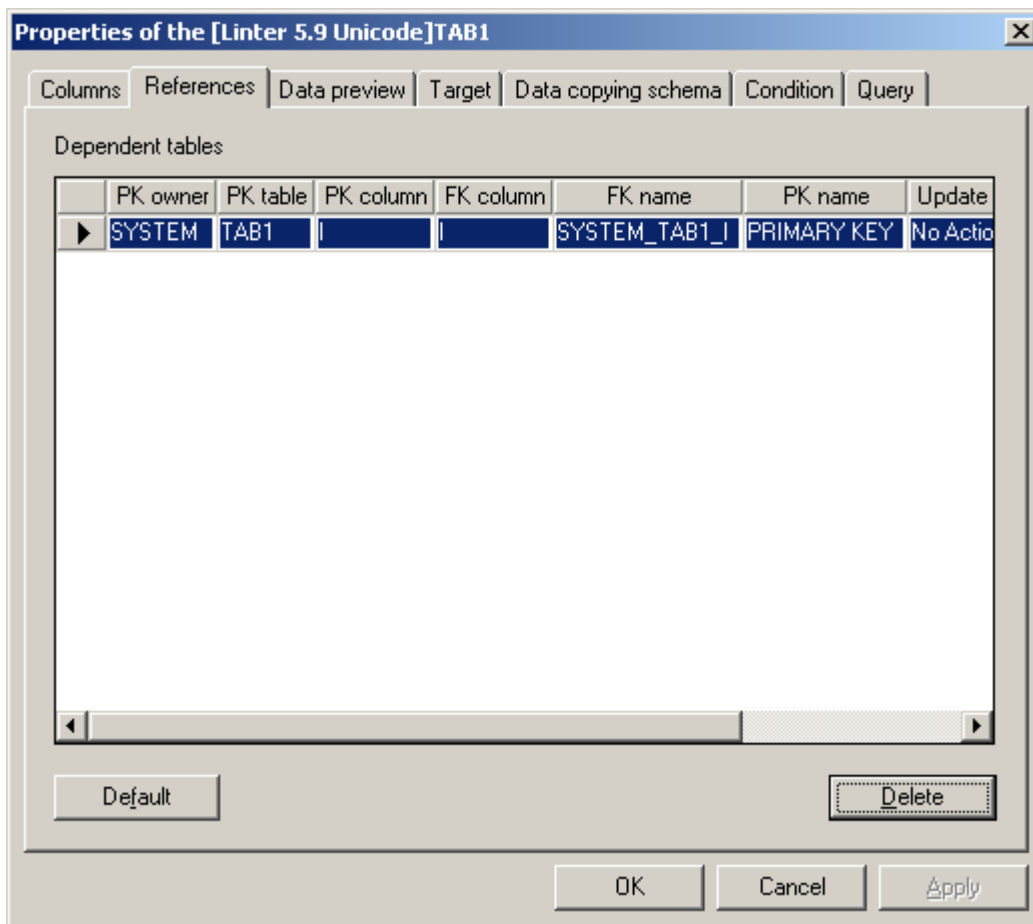
The Default button restores the default scheme and leaves the window open.

The Cancel button cancels all the changes and closes the window.

Link Integrity

Link integrity may only be transferred when both the source and target DBs support link integrity rules.

To transfer link integrity, select the References tab on the Edit Table Properties window, Screen 7 to bring up this function.



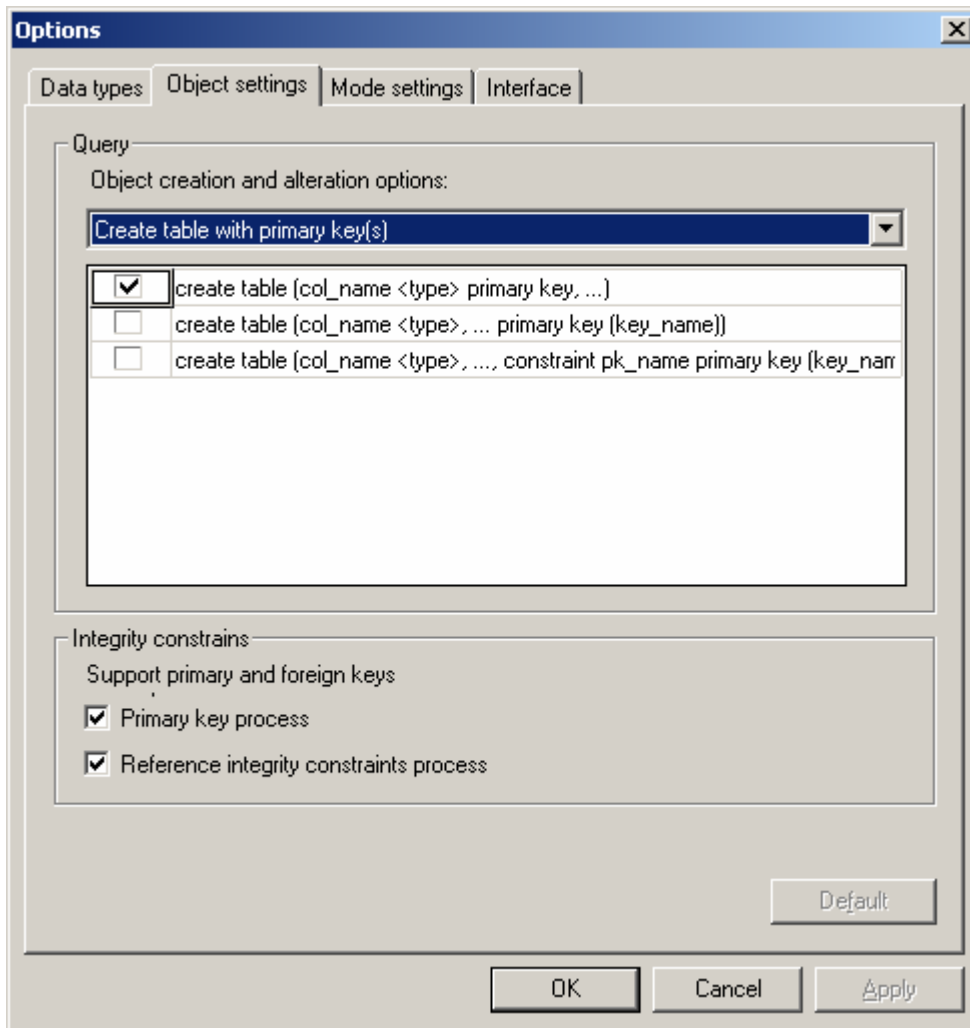
Screen 11 – Link Integrity

To exclude a link from the transfer select it and click the Delete

To restore link integrity to its initial state, click the Default button.

Since some incompatibilities exist between current and SQL Standard link syntax versions, it may be necessary to modify the expressions that create links. To access the link integrity function, press the F9 key or choose the **Source > Options > References** menu option.

The Options window will then be displayed with the References integrative tab active. Select the SQL expression templates you need to create primary keys, foreign keys, and/or table modifications (ALTER TABLE) from the choices displayed.



Screen 12 – Link Integrity Syntax Rules

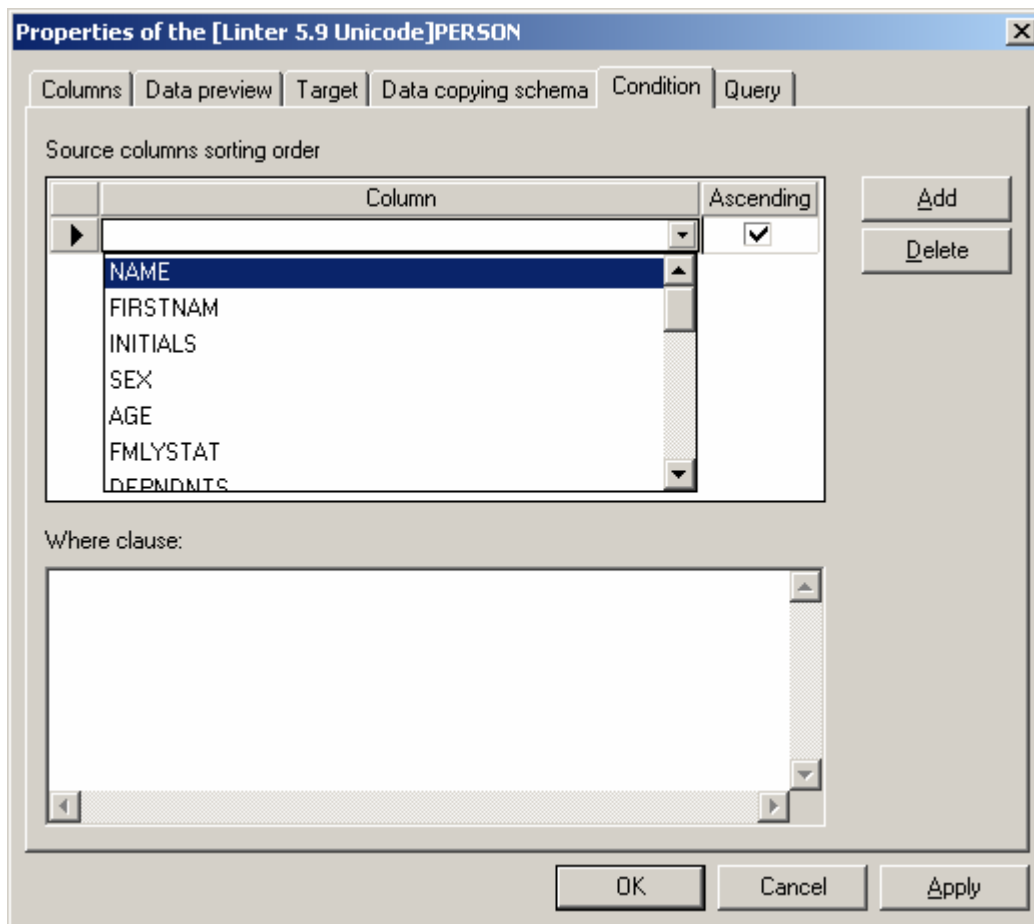
If links are not to be supported uncheck the Support references integrative box.

Click on the OK button to save the changes, the Cancel button to quit without saving changes.

Sorting Data

During the transfer the data may be stored in the receiving table in a different order from the source table.

The sorting function is accessed from the Edit Table Properties window, Screen 7, by clicking the Other tab.



Screen 13 – Modify Column Sorting Order

To modify the sort:

1. Click on the Add button to the right of the Source column sort order window block.
2. Click the down arrowhead button to the right of the text box below the word "Column".
3. Select the column to be used as a starting point for the sort from the drop down list.
4. A checkmark in the box below the word Ascending, indicates the sort is to be in ascending order. Uncheck the box, by clicking on it, to select a descending sort.
5. Repeat steps 1 - 4 for additional sorting columns.
6. Click the Apply and OK buttons when you are satisfied.

To remove a column included by mistake, select it and click the Delete Button.

Selective Data Transfer

Selective transfer allows you to transfer only those parts of the source table that contain valid data. Conditions, in the syntax of WHERE and SELECT clauses, may be applied to relevant columns to exclude obsolete or otherwise invalid data. The WHERE and SELECT keywords are not included in these condition statements.

To access this utility, shown above in Screen 13, choose the **Source > Properties > Other** menu option from the Converter Main Menu window, Screen 5. Click the Other tab on the Edit Table Properties window, Screen 7.

To set the selection criteria:

1. Select the column to which a condition is to be applied from the drop down menu under the word Column.

2. Type in the WHERE or SELECT statement in the Condition text box. Keywords are not included in your text.
3. When you have entered all the needed conditions, click the Apply and then OK buttons.

Paste Data into an Existing Table

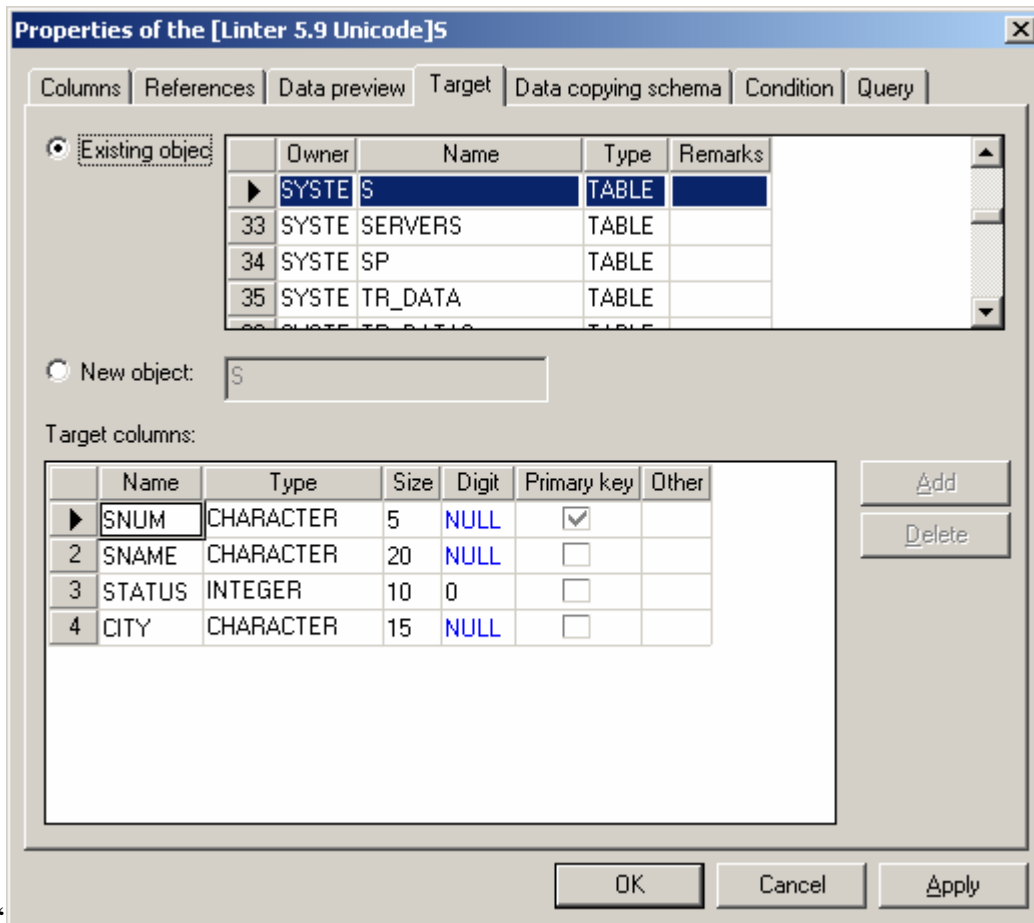
Pasting data into an existing table is a function used to merge or separate data in the source and target DBs.

When transferring data to a pre-existing target table, data type compatibility issues are resolved based on the target table. You cannot modify the data types of pre-existing target tables.

When the target table has been created with all of its properties (indexed columns, primary and secondary keys, etc.) defined, this

Function checks the target table's data types and other properties. The data type of data written into the target table is converted into the data type required by the target table.


To paste into an existing table, Open the Edit Table Properties window, Screen 7 and select the Target tab.



Screen 14 – Select Existing Target Table for Paste

1. Select the Existing object radio button.
2. Select the source table from the list in the Exist object window block. The target table's column list, and properties, will be displayed in the Target columns window block.
3. Click the OK button to accept the structure.

If your review of the target table's properties indicates that there is a data type mismatch, close the window and edit the data type of the source table as described in §8.5.

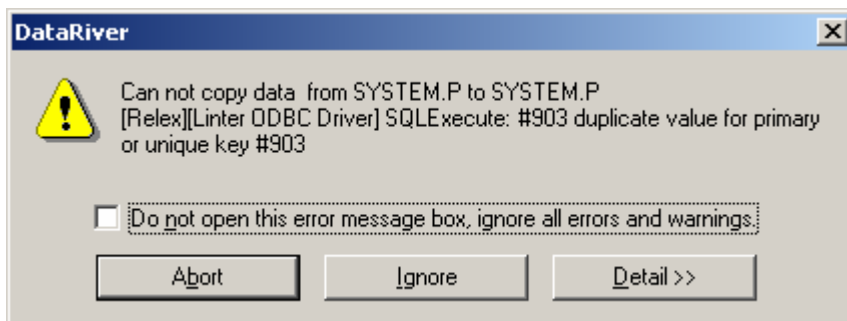
After clicking the OK button, initiate the transfer with F4, choosing the **Database > Convert** menu option, or clicking the  icon on the Main Menu, Screen 5.

Runtime Errors

During execution, the converter performs the following checks:

- 1) validity of parameters and operations set by the user;
- 2) the possibility of transferring data from the source to the target DB in according to predefined rules;
- 3) situations which can cause data loss.

When these checks locate a problem a diagnostic message is displayed:

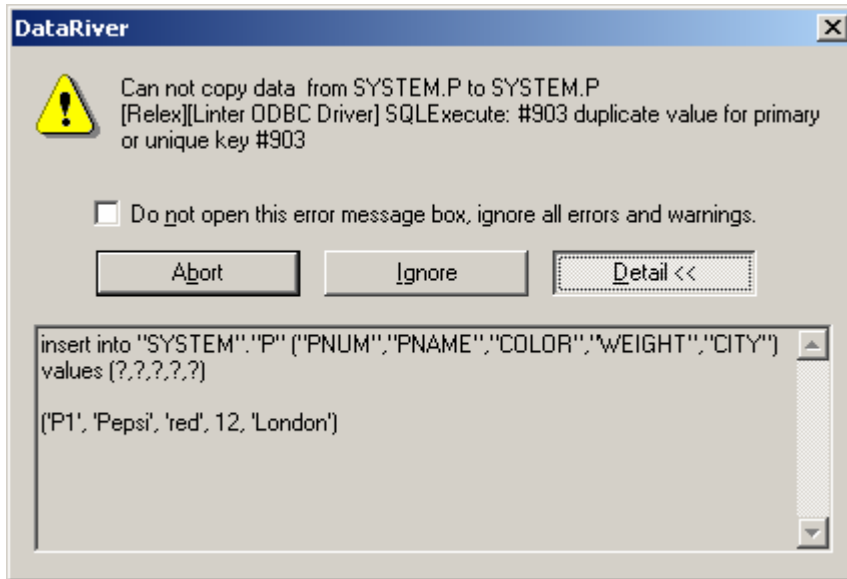


Screen 15 – Preliminary Diagnostic Window

The choices are:

- | | |
|------------|--|
| Abort | The conversion is halted. The data already transferred is saved in the target DB |
| Ignore | Continue with transfer, ignoring first message in list. |
| Ignore all | Continue with transfer, ignoring all messages. |
| More info | Show SQL query text in which error occurred. |

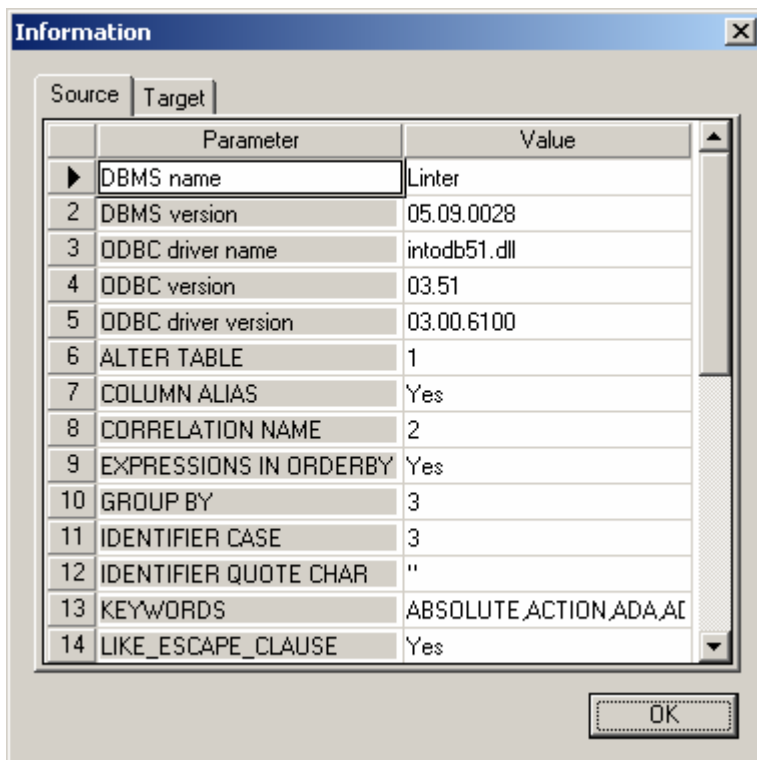
The options in the More info window are the same except that the More info button here returns you to the Preliminary Diagnostic Window.



Screen 16 – More Info Diagnostic Window

View Source and Target Information

To see information about the source or target DB, press F3 key or select **Database > General** information.



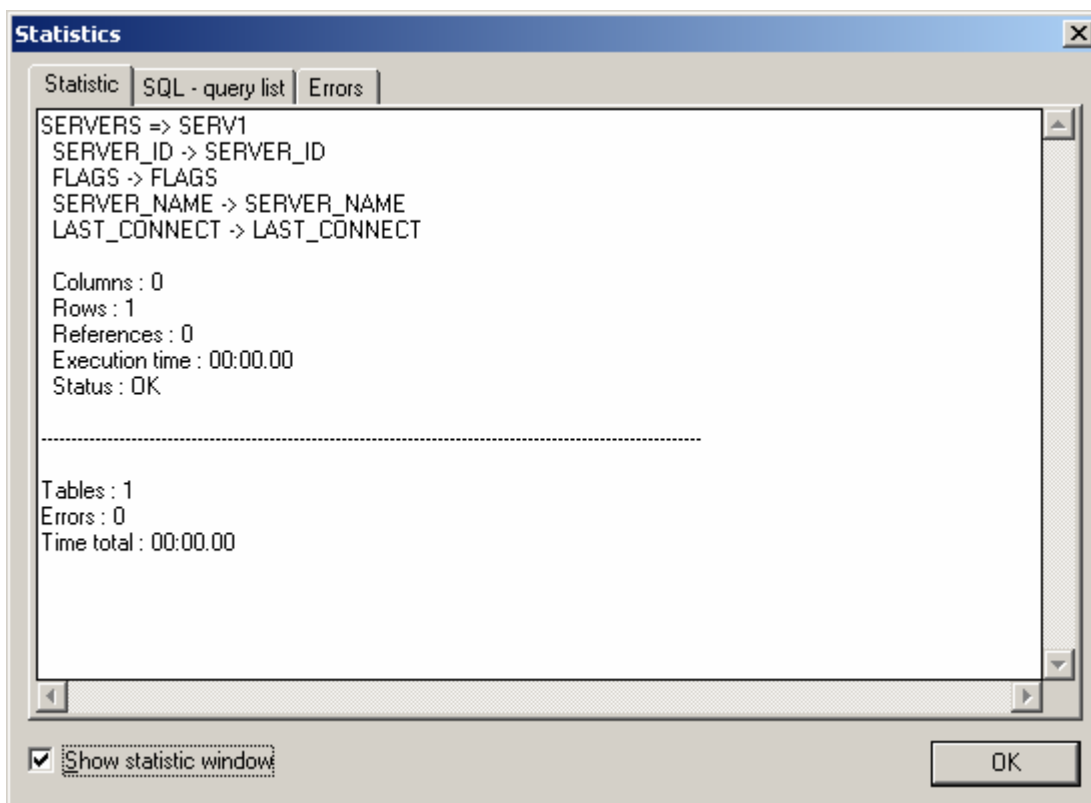
Screen 17 – View Source and Target Information

View Statistics

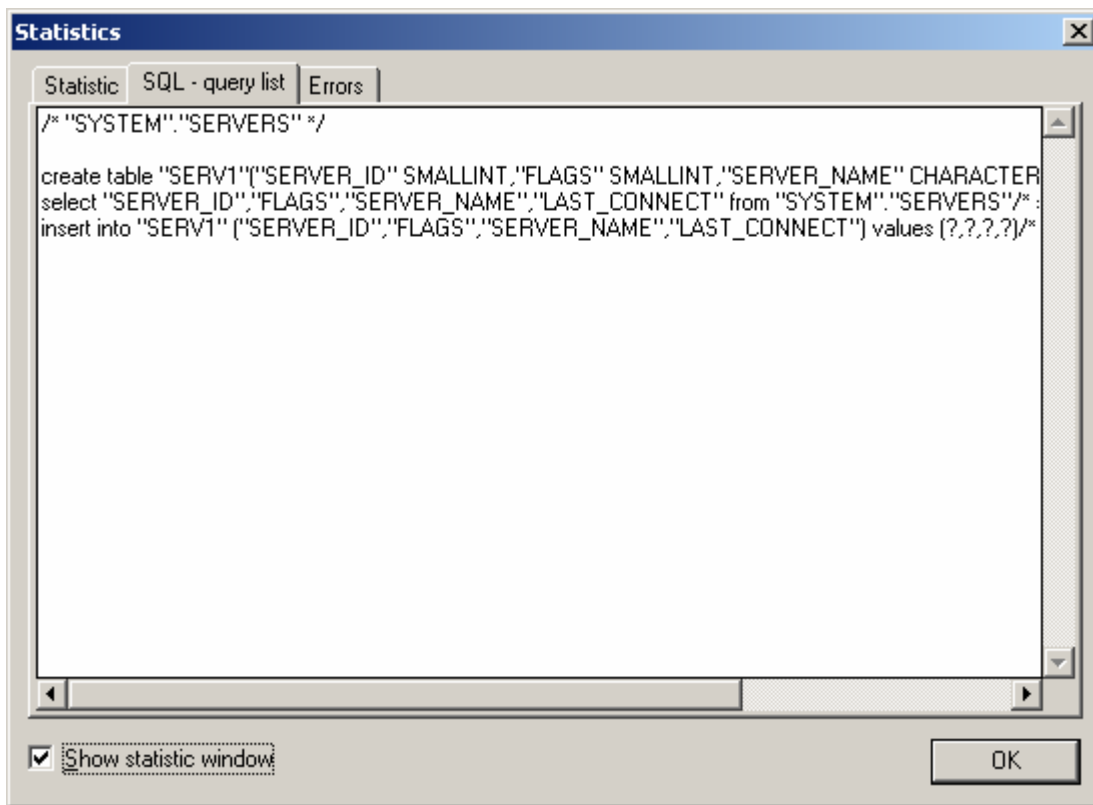
After execution, the program shows statistical information about the work done under two tabs.

The Statistic tab displays:

- For every table the number of columns, row, and links processed, the time elapsed for each operation, and the completion status.
- Summary data number of tables processed, number of errors, and the SQL query list tab displays all queries evaluated during execution.



Screen 18 – View Statistics



Screen 19 – View SQL Queries