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*Data System Library Release Notes  
for C/Teradata*

*Release 1.0.5  
March, 1997*

*ETI•EXTRACT® Data System Library Release Notes for C/Teradata*

Release 1.0.5, March, 1997

For ETI•EXTRACT

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## Introduction

These *Release Notes* provide the following information about Release 1.0.4 of the ETI•EXTRACT Data System Library™ (DSL) for C/Teradata:

- Overview
- Data Types Supported
- Query Programs
- Create Programs
- Populate Programs
- Retrieving a Teradata® Schema
- Templates for C/Teradata
- Filters for C/Teradata
- Usage Notes
- Program Generator Extension Module Code
- Known Problems, Limitations, and Other Considerations

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## Contacting ETI

Should you encounter difficulty in using the DSL for C/Teradata, have questions regarding the documentation, or have feedback or suggestions that can help ETI improve the DSL for C/Teradata, please contact the ETI AnswerLine. ETI places a high value on your success and fulfilling your needs as a customer.

You can reach ETI AnswerLine personnel at:

**800-856-0416** (voice, North American customers)

**512-327-6994 extension 450** (voice, North American customers)

**512-329-0388** (fax, North American customers)

**eti.answerline@evtech.com** (email, North American customers)

**01344-382135** (voice, United Kingdom customers)

**44-1344-382135** (voice, European customers outside United Kingdom)

**01344-382091** (fax, United Kingdom customers)

**44-1344-382091** (fax, European customers outside United Kingdom)

**answerline-europe@evtech.com** (email, European customers)

ETI's World Wide Web address is **<http://www.evtech.com>**. You can access the AnswerLink, ETI's online support center, from there.

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Related Documentation

Related documentation for the *Data System Library Release Notes for C/Teradata* consists of the following:

- ETI•EXTRACT Conversion Specialist's Guide*
- ETI•EXTRACT Master User's Guide*
- ETI•EXTRACT Reference Manual*
- ETI•EXTRACT Data System Library Installation Guide*
- The Teradata® documentation library

**Note:** For ETI•EXTRACT, a README PDF document may be installed with the other Portable Document Format (PDF) files of the DSL for C/Teradata. If so, the README document contains information that became available after these *Release Notes* were printed.

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Online Help

The online help for ETI•EXTRACT is available by using the Help menu in any ETI•EXTRACT tool window, or by pressing the F1 key. You can access general information by clicking **Help** on the Menu Bar. If you want help relative to a task you are performing, press **F1** for context-sensitive help.

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ETI•EXTRACT Documentation Online

All of the *ETI•EXTRACT Data System Library for C/Teradata* documentation is available online in the form of Adobe™ Acrobat Reader™ Portable Document Format (PDF) files. They are located in the doc directory of your *ETI•EXTRACT Data System Library for C/Teradata* installation directory. The *ETI•EXTRACT Data System Library for C/Teradata* distribution tape includes a copy of the UNIX version of Acrobat Reader, and you can display any of the manuals by using the following command:

```
ex_manual manual_name
```

Substitute the name of a manual for *manual\_name*.

---

Tcl man Pages

For ETI•EXTRACT you can extend the capabilities of *ETI•EXTRACT Data System Library for C/Teradata* by writing Program Generator Extension Functions and Grammar Extension Functions in Tool Command Language (Tcl). Tcl is a publicly available interpreted language and is embedded in *ETI•EXTRACT Data System Library for C/Teradata*. For more information on Tcl, refer to *Practical Programming in Tcl and Tk*, Brent B. Welch, ISBN 0-13-182007-9.

In addition, *ETI•EXTRACT Data System Library for C/Teradata* includes UNIX manual (man) pages for Tcl. You can view them by entering the command

```
man command_name
```

where *command\_name* is a Tcl command.

For example, you can display a summary of Tcl language syntax by entering the command

```
man Tcl
```

## Conventions

These *Release Notes* use the following conventions:

- ❑ Important terms, variable names, and titles of publications are shown in *italics*.
- ❑ Selections from windows and other dialog features, and names of items such as data types and properties, are shown in **bold**.
- ❑ The convention of select **Menu-Title: Command** means to click the menu title in the menu bar of ETI•EXTRACT; then, click the command name. For example, to open a file you would select **File: Open**.
- ❑ The *EXTRACT\_database\_name* notation represents the name of a MetaStore database in ETI•EXTRACT.
- ❑ The *.major* notation represents the appropriate major version number for an object in ETI•EXTRACT.
- ❑ *Property* means a conversion property, schema property, or other property associated with an object. Properties are evaluated as context variables in templates. Property and context variable may be used interchangeably.
- ❑ For ETI•EXTRACT, *conversion directory* means the *.../cnvdir/conversion-name.major* directory. The ellipsis represents the path to the **cnvdir** subdirectory, as it can vary depending on the workset the conversion was created in.
- ❑ *Unit* is a generic ETI•EXTRACT term and means a table. Unit and table may be used interchangeably.
- ❑ *Part* is a generic ETI•EXTRACT term and means a column of a table. Part and column may be used interchangeably.
- ❑ *Mapped* means that a source part has been mapped to a target part.

**Note:** A note provides important information.

---

## Important Installation Information for ETI•EXTRACT

After the DSL for C/Teradata is installed, you should do the following to configure your installation correctly:

- ❑ The C and shell programming languages are required for the DSL for C/Teradata. They should be attached to all hosts and installations where the DSL for C/Teradata is used.
- ❑ Make sure all hosts and installations have the language `text` attached if you want to generate the conversion report template.
- ❑ Make sure that the PG Extension Module in your DSL window contains the functions `is_numeric` and `is_integer`. If they do not, the code is listed at the end of this document. You can append the code to the existing PG Extension Module.
- ❑ There are four file name syntax definitions required by the DSL, `c`, `shell`, `c-inmod`, and `c-outmod`. Of these four, the latter two may be lacking in existing ETI•EXTRACT environments. They may be added by editing the appropriate Operating System, typically UNIX. Syntax definitions for `c-inmod` and `c-outmod` must be identical to that for `c`, except that the File Prefix must be `inmod_` and `outmod_` respectively, instead of `blank`. Ensure these are present by editing the description of the operating system on which the DSL for C/Teradata resides.
- ❑ Make certain that the Host object(s) references the Operating System object(s) that contain all four file syntax definitions described above.

---

## Overview

The DSL provides templates that generate Query, Populate, and Create programs.

The query templates use Teradata's FastExport™ utility, with an OUTMOD user exit routine writing the intermediate files. The INMOD user exit routine is not used for the query in this release, but exits as a template definition whose condition evaluates to false. If it were needed to qualify the data queried with data from a key file, then the condition would have to be true, and template code written to support that feature.

Intermediate files produced by the query conform to the July 1996 ETI•EXTRACT intermediate file standards.

The create templates generate SQL create statements either in a separate file suitable for execution using BTEQ™, or in the populate utility directives.

The populate templates use either the FastLoad™ or MultiLoad™ Teradata utility, depending on the DML verbs required (The Context Variable determining this is named **data\_conv\_mode**). When data transformations are specified, the utility uses an INMOD user exit routine to read the intermediate files and transform the data. When no transformations are specified, the Teradata utility processes the intermediate file directly.

UNIX shell scripts are generated by the query and populate templates, with embedded directives to the Teradata utility they invoke.

---

## Data Types Supported

Data types supported by the DSL are:

- BYTEINT
- SMALLINT
- INTEGER
- DECIMAL

**Note:** The accuracy of arithmetic operations may be limited by floating point, since there is not a decimal type in the C language

- FLOAT
- CHAR
- VARCHAR
- LONG VARCHAR

**Note:** Uniformly 2000 bytes in length

- BYTE
- VARBYTE

**Note:** These are not differentiated from VARCHAR types – if transliteration (converting characters of one alphabet to corresponding characters of another alphabet) across platforms is required, these parts should be segregated into a separate intermediate file that is transferred as binary

---

## Query Programs

Query programs generated by the DSL use a shell script with FastExport directives and an OUTMOD routine.

ETI•EXTRACT intermediate files are produced by the OUTMOD routine, which also specifies to FastExport to skip every output record to avoid unnecessary overhead.

The ordinary export file is declared as /dev/null.

All SQL statements required by the mapping, joins using SQL, and selective retrieval are supported in the FastExport directives. Source virtual parts are supported in the OUTMOD routine and in the FastExport directives.

---

## Create Programs

The DSL can generate the SQL CREATE statements to create tables and databases. The Creation of indexes is not supported.

The SQL statements are based on information already in the ETI•EXTRACT schema which is retrieved from information on an existing database. The primary use for this feature is to drop and recreate the table prior to loading it. Additionally, you can use it to create objects from scratch, given proper schema information in ETI•EXTRACT.

SQL create statements are generated either in a separate file, or embedded in the populate utility directives.

Teradata has a limitation that CREATE TABLE can produce no more than fifty columns. The work-around is to create additional columns with ALTER TABLE statements. This release does not generate the ALTER TABLE statements, thus does not create tables with more than 50 columns. Still, a generated SQL CREATE with more than 50 columns can be hand edited to use ALTER TABLE ADD on the columns beyond the 50th.

---

## Populate Programs

Populate programs generated by the DSL use either the FastLoad or MultiLoad utility, generating the utility directives in the shell script. An INMOD routine is generated in C language to support data transformation. An INMOD is produced when target part filters are applied. Certain transformations could be performed in the utility directives without the INMOD routine. Other transformations do require the INMOD, so the DSL generates it in response to any target part filter.

Whether FastLoad or MultiLoad is used is specified by the property **data\_conv\_mode**. You can set this property using the target unit or target database filter or you can set it at a higher level in the environment.

**Note:** DELETE MLOAD is not supported in this release.

Since the ETI•EXTRACT conversion model produces a single intermediate file for each target unit, the MultiLoad capability of loading up to 5 tables from a single data file is also not supported.

MultiLoad's ability to associate various SQL DML statements with certain incoming data values is not supported.

## Retrieving a Teradata Schema

This section describes the steps involved in retrieving a Teradata schema.

1. Execute the script `create_ctd_rs_script` in the `MetaStore/das/teradata.1` directory. The script prompts for a username and password, then for a database name and table names. The retrieval does not have to include every table in a Teradata database. If no table names are specified, all tables in the database are used. The script creates two files. One file contains BTEQ and SQL code that produces a metadata report. The second, `RS-RUN`, is a UNIX shell script that invokes BTEQ and run the above named script.
2. Use a file transfer utility, such as FTP, to move the two files to the host on which the Teradata database can be accessed.
3. Execute the `RS-RUN` shell script. It produces 7 report files with the name extension `.txt` and a log file that traces the script's execution. The 7 report files are numbered `Teradata_Schema1.txt` through `Teradata_Schema7.txt`.
4. Use a file transfer utility, such as FTP, to move the 7 report files to the ETI•EXTRACT host, in a directory of your choice. If several schemas are retrieved, create a separate directory for each schema.
5. Run the Teradata `retrieve-schema`. In ETI•EXTRACT, use the Schema Editor to retrieve the schema from the directory you specify. Then save the schema, giving it an appropriate name.

---

## Templates for C/Teradata

After you install the DSL, make certain that the operating system you use has file name syntax entries for `c-inmod` and `c-outmod`.

Also, ensure that all the hosts that access Teradata support an operating system that has these two file name syntaxes. These are necessary because the Query templates generate two C language files, and they must have unique identifiable names.

The two C language files are for the two user exits, `INMOD` and `OUTMOD`. The Populate utilities use the `INMOD`, and the Query utility could use both. This release does not generate the `INMOD` for Query programs, which would supply data values to qualify the query. The ETI•EXTRACT generated `OUTMOD` routine controls the production of intermediate files and virtual parts, and offers CIPs and other points for customization.

---

## Filters for C/Teradata

The DSL for C/Teradata provides the following source database filters:

- ❑ Database Specify data conditions to qualify each SQL statement
- ❑ Insert custom code (CIPs)
- ❑ Custom filters
  - Unit Insert custom code (CIPs) Custom filters
  - Part Insert custom code (CIPs) Custom filters
- ❑ Virtual parts.
 

**Note:** You can create virtual parts and assign an initial value, based on a literal, another part or parts, or custom code such as a custom function call

The DSL for C/Teradata provides the following target database filters:

- ❑ Database Custom filters
  - Insert custom code (CIPs)
  - Drop leading and trailing characters
  - Set a NULLIF value
  - CREATE the target database and/or units
  - Choose the load utility / appropriate DML verbs

The DSL for C/Teradata provides the following target unit filters:

- ❑ Unit Insert custom code (CIPs)
  - Custom filters
  - Choose the load utility / appropriate DML verbs
  - Drop leading and trailing characters
  - Set a NULLIF value
  - CREATE the target database and/or units

The DSL for C/Teradata provides the following target part filters:

- ❑ Part Insert custom code (CIPs)
  - Custom filters
  - Modify value
  - Drop leading and trailing characters
  - Set a NULLIF value
  - Set a default value

## Usage Notes

This section provides notes about using the Data System Library for C/Teradata.

## Conversion Properties and Values

The DAS Object for Teradata contains dozens of properties specific to this DSL. These are named with the prefix **ctd**. They provide default settings that may be altered or overridden as appropriate for your site. For example, the property **ctd\_after\_journal** when installed is set to **NO AFTER JOURNAL**.

Be certain to carefully review all of these properties, and adjust them to suit your needs. Overriding the DAS property values at the host, installation, or database levels can produce accurate settings for complex environments.

The properties and their values are shown in the following table. Where two VALUES are shown, the second shown is an annotation only.

Table 1. Conversion Properties and Values

Property	Value
ctd_after_journal	Supplies the AFTER JOURNAL clause for table creation. Default setting is <b>NO AFTER JOURNAL</b> .
ctd_ampcheck	Supplies the AMPCHECK clause for MultiLoad. Default setting is <b>APPLY</b> .
ctd_before_journal	Supplies the BEFORE JOURNAL clause for table creation. Default setting is <b>NO BEFORE JOURNAL</b> .
ctd_checkpoint_rate	Supplies the CHECKPOINT clause for MultiLoad. Default setting is <b>15</b> (every 15 minutes).
ctd_db_account	Supplies the ACCOUNT value for database creation. Default setting is <b>extract</b> .
ctd_db_bytes	Supplies the perm size for database creation. Default setting is <b>1000000</b> (10 MB).
ctd_db_spool_bytes	Supplies the spool size for database creation. Default setting is <b>100000</b> (100KB).
ctd_db_owner	Supplies the FROM db clause for database creation. Default setting is <b>dbc</b> .
ctd_default_journal	Supplies the DEFAULT JOURNAL TABLE value for database creation.

Table 1. Conversion Properties and Values

Property	Value
ctd_err_limit	Set to the number of SQL errors that will stop the load. The errors option will be inserted into the directives. See the Teradata documentation for additional information about the ERRLIMIT option. Default setting is <b>100</b> .
ctd_err_percent	Set to the number of SQL errors that will stop MultiLoad. If this property is used, then the property <b>ctd_err_limit</b> must also be used. See the Teradata documentation for additional information about the ERRLIMIT option. Default setting is <b>50</b> .
ctd_fexp_mode	Supplies the MODE value for FastExport. Default setting is <b>INDICATOR</b> and must not be changed.
ctd_fexp_format	Supplies the FORMAT for FastExport. Default setting is <b>TEXT</b> and must not be changed.
ctd_export_utility	Names the query (export) utility. Default setting is <b>FASTEXPORT</b> and must not be changed.
ctd_inmod_required	(TRUE or FALSE) A true condition forces an INMOD MultiLoad and FastLoad. Default setting is "" (F). ("", 0, or false = FALSE / <b>Any other value</b> = TRUE).
ctd_load_utility	( <b>FASTLOAD</b> or <b>MULTILOAD</b> ) This is derived dynamically or set manually. Default setting is "".
ctd_logon_id	Set to the user ID for logging in to the Teradata database. The userid will appear in generated code. Using this property will suppress all of the UNIX shell scripts from prompting for a Teradata user ID on the command line. Note that you can access the user ID in the shell script if you use this property. You can create this property at any level appropriate for your site's security procedure. Default setting is <b>dbc</b> .

Table 1. Conversion Properties and Values

Property	Value
ctd_logon_pswd	Set to the password for logging in to the Teradata database. The userid will appear in generated code. Using this property will suppress all of the UNIX shell scripts from prompting for a Teradata password on the command line. Note that you can access the password in the shell script if you use this property. Default setting is <b>dbc</b> .
ctd_outmod_required	(TRUE or FALSE) A true condition makes an OUTMOD subroutine for FastExport. Default setting is T (TRUE) and must not be changed. ( <b>"", 0, or false</b> = FALSE / <b>Any other value</b> = TRUE).
ctd_drop_options	Supplies the DROP clause for <b>leading/trailing blanks/nulls</b> . Default setting is <b>false</b> .
ctd_query_locking_mode	Supplies the LOCKING clause for a SQL SELECT statement. Specifies the kind of lock used during a query in FastExport. The value is the entire "LOCKING ..." clause to be used prior to a SELECT statement in the FastExport directives."
ctd_separate_SQL_DDL_file	(TRUE or FALSE) A true condition places SQL CREATE in a separate file for BTEQ, instead of in the utility directives. Default setting is <b>false</b> . ( <b>"", 0, or false</b> = FALSE / <b>Any other value</b> = TRUE).
ctd_session_limit	Number of sessions to use for MultiLoad. Default setting is <b>3</b> .
ctd_suppress_inmod	(TRUE or FALSE) A true condition can force no INMOD for FastLoad or MultiLoad. Default setting is <b>false</b> . ( <b>"", 0, or false</b> = FALSE / <b>Any other value</b> = TRUE).
ctd_tenacity_hours	How long to keep trying to logon. Default setting is <b>1</b> hour.
ctd_tgt_unit_sampling	(TRUE or FALSE) A true condition supplies the FROM ... FOR ... THRU clause for MultiLoad. Default setting is <b>false</b> . ( <b>"", 0, or false</b> = FALSE / <b>Any other value</b> = TRUE).

## Schemas

---

Teradata's Personnel schema (published in Teradata documentation for demonstration purposes), is included in the `sample` directory under the `das/teradata.1` directory. You can retrieve it for practice from the metadata report files with the name extension `.txt` that are shipped in the `sample` directory.

---

Program  
Generator  
Extension  
Module Code

```
#####
# This program is the confidential and proprietary property of
# Evolutionary Technologies International, Inc. Any unauthorized use,
# reproduction, or transfer of this program is strictly prohibited.
# Copyright (c) 1996, Evolutionary Technologies International, Inc.
# (Subject to limited distribution and restricted disclosure only.) All
# rights reserved.

#

# RESTRICTED RIGHTS NOTICE: Use, reproduction, or disclosure by the
# government is subject to restrictions as set forth in subparagraphs
# (c)(1)(ii) of the Rights in Technical Data and Computer Software
# clause at 252.227-7013 (48 CFR Ch. 2)) and/or the Commercial Computer
# Software Restricted Rights clause at FAR 52.227.19(c). Unpublished:
# Rights reserved under the copyright laws of the United States.

#

# Contractor/manufacturer is Evolutionary Technologies International,
# Inc. 4301 Westbank Drive, Bldg. B, Suite 100, Austin TX 78746 (512)
# 327-6994.

# =====

#BEGIN_DEFINITION

#NAME : is_integer

#TYPE : tclcmd

#

# Returns "true" when a string value is a valid integer value,
# otherwise returns "false".

#

# Leading and trailing spaces are ignored. Leading sign (+ or -)
# is optional, followed by digits 0 thru 9. The digits may optionally
# be followed by a decimal point, or decimal point and zeros.

#

#END_DEFINITION

proc is_integer {value} {
```

```
        if [regexp {^ *[-+]?[0-9]+\.\.?0* *} $value] {
            return "true"
        }
        return "false"
    }
#BEGIN_DEFINITION
#NAME : is_numeric
#TYPE : tclcmd
#
# Returns "true" when a string value is a valid numeric value,
# Leading and trailing spaces are ignored. Leading sign (+ or -)
# is optional, followed by digits 0 thru 9. The digits may optionally
# be followed by a decimal point and more digits. This may optionally
# be followed by "E" or "e", another optional sign, and digits for
# an exponent.
#
#END_DEFINITION
proc is_numeric {value} {
    if [regexp {^ *[-+]?[0-9]+\.\.?[0-9]*([eE][-+ ]?[0-9]+)? *}
$value] {
        return "true"
    }
    return "false"
}
```

---

## Known Problems, Limitations, and Other Considerations

This section contains information about known problems, limitations, and other considerations that pertain to the DSL for C/Teradata.

---

### Known Problems

The following problems in this release of the DSL for C/Teradata are known to ETI and solutions will be forthcoming:

- ❑ The generated C language routines for INMOD and OUTMOD compile with numerous warnings.  
**Note:** The warnings pertain to the **append\_warning** routine and cause no errors on execution, but are a nuisance.
- ❑ The target part filter supports the possibility of setting values to NULL, but not in every possible branch the filter dialog can produce.

---

### Limitations

There are several capabilities in Teradata that are not supported in the DSL.

This release of the DSL for C/Teradata has the following limitations:

- ❑ Datatypes BYTE and VARBYTE are supported only if they are not involved in data transformations, and only if transliteration of the data is not required (converting characters of one alphabet to corresponding characters of another alphabet).

### FastExport Limitations

There are several limitations in the FastExport utility:

- ❑ IMPORT is not supported, so qualifying a query with input data is not available.
- ❑ ROUTE MESSAGES is not supported. The standard FASTEXPORT output is captured to a file and the OUTMOD routine produces a message file.
- ❑ SQL ORDER BY is not supported directly. The CIP **cip\_sql\_cursor\_end** may be used to produce an ORDER BY clause in the SQL SELECT statement.
- ❑ Restart of FASTEXPORT is partially supported. The restart information is held in memory in the OUTMOD routine instead of on file. Therefore, failures that cause a loss of information in memory can not be restarted.  
**Note:** You can restart other failures that leave the memory of the OUTMOD intact (for example, server failure in a client-server set up).

- FastLoad Limitations      There are several limitations in the FastLoad utility:
- ❑ Certain data transformations that could be implemented with load directives, are instead implemented using the INMOD user exit. In fact, any filters applied to the target part will result in the use of the INMOD. While this is not optimal for some simple transformations, it is a general approach that is low in operational cost, and offers the full power of the C language to support customization and elaborate transformation rules.
  - ❑ RECORD n THRU m sampling of data is not supported for FASTLOAD, while it is supported for MULTILOAD by the property **ctd\_tgt\_unit\_sampling**.

- MultiLoad Limitations      There are several limitations in the MultiLoad utility:
- ❑ DELETE MLOAD is not supported. That process deletes data based on criteria not involving primary key values. The DSL does offers a delete capability that is based on primary key values. It is available from the target database and target unit filers.
  - ❑ Certain data transformations that could be implemented with load directives, are instead implemented using the INMOD user exit. In fact, any filters applied to the target part will result in use of the INMOD. While this is not optimal for some simple transformations, it is a general approach that is low in operational cost, and offers the full power of the C language to support customization and elaborate transformation rules.
  - ❑ MULTILOAD's ability to load up to five tables in a single run is not supported. The DSL loads only one target table per job step due to FASTLOAD's limitation of one table.
  - ❑ Multiple IMPORT statements per MULTILOAD invocation are not supported.
  - ❑ If the MULTILOAD templates are adjusted to support an arbitrary number of target units per job step, then the arbitrary limit expressed by property **max\_units\_per\_populate** will apply to all target units in the given database in that conversion. In that case, FASTLOAD and MULTILOAD target units should be mapped in separate conversions, and the cluster of tables that belong in the same MULTILOAD, may need to be mapped in a conversion from target units that belong in a separate MULTILOAD run.
  - ❑ APPLY <DML *label*> WHERE <*data condition*> is not supported.
  - ❑ MULTILOAD's options to MARK or IGNORE MISSING or DUPLICATE rows is supported, but not by filters. The properties that accomplish these settings are **ctd\_miss\_delete\_action**, **ctd\_miss\_update\_action**, **ctd\_dup\_insert\_action**, and **ctd\_dup\_update\_action**.  
 Note: DO INSERT FOR MISSING UPDATE ROWS is supported, and can be chosen in the target database or target unit filter.

CREATE TABLE  
Limitations

There are several limitations in the CREATE TABLE utility:

- ❑ Teradata's limit of creating no more than fifty columns per table is not reflected in the DSL. An ETI•EXTRACT generated CREATE statement will contain all the table's columns. When this exceeds fifty, you must edit the CREATE statement end it after fifty columns, and turn the remaining columns into ALTER TABLE ADD statements in groups of no more than fifty columns each.
- ❑ The filter support for CREATE DATABASE does not include specification of the parent database. Similarly, when you assign a database name in ETI•EXTRACT that is different from it's name in Teradata, the CREATE DATABASE filter support does not include prompts for the name known to Teradata.