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HP IMAGE/SQL Administration Guide

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HP IMAGE/SQL Administration Guide

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Print History

The following table lists the printings of this document, together with the respective release dates for each edition. The software version indicates the version of the software product at the time this document was issued. Many product releases do not require changes to the document. Therefore, do not expect a one-to-one correspondence between product releases and document editions.

Edition	Date	Software Version
First Edition	July 1990	36385-A.00.00
Second Edition	November 1992	36385-A.00.07 or 36385-B.F0.00
Third Edition	June 1993	36385-B.F0.20

About this Manual

This manual explains how to administer and maintain IMAGE/SQL. You should be familiar with TurboIMAGE/XL and have a general knowledge of relational databases to use this guide effectively. This manual assumes you are familiar with IMAGE/SQL or have read *Getting Started with HP IMAGE/SQL.*

For compatibility reasons, this guide uses the acronym ATC (for ALLBASE/Turbo CONNECT). The terms Turbo CONNECT and ALLBASE/Turbo CONNECT are synonymous with IMAGE/SQL.

Change bars in this margin show where substantial changes have been made to this manual since the last edition.

The following briefly describes each chapter:

Chapter 1 **Introduction**
Introduces some basic IMAGE/SQL concepts and shows you how to begin using IMAGE/SQL.

Chapter 2 **Using the IMAGE/SQL Utility**
Provides step-by-step directions for several typical administrative tasks.

Chapter 3 **Understanding IMAGE/SQL**
Provides a discussions of IMAGE/SQL concepts and functionality.

Chapter 4 **IMAGE/SQL Utility Command Syntax**
Contains detailed information about the IMAGE/SQL utility commands.

Chapter 5 **IMAGE/SQL Locking**
Describes how IMAGE/SQL assigns locks on IMAGE/SQL tables and how IMAGE/SQL handles deadlocks.

Chapter 6 **IMAGE/SQL Transactions**
Describes IMAGE/SQL transactions, repeatable reads, and IMAGE/SQL aborted transactions.

Continued on the next page.

About this Manual (Continued)

Appendix A	**IMAGE/SQL Error Messages** Contains reference information about error messages.
Appendix B	**SALES Database Schema** Contains a listing of the SALES database used throughout the manual.
Appendix C	**IMAGE/SQL and Database Utilities** Describes the DBUTIL, SQLUtil, and SQLGEN utilities.
Appendix D	**SQL Exceptions** Lists SQL statements that have restrictions when used on a TurboIMAGE/XL data set.
Glossary	**Glossary** Gives basic definitions of terms.

Suggested Tools for Accessing TurboIMAGE/XL Data

For IMAGE/SQL users with a limited amount of ALLBASE/SQL experience, a high-level query and reporting tool like ALLBASE/Query provides easy access to TurboIMAGE/XL data from ALLBASE/SQL.

For IMAGE/SQL users with more ALLBASE/SQL experience or for those who want to learn more about ALLBASE/SQL, ISQL can be used.

Additional Documentation

Here is a list of manuals you may find useful:

Title	Part Number
Getting Started with HP IMAGE/SQL	36385-90008
TurboIMAGE/XL Database Management System Reference Manual	30391-90001
ALLBASE/SQL Reference Manual	36216-90001
ALLBASE/ISQL Reference Manual	36216-90004
ALLBASE/SQL Database Administration Guide	36216-90005
ALLBASE/SQL C Application Programming Guide	36216-90023
ALLBASE/SQL COBOL Application Programming Guide	36216-90006
ALLBASE/SQL FORTRAN Application Programming Guide	36216-90030
ALLBASE/SQL Pascal Application Programming Guide	36216-90007
ALLBASE/SQL Message Manual	36216-90009
ALLBASE/SQL Quick Reference Guide	36216-90038
ALLBASE/NET User's Guide	36216-90031

Conventions

`UPPERCASE`

In a syntax statement, commands and keywords are shown in uppercase characters. The characters must be entered in the order shown; however, you can enter the characters in either uppercase or lowercase. For example:

```
COMMAND
```

can be entered as any of the following:

```
command          Command          COMMAND
```

italics

In a syntax statement or an example, a word in italics represents a parameter or argument that you must replace with the actual value. In the following example, you must replace *FileName* with the name of the file:

`COMMAND` *FileName*

punctuation

In a syntax statement, punctuation characters (other than brackets, braces, vertical bars, and ellipses) must be entered exactly as shown. In the following example, the parentheses and colon must be entered:

`(`*FileName*`):(`*FileName*`)`

underlining

Within an example that contains interactive dialog, user input and user responses to prompts are indicated by underlining. In the following example, yes is the user's response to the prompt:

```
Do you want to continue? >> yes
```

`{ }`

In a syntax statement, braces enclose required elements. When several elements are stacked within braces, you must select one. In the following example, you must select either ON or OFF:

$$\texttt{COMMAND}\begin{Bmatrix}\texttt{ON}\\ \texttt{OFF}\end{Bmatrix}$$

`[ ]`

In a syntax statement, brackets enclose optional elements. In the following example, OPTION can be omitted:

`COMMAND` *FileName* `[OPTION]`

When several elements are stacked within brackets, you can select one or none of the elements. In the following example, you can select OPTION or *Parameter* or neither. The elements cannot be repeated.

$$\texttt{COMMAND}\ \textit{FileName}\begin{bmatrix}\texttt{OPTION}\\ \textit{Parameter}\end{bmatrix}$$

Conventions (continued)

[...]

In a syntax statement, horizontal ellipses enclosed in brackets indicate that you can repeatedly select the element(s) that appear within the immediately preceding pair of brackets or braces. In the example below, you can select *Parameter* zero or more times. Each instance of *Parameter* must be preceded by a comma:

[,*Parameter*] [...]

In the example below, you only use the comma as a delimiter if *Parameter* is repeated; no comma is used before the first occurrence of *Parameter*:

[*Parameter*] [,...]

| ... |

In a syntax statement, horizontal ellipses enclosed in vertical bars indicate that you can select more than one element within the immediately preceding pair of brackets or braces. However, each particular element can only be selected once. In the following example, you must select A, AB, BA, or B. The elements cannot be repeated.

$\left\{\begin{matrix}\mathrm{A}\\\mathrm{B}\end{matrix}\right\}$ | ... |

...

In an example, horizontal or vertical ellipses indicate where portions of an example have been omitted.

Δ

In a syntax statement, the space symbol Δ shows a required blank. In the following example, *Parameter* and *Parameter* must be separated with a blank:

(*Parameter*)Δ(*Parameter*)

▭

The symbol ▭ indicates a key on the keyboard. For example, RETURN represents the carriage return key.

CTRL *char*

CTRL *char* indicates a control character. For example, CTRL Y means that you press the control key and the Y key simultaneously.

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1

Introduction

This chapter introduces some basic IMAGE/SQL concepts and shows how to begin using IMAGE/SQL.

For additional introductory information on IMAGE/SQL, refer to *Getting Started with HP IMAGE/SQL.*

What is IMAGE/SQL?

IMAGE/SQL is one of Hewlett-Packard's relational database management systems. IMAGE/SQL provides relational access to your TurboIMAGE data using the industry-standard Structured Query Language (SQL). This access method includes full read and write capability using ANSI standard functionality. Closely tuned to the architecture of HP computers, IMAGE/SQL gives you flexibility in designing and using SQL database applications on a small or large scale.

IMAGE/SQL includes the following:

- TurboIMAGE/XL
- The components of ALLBASE/SQL needed to provide relational access to TurboIMAGE/XL databases
- IMAGE/SQL utility, a data administration tool that links the above together

Basic Terms for Getting Started

The following definitions will get you started. A complete alphabetical listing of all terms and their definitions can be found in the glossary at the end of this guide.

- **DBEnvironment** - a collection of related files containing one or more ALLBASE/SQL databases that share the same logging and recovery process.
- **Table** - the basic unit of storage in an ALLBASE/SQL database. Tables are made up of rows and columns of data.
- **Attached Database** - a TurboIMAGE/XL database whose data can be accessed with ALLBASE/SQL. Information about the attached TurboIMAGE/XL database is stored in the DBEnvironment.
- **Detached Database** - a TurboIMAGE/XL database whose data cannot be accessed with ALLBASE/SQL. No information about the TurboIMAGE/XL database is stored in the DBEnvironment. A TurboIMAGE/XL database must be detached from a DBEnvironment before it is restructured.
- **Mapping** - the process IMAGE/SQL uses to allow a TurboIMAGE/XL database to emulate a DBEnvironment database. Mapping takes place for TurboIMAGE/XL names, data sets, data items, data item types, and data security.
- **Mapped Table** - a table defined in the DBEnvironment based on a TurboIMAGE/XL data set. Data set characteristics are mapped by the IMAGE/SQL utility to ALLBASE/SQL characteristics.
- **DBC (Database Creator)** - the creator of the TurboIMAGE/XL database. You must be either the database creator or give the TurboIMAGE/XL database maintenance word to attach the database to a DBEnvironment. Commands that add users, or view or modify user information can only be executed by the DBC.
- **DBECreator** - the individual who originally configured the DBEnvironment.
- **DBA (Database Administrator)** - a database administrator of the DBEnvironment. You must be a DBA of the DBEnvironment to which the TurboIMAGE/XL database is attached to issue most IMAGE/SQL utility commands. The creator of the DBEnvironment is automatically a DBA. Other ALLBASE/SQL users can be granted DBA authority by a DBA.

Getting Acquainted with the IMAGE/SQL Utility

The following example shows how to use the IMAGE/SQL utility to attach a TurboIMAGE/XL database to a DBEnvironment.

Invoking the IMAGE/SQL Utility

To initiate an IMAGE/SQL utility session, log on to a group and account containing a TurboIMAGE/XL database and a DBEnvironment. At the MPE XL system prompt, type IMAGESQL. For example:

```
:HELLO NANCY.ATC
:IMAGESQL


HP36385 B.F0.10          IMAGE/SQL Utility       FRI, DEC 18, 1992, 11:30 AM
(C) COPYRIGHT HEWLETT-PACKARD COMPANY 1992


>>
```

The DISPLAY OPTIONS command displays information about your IMAGE/SQL utility session:

```
>>DISPLAY OPTIONS
Current TurboDB       :
Current SQLDBE        :
Echo                  : ON
Command Logging       : ON
Log File              : ATCLOG.SERED.ATC
>>
```

Notice that the headings “Current TurboDB:” and “Current SQLDBE:” have no information displayed at this time.

Attaching to a DBEnvironment

Three IMAGE/SQL commands are needed to attach a TurboIMAGE/XL database to the DBEnvironment:

SET TURBODB identifies the TurboIMAGE/XL database to be attached to a DBEnvironment. To issue this command you must be the DBC or supply the TurboIMAGE/XL database maintenance word.

SET SQLDBE identifies the DBEnvironment to which the TurboIMAGE/XL database will be attached. To issue this command you must be the DBECreator or supply the DBEnvironment maintenance word.

ATTACH performs the attach. To issue this command you must be a DBA of the DBEnvironment.

In the following example, the SALES database and the PartsDBE DBEnvironment are identified with two SET commands.

```
>>SET TURBODB SALES.SERED.ATC
>>SET SQLDBE PARTSDBE.SERED.ATC
>>
```

Once the SET commands are issued, the DISPLAY OPTIONS command displays this information:

```
>>DISPLAY OPTIONS
Current TurboDB      : SALES.SERED.ATC
Current SQLDBE       : PARTSDBE.SERED.ATC
Echo                 : ON
Command Logging      : ON
Log File             : ATCLOG.SERED.ATC
>>
```

The ATTACH command can now be used to attach SALES to PartsDBE. Note that messages issued at attach time inform you if mapping is taking place.

```
>>ATTACH
Split 1 compound source field(s) (ATCWARN 32063).
Mapped 15 source table/source field name(s) (ATCWARN 32062).
Mapped 1 incompatible/imprecise source type(s) (ATCWARN 32061).
>>
>>EXIT
>>
```

Selecting TurboIMAGE/XL Data from Mapped Tables

The attached TurboIMAGE/XL database is now a part of the DBEnvironment and can be queried with SQL SELECT statements by the DBC. (Other users must be explicitly added by the DBC. Refer to chapter 2 for more details.)

In the example below, ALLBASE/ISQL is used to connect to PartsDBE. A SELECT statement is then used to display the data in the mapped table SALES.VENDOR.

```
isql=> CONNECT to 'PartsDBE';
isql=> SELECT * from sales.vendor;

select * from sales.vendor;
----------------+--------------------------+------------+-----+------
VENDOR          |STREET                    |CITY        |STATE|ZIP
----------------+--------------------------+------------+-----+------
Celtic Graphics |105 19th Ave.             |Seattle     |WA   |98115
Trident 3D      |55 Homestead Road         |Cupertino   |CA   |95014
Ablrn Tech.     |90 Marina Way             |Berkeley    |CA   |94708
Space Ent.      |110 Homestead Ave.        |Cupertino   |CA   |95014
Cutler Micro    |9442 E. 57th Ave.         |Seattle     |WA   |98115
Seminational Co.|5000 Marina Way           |San Diego   |CA   |92093
.                 .                         .          .      .
.                 .                         .          .      .
.                 .                         .          .      .
```

This chapter has shown you how easy it is to get started using IMAGE/SQL. Once the database is attached, you may need to complete several additional IMAGE/SQL utility tasks. Chapter 2 describes typical IMAGE/SQL utility tasks and shows you how to perform them.

2

Using the IMAGE/SQL Utility

This chapter assumes you have already read Chapter 1, "Introduction" or *Getting Started with HP IMAGE/SQL*. This chapter provides step-by-step directions for performing IMAGE/SQL administrative tasks using IMAGE/SQL utility commands.

This chapter contains the following information:

- An overview of the role of the IMAGE/SQL administrator.
- Checklists showing which tasks to perform when setting up and maintaining the IMAGE/SQL environment.
- An explanation of how each task description is organized.
- A table showing the prerequisites needed for performing IMAGE/SQL utility tasks.
- A summary of commands needed for each task.
- Directions for performing each task.

Administering IMAGE/SQL: An Overview

As an administrator, you are responsible for the IMAGE/SQL environment. This chapter shows how to use IMAGE/SQL commands to perform tasks necessary for setting up and maintaining this environment.

Setting Up the IMAGE/SQL Environment

The initial IMAGE/SQL setup involves the following steps:

- Establishing the connection between the DBEnvironment and the TurboIMAGE/XL database.
- Adding users.
- Customizing the default mapping to meet your needs.

Maintaining the IMAGE/SQL Environment

Once the IMAGE/SQL environment is set up, nothing else is necessary until one of the following occurs:

- The needs of the IMAGE/SQL environment change.
- The TurboIMAGE/XL database requires restructuring.

For your convenience, Table 2-1, Table 2-2, and Table 2-3 on the next page are checklists for you to use as you set up and maintain IMAGE/SQL. Each checklist contains an ordered list of tasks with space to check off each task as it is completed.

You may want to make a photocopy of these tables so you can refer to them as you perform the tasks.

Table 2-1. Checklist for Setting Up the IMAGE/SQL Environment

√	Opt/ Req	Task#	Task Description	Notes
	Opt	1	Configuring a DBEnvironment.	Perform to create a DBE if no suitable DBE is available for ATTACH purposes.
	Req	2	Attaching a TurboIMAGE/XL database.	Perform to establish the connection between the DBE and the TurboIMAGE/XL database.
	Opt	3	Adding users.	Perform to add users in addition to the DBC.
	Opt	4	Updating data type mapping.	Perform to select alternative data type mapping.
	Opt	5	Splitting mapped columns.	Perform to divide a mapped column into two or more mapped columns.

Table 2-2. Checklist for Maintaining the IMAGE/SQL Environment

√	Opt/ Req	Task#	Task Description	Notes
	Opt	4	Updating data type mapping.	Perform to select alternative data type mapping.
	Opt	5	Splitting mapped columns.	Perform to divide a mapped column into two or more mapped columns.
	Opt	6	Updating information about users.	Perform to update a user's password or access mode.
	Opt	7	Deleting users.	Perform to delete an IMAGE/SQL user's access to the TurboIMAGE/XL database.

Table 2-3. Checklist for Restructuring in the IMAGE/SQL Environment

√	Opt/ Req	Task#	Task Description	Notes
	Req	8	Detaching a TurboIMAGE/XL database.	Perform before restructuring the TurboIMAGE/XL database.
	Req	NA	Restructuring the TurboIMAGE/XL database.	Refer to the *TurboIMAGE/XL Database Management System Reference Manual* for information about performing restructuring tasks.
	Req	2 - 5	Restoring the IMAGE/SQL environment; includes all setup tasks originally performed.	Perform to reattach the database, to add back users, and to redo any customized mapping.

About the Tasks

- Each task is divided into three parts:

  Getting Ready — describes preparatory steps and gives information you need to know before performing the task.

  Performing the Task — describes how to perform the task.

  Task Reference — lists information useful when performing the task and provides cross-references to related tasks.

- To perform most tasks you must be attached to the DBEnvironment. Here are some general guidelines:

  □ To issue the SET commands, you must be the creator or supply the maintenance word of the TurboIMAGE/XL database or DBEnvironment named in the command.

  □ For most other commands you must be a DBA of the DBEnvironment. For commands involving database security, you must be the DBC. The maintenance word is not sufficient.

- Figure 2-1 shows the prerequisites needed to issue all IMAGE/SQL utility commands. For complete IMAGE/SQL utility command syntax, refer to Chapter 4, "IMAGE/SQL Utility Command Syntax."

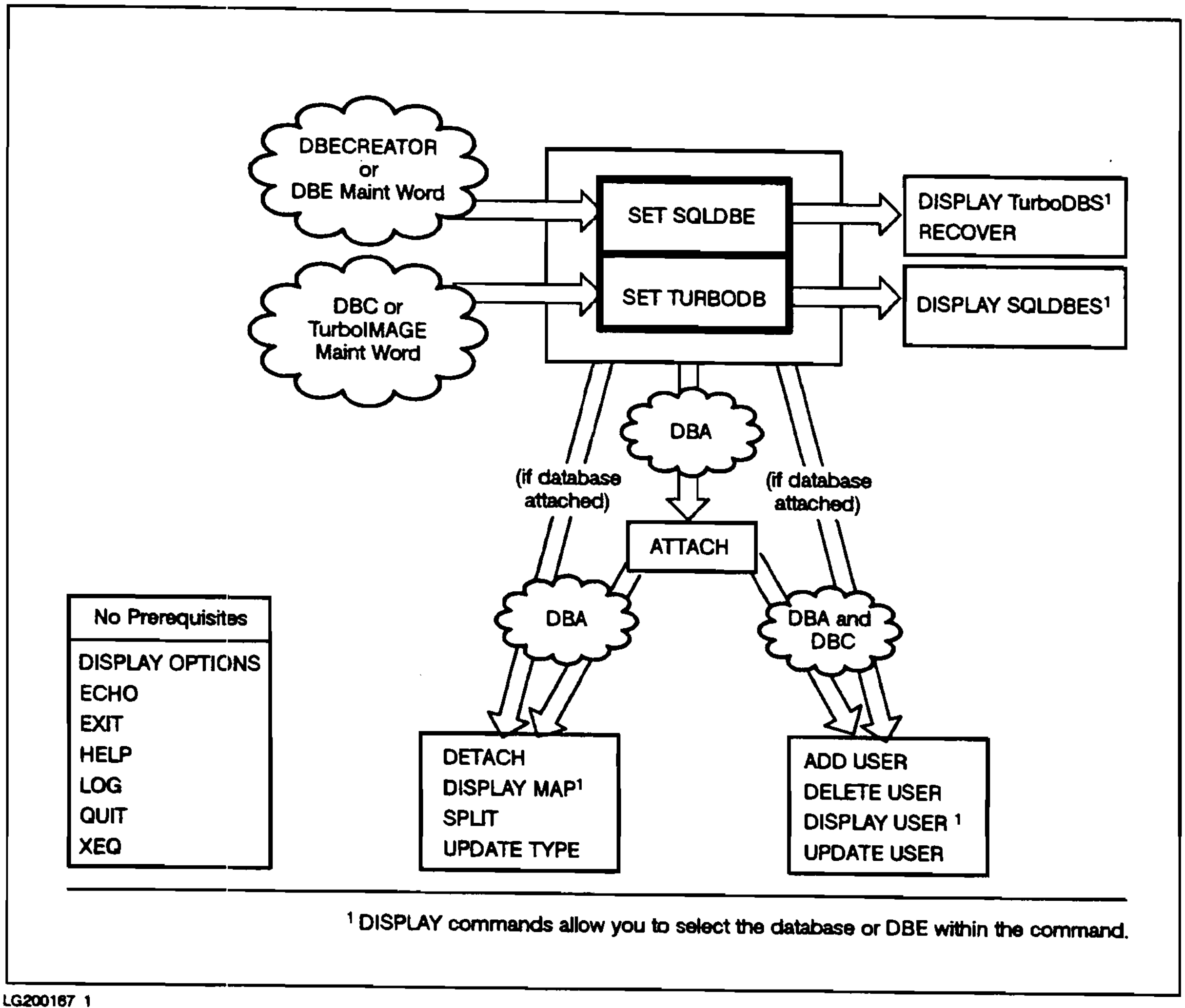


Figure 2-1. IMAGE/SQL Utility Command Prerequisites

Tasks Covered in this Chapter

For your convenience Table 2-4 lists the tasks and the commands needed to perform each task.

Table 2-4. IMAGE/SQL Utility Tasks and Related Commands

Task	Task #	Commands Used
Configuring a DBEnvironment	Task 1	START DBE NEW (an SQL statement)

Attaching a TurboIMAGE/XL database	Task 2	SET SQLDBE
		SET TURBODB
		ATTACH

Adding IMAGE/SQL users	Task 3	ADD USER
Updating data type mapping information	Task 4	UPDATE TYPE
Splitting data items	Task 5	SPLIT
Updating information about IMAGE/SQL users	Task 6	UPDATE USER
Deleting IMAGE/SQL users	Task 7	DELETE USER
Detaching a TurboIMAGE/XL database	Task 8	DETACH
Displaying IMAGE/SQL utility information	Task 9	DISPLAY OPTIONS DISPLAY MAP DISPLAY USER DISPLAY SQLDBE DISPLAY TURBODB HELP
Issuing MPE XL commands	Task 10	:*MPE XLCommandName*
Setting IMAGE/SQL utility file equations	Task 11	:FILE
Logging IMAGE/SQL utility commands	Task 12	LOG
Using IMAGE/SQL utility command files	Task 13	XEQ
Selecting data from mapped tables	Task 14	SELECT (an SQL statement)
Maintaining the ATCINFO file	Task 15	RECOVER

Configuring a DBEnvironment: Task 1

This task describes how to configure a DBEnvironment so you can access your TurboIMAGE/XL database(s) with ALLBASE/SQL (see (Task Reference)).

(Getting Ready)

- When all of the TurboIMAGE/XL databases to be attached to the DBEnvironment are created by the same user in one group and account, it is convenient to configure the DBEnvironment in this group and account.

  If this is not the case, several other issues should be considered. The following considerations apply if the TurboIMAGE/XL database to be attached exists in a different group and/or account than the DBEnvironment:

  - IMAGE/SQL supports standard MPE XL security rules. Make sure correct user, group, and account capabilities are in place when you plan to access a TurboIMAGE/XL database from a DBEnvironment in a different account than the database.
  - Make sure maintenance words exist for the DBEnvironment and all TurboIMAGE/XL databases because IMAGE/SQL utility administrators often need to specify DBEnvironment and TurboIMAGE/XL maintenance words if they are not the creator.
  - Be sure to grant DBA authority to everyone who will be performing IMAGE/SQL utility tasks (see (Task Reference)) because IMAGE/SQL utility administrators need DBA authority to perform most IMAGE/SQL utility tasks.

- Make sure the TurboIMAGE/XL database and the DBEnvironment have the same native language support (NLS) defined for them.
- When a DBEnvironment is configured, two files are created: DBEFILE0 and DBELOG1. IMAGE/SQL requires that these files be larger than their defaults. Make sure these files are large enough to accommodate IMAGE/SQL. In the example below, a file size of 500 pages is used for each of these files, but you may need to adjust these sizes depending on the size and number of TurboIMAGE/XL databases you plan to attach (see (Task Reference)).

Performing the Task

Log on in the same group and account as the TurboIMAGE/XL database(s) and run ISQL. At the ISQL prompt, enter the START DBE NEW statement. For example, to configure a DBEnvironment named PartsDBE, enter the following:

```
isql=> START DBE 'PartsDBE' MULTI NEW
> DBEFILE0 DBEFILE DBEFILE0 ⇐DBEFile0Definition
> WITH PAGES = ~~500~~, 1000)  ⇐   .    .
> NAME = 'PartsF0',            ⇐   .    .
> LOG DBEFILE DBELOG1          ⇐DBELog0Definition
> WITH PAGES = ~~500~~, 1000)  ⇐   .    .
> NAME = 'PartsLog';           ⇐   .    .
isql=> EXIT;
:
```

If you forget the semicolon, ISQL prompts you with a right-angle bracket (>). At this prompt, enter a semicolon and ISQL will execute the statement. The MULTI parameter is necessary if you plan on a multiuser IMAGE/SQL environment. The above comand can also be done by the IMAGE/SQL utility.

To set a maintenance word for the newly configured DBEnvironment, use the SETDBEMAINT command of SQLUtil. This utility prompts you for necessary information, as in the following example.

```
:RUN SQLUTIL.PUB.SYS
>> SETDBEMAINT
DBEnvironment Name: PartsDBE
Current Maintenance Word:  Carriage Return
New Maintenance Word:  usr
Retype New Maintenance Word:  usr
>>
```

Once you have configured the DBEnvironment and set a maintenance word for it, you are ready to attach TurboIMAGE/XL databases to it.

Task Reference

- No information is given here about considerations that may be necessary when configuring a DBEnvironment that contains ALLBASE/SQL databases. Consult the *ALLBASE/SQL Database Administration Guide* for more guidance in this area.
- The following summaries of SQL statements will get you started.
  - □ The SQL START DBE NEW statement has the following syntax:

```
START DBE 'DBEnvironmentName' [MULTI] NEW
 ┌DUAL LOG                                  ┐
 │BUFFER = (DataBuffPages, LogBuffPages)    │
 │LANG = LanguageName                       │
 │TRANSACTION = MaxTransactions             │ |, ... |
 │DBEFile0Definition                        │
 └DBELogDefinition                          ┘
```

Refer to the (Performing the Task) example for details of the syntax for *DBEFile0Definition* and *DBELogDefinition*.

  - □ The SQL GRANT statement has the following syntax for granting DBA authority:

```
      ⎧ CONNECT  ⎫    ⎧ DBEUserID ⎫
GRANT ⎨ DBA      ⎬ TO ⎨ GroupName ⎬ [, ... ]
      ⎩ RESOURCE ⎭    ⎩ ClassName ⎭
```

  - □ Use SQLUtil to set a DBEnvironment maintenance word. To access SQLUtil, issue the following command:

```
: RUN SQLUTIL.PUB.SYS
:
```

The SQLUtil SETDBEMAINT command is used to set a maintenance word. The syntax for this command is as follows:

```
>> SETDBEMAINT
DBEnvironment Name: DBEnvironmentName
Current Maintenance Word: OldMaintenanceWord
New Maintenance Word: NewMaintenanceWord
Retype New Maintenance Word: NewMaintenanceWord
```

When no current maintenance word exists, enter a carriage return at the “Current Maintenance Word:” prompt.

Attaching a TurboIMAGE/XL Database: Task 2

This task describes how to attach a TurboIMAGE/XL database.

Note

If you are attaching a database with the same name but in a different group and/or account as a database already attached to the DBEnvironment, you must specify an alternative owner name at attach time (see (Task Reference)). This is because in a mapped table, by default, the owner name is the database name. Duplicate table names are not allowed within the same database. In any case, you cannot attach the same TurboIMAGE/XL database twice to the same DBEnvironment.

(Getting Ready)

- It is convenient to have the TurboIMAGE/XL database and the DBEnvironment in the same group and account.

  If this is not the case, there are several issues to consider. The following considerations apply if the TurboIMAGE/XL database(s) to be attached exist(s) in a different group and/or account than the DBEnvironment:

  - □ IMAGE/SQL supports standard MPE XL security rules. Correct user, group, and account capabilities must be in place to use IMAGE/SQL to access a TurboIMAGE/XL database from a DBEnvironment in a different account than the database.
  - □ IMAGE/SQL utility administrators often need to specify DBEnvironment and TurboIMAGE/XL maintenance words as a part of the SET command if they are not the creator. Because of this, it is recommended that maintenance words exist for the DBEnvironment and all TurboIMAGE/XL databases.
  - □ IMAGE/SQL utility administrators need DBA authority to perform most IMAGE/SQL utility tasks. Be sure to grant DBA authority to everyone who will be performing IMAGE/SQL utility tasks (see (Task Reference)).

- The TurboIMAGE/XL database and the DBEnvironment must have the same native language support (NLS) defined for them.

- The ATTACH command requires that the appropriate SET SQLDBE and SET TURBODB commands have been issued. To check the status of these commands, use the DISPLAY OPTIONS command:

```
>> DISPLAY OPTIONS
Current Turbodb :
Current SQLDBE  :
Echo            : ON
Command Logging : ON
Log File        : ATCLOG.SERED.ATC
```

- If necessary, issue the SET commands. For example:

```
>>SET SQLDBE PARTSDBE.SERED.ATC
>>SET TURBODB SALES.SERED.ATC
>>
```

If the DBEnvironment does not exist, IMAGE/SQL displays this message:

```
DBE does not exist, do you want to create one? [Y/N] :
```

If you reply 'Y', a DBEnvironment and DBE files are automatically created for you. The files created are:

File Created	File Name
DBE CON file	*DBEnvironment-name*
DBE FILE	*DBEnvironment-name*FL
LOG FILE	*DBEnvironment-name*LG
ATCINFO file	*DBEnvironment-name*CR

For example, if you issue the command

```
SET SQLDBE MYDBE
```

and the DBEnvironment MYDBE does not exist, these files are created: MYDBE, MYDBEFL, MYDBELG, and MYDBECR.

The default size of DBE FILE and LOG FILE is 1000 pages.

Performing the Task

Once you are sure the appropriate SET commands have been specified and that the correct MPE XL security is in place, issue the ATTACH command.

```
>> ATTACH
Split 1 compound source fields (ATCWARN 32063).
Mapped 15 source table/source field names (ATCWARN 32062).
Mapped 1 incompatible source types (ATCWARN 32061).
>>
```

Messages issued at attach time inform you if any mapping has been done (see Task Reference). The SALES database is now a logical part of the PartsDBE DBEnvironment. Although the data remains in the TurboIMAGE/XL database, it can now be accessed from mapped tables just as it would be accessed from ALLBASE/SQL tables.

Task Reference

- By default, the IMAGE/SQL utility uses the TurboIMAGE/XL database name as the owner name.

  You must specify an alternative owner name if you are attaching a TurboIMAGE/XL database with the same name as one already attached. To do this, use the WITH OWNER= parameter of the ATTACH command.
- To specify a maintenance word, use the MAINT= parameter of the SET TURBODB or SET SQLDBE command. Refer to Chapter 4, "IMAGE/SQL Command Syntax," for details about these commands and their parameters.
- Use the DISPLAY MAP command to see detailed database mapping information.

- When a TurboIMAGE/XL database is attached to a DBEnvironment, IMAGE/SQL performs the following tasks:
  - □ Makes a table entry in the system catalog of the DBEnvironment for each corresponding source data set.
  - □ Creates a column definition for each field in the source data set. IMAGE/SQL columns are defined as NOT NULL with default values.

    Default values are based on IMAGE/SQL item types, as listed in Table 2-5.

Table 2-5. IMAGE/SQL Default Data Types

Group	IMAGE/SQL Data Type	Default Type
Alphanumeric	CHAR	Blanks
Date/Time	DATE	CURRENT_DATE
	DATETIME	CURRENT_DATETIME
	INTERVAL	0 00:00:00.000
	TIME	CURRENT_TIME
Numeric	FLOAT	0.0
	DECIMAL	0
	INTEGER	0
	SMALLINT	0

If all columns in a table are not specified, the missing columns will be defined using the default values.

  - □ Produces default mapping information that maps TurboIMAGE/XL data sets to ALLBASE/SQL tables and stores this information in the ATCINFO file. Specifically, mapping is done in the following areas:

    - **Data item and data set names:**
      Some characters allowed in TurboIMAGE/XL names (specifically, + − * / ? ' % &) are not valid in ALLBASE/SQL names. Therefore, whenever the IMAGE/SQL utility encounters such a character in a TurboIMAGE/XL name, it converts it to an underscore (_).
    - **Data types:**
      TurboIMAGE/XL data types are mapped to ALLBASE/SQL data types. When inexact or imprecise mapping is necessary, an I appears in the NOTES section of the DISPLAY MAP display. When a compound field is split into separate mapped columns, an S appears in the NOTES section of the display.
    - **User security:**
      Initially, only the TurboIMAGE/XL database creator (DBC) is defined as a user in the DBEnvironment. For other users to access the attached database, the DBC must add users with the IMAGE/SQL utility's ADD USER command. Refer to Task 3, "Adding IMAGE/SQL Users," for more information.

- Once the database is attached, the DBC must add any additional IMAGE/SQL users.
- It is desirable to update data types (Task 4) and split mapped columns (Task 5) before IMAGE/SQL users access the attached database. This is because whenever a mapped column is split or the data type of a mapped column is updated, any user-created views containing these mapped columns are dropped.
- If the DBEnvironment does not exist, IMAGE/SQL automatically creates a DBEnvironment and DBE files. The default ATCINFO file name is the DBEnvironment name appended by 'CR'.

Adding IMAGE/SQL Users: Task 3

This task describes how to add IMAGE/SQL users.

Getting Ready

The DBC is the only IMAGE/SQL user defined when a database is attached. All other IMAGE/SQL users must be explicitly added. To perform this task, you must be the TurboIMAGE/XL DBC and the ALLBASE/SQL DBA. If you want to check the current users before adding new IMAGE/SQL users, issue the DISPLAY USER command. For example:

```
>>DISPLAY USER

TurboIMAGE/XL DB : SALES.SERED.ATC
DBEnvironment    : PARTSDBE.SERED.ATC

USER LOGON        DBOPEN MODE  USER PASSWORD  USER CLASS
----------        -----------  -------------  ----------

NANCY@ATC         5            ;              64
>>
```

Here, only the DBC is defined as an IMAGE/SQL user. Until additional IMAGE/SQL users are added, only the DBC can use IMAGE/SQL.

Performing the Task

Add IMAGE/SQL users with the ADD USER command. The password specified for the new user in this command must exist in the TurboIMAGE/XL database schema.

The following example adds the user SMITH@ATC to the DBEnvironment (see Task Reference) and maps this ALLBASE/SQL DBEUserID to TurboIMAGE/XL password CLERK, which is associated with user class 14 in the TurboIMAGE/XL schema:

```
>>ADD USER SMITH@ATC WITH PASS=CLERK, MODE=6

Warning:  command containing a password has been logged (ATCWARN 32069)
ALLBASE/SQL group SALES_14 created.
View SALES.DATE_MASTER_V14 created.
View SALES.CUSTOMER_V14 created.
View SALES.PRODUCT_V14 created.
View SALES.INVENTORY_V14 created.
View SALES.SALES_V14 created.
>>
```

The creation of these views allows SMITH@ATC to read only the data that is specified in the TurboIMAGE/XL schema for password

CLERK. This user has DBOPEN mode 6 access to the database. The DISPLAY USER command now reflects the added user:

```
>>DISPLAY USER

TurboIMAGE/XL DB : SALES.SERED.ATC
DBEnvironment    : PARTSDBE.SERED.ATC

USER LOGON           DBOPEN MODE  USER PASSWORD  USER CLASS
----------           -----------  -------------  ----------

NANCY@ATC            5            ;              64
SMITH@ATC            6            CLERK          14

>>
```

Task Reference

- At attach time, the TurboIMAGE/XL database creator (DBC) is the only IMAGE/SQL user defined in the ATCINFO file.
- The ALLBASE/SQL syntax *User@Account* is used to add an IMAGE/SQL user. This name, referred to as the DBEUserID, is made up of an MPE XL user and account name, connected with the @ symbol. It must contain valid logon syntax.
- The ADD USER command maps the corresponding TurboIMAGE/XL user class to an ALLBASE/SQL group. The name of the new ALLBASE/SQL authorization group is *Ownername_nn*, where *nn* is the TurboIMAGE/XL user class number.
- To map the data set and data item security defined for the user class in the source TurboIMAGE/XL database schema, ALLBASE/SQL views are created for each new group. The name of these views is *MappedTableName_*V*nn*, where *nn* is the TurboIMAGE/XL user class number. One view is created for each mapped table the authorization group is allowed to read. Each view contains only those mapped columns to which the authorization group (user class) is allowed access.
- IMAGE/SQL supports all DBOPEN modes. Mode 5 is the default. Refer to the *TurboIMAGE/XL Database Management System Reference Manual* for more information about DBOPEN modes.

Updating IMAGE/SQL Utility Data Type Mapping Information: Task 4

This task describes how to select alternative IMAGE/SQL utility data type mapping.

Getting Ready

To select alternative data type mapping, you may first want to examine the default mapping done by the IMAGE/SQL utility (see Task Reference). For example, the following default data type mapping information is stored in the ATCINFO file for the mapped table CUSTOMER:

```
>>DISPLAY MAP CUSTOMER

TurboIMAGE/XL DB : SALES.SERED.ATC
DBEnvironment    : PARTSDBE.SERED.ATC
Owner Name       : SALES

MAPPED(SOURCE)   SOURCE              MAPPED           SOURCE     MAPPED
   TABLE         FIELD               COLUMN            TYPE       TYPE       NOTES
------------ ---------------- -------------------- ------- -------------- -----


CUSTOMER (CUSTOMER)
             ACCOUNT          ACCOUNT              J2      INTEGER
             LAST-NAME        LAST_NAME            X16     CHAR(16)
             FIRST-NAME       FIRST_NAME           X10     CHAR(10)
             INITIAL          INITIAL              U2      CHAR(2)
             STREET           STREET               X26     CHAR(26)
             CITY             CITY                 X12     CHAR(12)
             STATE            STATE                X2      CHAR(2)
             ZIP              ZIP                  X6      CHAR(6)
             CREDIT-RATING    CREDIT_RATING        R2      FLOAT           I

NOTES:
  I: Imprecise(float)/Incompatible(others) mapping between source and
     mapped data types
>>
```

By default, R2, the source data type of CREDIT_RATING, is mapped to a FLOAT. The I in the NOTES section indicates that this mapping may be imprecise because of differences in numeric storage between a 32-bit 3000 real (R2) and a 64-bit IEEE real (FLOAT).

Task 4: Updating IMAGE/SQL Utility Data Type Mapping Information

Performing the Task

To change default data type mapping, use the UPDATE TYPE command. For example:

```
>>UPDATE TYPE R2 IN CUSTOMER.CREDIT_RATING TO CHAR(4)
Updated information in table CUSTOMER.
>>
```

In this example, CHAR(4) is specified as the data type mapping for CUSTOMER.CREDIT_RATING. The DISPLAY MAP command now reflects this change:

```
>>DISPLAY MAP CUSTOMER

TurboIMAGE/XL DB : SALES.SERED.ATC
DBEnvironment    : PARTSDBE.SERED.ATC
Owner Name       : SALES

MAPPED(SOURCE)   SOURCE             MAPPED          SOURCE    MAPPED
   TABLE         FIELD              COLUMN           TYPE      TYPE        NOTES
------------- ---------------- -------------------- ------- -------------- -----


CUSTOMER (CUSTOMER)
             ACCOUNT          ACCOUNT              J2      INTEGER
             LAST-NAME        LAST_NAME            X16     CHAR(16)
             FIRST-NAME       FIRST_NAME           X10     CHAR(10)
             INITIAL          INITIAL              U2      CHAR(2)
             STREET           STREET               X26     CHAR(26)
             CITY             CITY                 X12     CHAR(12)
             STATE            STATE                X2      CHAR(2)
             ZIP              ZIP                  X6      CHAR(6)
             CREDIT-RATING    CREDIT_RATING        R2      CHAR(4)       IU

NOTES:
  I: Imprecise(float)/Incompatible(others) mapping between source and
     mapped data types
  U: Source field has been updated
>>
```

The U in the NOTES section indicates that the data type mapping for this source field has been updated. The I indicates that the new mapping is incompatable with the source data type because numerical operations cannot be performed on character data.

Task Reference

- When the data type of a mapped column is updated, all user-created views based on IMAGE/SQL utility views containing the updated mapped column are dropped. Therefore, it is desirable to update data types before IMAGE/SQL users access the attached database.
- Table 2-6 summarizes IMAGE/SQL data type mapping defaults and alternatives. The following abbreviations and variables are used in Table 2-6:

MSB most significant bit.

b number of bytes needed for storage.

n number of occurrences of the associated SQL type (the TurboIMAGE/XL sub-item length).

Table 2-6. IMAGE/SQL Data Type Mapping Defaults and Alternatives

Source Type	Bits	SQL Type Default	Comments on Default	SQL Type Alternative	Comments on Alternative
U*n*	8**n*	char(*n*)			
X*n*	8**n*	char(*n*)			
Z*n*†	8**n*	decimal(*n*,0)	default when *n* <= 15	char(*n*)††	default when *n* > 15
P*n*†	4**n*	decimal(*n-1*,0)	default when *n* <= 16	char(*n/2*)††	default when *n* > 16
I1, J1	16	smallint			
I2, J2	32	integer			
I3, J3	48	decimal(15,0)	value converted to packed decimal	char(6)††	8 bits binary data stored in each char
I4, J4†	64	char(20)††	value converted from binary to printable ASCII; zero-filled; sign included at run time	decimal(15,0)††† char(8)††	value converted to packed decimal 8 bits binary data stored in each char
K1†	16	integer	no loss of magnitude	smallint†††	MSB taken as sign
K2†	32	integer†††	MSB taken as sign	float decimal(15,0)	short IEEE converted to long IEEE value converted to packed decimal
K3	48	decimal(15,0)	value converted to packed decimal	char(6)††	8 bits binary data stored in each char

Table 2-6. IMAGE/SQL Data Type Mapping Defaults and Alternatives (continued)

Source Type	Bits	SQL Type Default	Comments on Default	SQL Type Alternative	Comments on Alternative
K4†	64	char(20)††	value converted from binary to printable ASCII; zero-filled; no sign at run time	float decimal(15,0)††† char(8)††	long IEEE assumed value converted to packed decimal 8 bits binary data stored in each char
R2†	32	float	value converted from short HP 3000 real to long IEEE real at run time	char(4)††	8 bits binary data stored in each char; no IEEE conversion
R4†	64	float	value converted from HP 3000 real to long IEEE real at run time	char(8)††	8 bits binary data stored in each char; no IEEE conversion
X16	108	char(16)		DATE	
X16	108	char(16)		DATETIME	
X16	108	char(16)		INTERVAL	
X16	108	char(16)		TIME	
all other data types†		char(*b*)††	8 bits binary data stored in each char		

† 100% mapping to an SQL type is not available.

†† Caution: When this type is mapped to char, the numeric meaning is lost in sorting, expressions, and aggregate functions.

††† Potential to under/overflow the available range. A run-time error results if the data value is outside the range of the SQL type. In this case, you may want to store the data in an alternative type.

Splitting Mapped Columns: Task 5

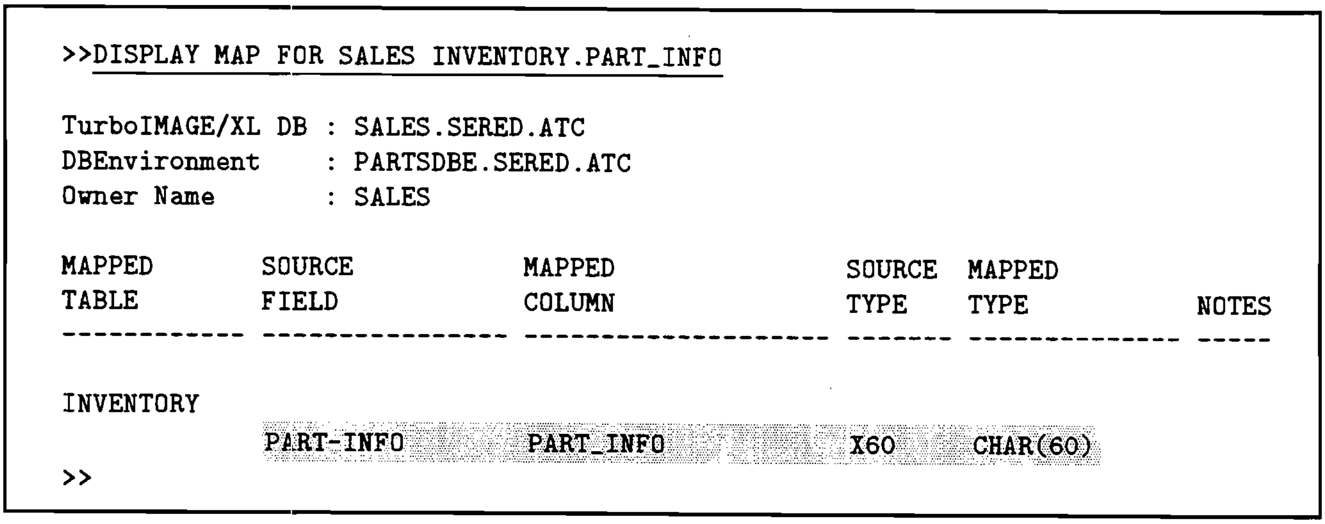
One data set field is sometimes used in TurboIMAGE/XL databases to hold several related units of data. This task describes how to easily access these individual data units by dividing them into separate mapped columns.

Getting Ready

Before splitting a mapped column, some preparation is necessary:

1. Confirm that the TurboIMAGE/XL database containing the source field is attached to a DBEnvironment.
2. Determine what TurboIMAGE/XL data type and length each individual unit would be assigned if it were to be defined as an individual data item in the TurboIMAGE/XL database schema.

   For example, PART-INFO, a large field in the INVENTORY data set, contains several units of information about a particular part. The DISPLAY MAP command shows how it is mapped at attach time:



```
>>DISPLAY MAP FOR SALES INVENTORY.PART_INFO

TurboIMAGE/XL DB : SALES.SERED.ATC
DBEnvironment    : PARTSDBE.SERED.ATC
Owner Name       : SALES

MAPPED       SOURCE           MAPPED                SOURCE  MAPPED
TABLE        FIELD            COLUMN                TYPE    TYPE           NOTES
------------ ---------------- --------------------  ------- -------------- -----

INVENTORY
             PART-INFO        PART_INFO             X60     CHAR(60)
>>
```

Specifically, PART-INFO contains:

- A part identification code (the first 4 bytes of PART-INFO).
- The version number of the part (the next 2 bytes of PART-INFO).
- Brief notes about the part (the last 54 bytes of PART-INFO).

Each unit of information corresponds to the following TurboIMAGE/XL data types:

- The part identification code is X4 (4 bytes).
- The version number of the part is I1 (2 bytes).
- The notes about the part is X54 (54 bytes).

3. Make sure that the sum of the lengths of the data units calculated in step 2 matches the length of the original field, in this case PART-INFO (60 bytes). (Here 4 + 2 + 54 = 60, so the lengths correspond.)
4. Decide what to name the new mapped columns (see (Task Reference)). For example, the new mapped columns in the mapped table INVENTORY is named:

   PART_ID_CODE
   PART_VERSION_NO
   PART_NOTES
5. Determine what SQL data type(s) can be mapped to each TurboIMAGE/XL data type identified in step 2; refer to Table 2-6 (see (Task Reference)). When alternative data type mapping possibilities exist, decide which mapping best reflects the format of the data.

(Performing the Task)

The SPLIT command requires you to enter the name of the new mapped column, its equivalent TurboIMAGE/XL data type, and, optionally, its SQL data type. Note that the ampersand (&) is used to continue to the next line (see (Task Reference)). Be sure to list the new mapped columns in the order in which they are stored in the original source field:

For example:

```
>>SPLIT INVENTORY.PART_INFO INTO PART_ID_CODE:X4:CHAR(4),&
                                 PART_VERSION_NO:I1:SMALLINT,&
                                 PART_NOTES:X54:CHAR(54)

Updated information in table INVENTORY.
```

Here the mapped column PART_INFO in the mapped table INVENTORY is being split into three new mapped columns:

PART_ID_CODE of type CHAR(4)
PART_VERSION_NO of type SMALLINT
PART_NOTES of type CHAR(54)

Note that for clarity, the SQL data types are explicitly specified in the above example. However, because they represent default data type mapping, it is not mandatory to explicitly specify these SQL data types.

The DISPLAY MAP command shows the newly split columns:

```
>> DISPLAY MAP FOR SALES INVENTORY

TurboIMAGE/XL DB : SALES.SERED.ATC
DBEnvironment    : PARTSDBE.SERED.ATC
Owner Name       : SALES

MAPPED       SOURCE           MAPPED               SOURCE  MAPPED
TABLE        FIELD            COLUMN               TYPE    TYPE           NOTES
------------ ---------------- -------------------- ------- -------------- -----

INVENTORY
             PRODUCT#         PRODUCT#             U8      CHAR(8)
               .                .                    .       .
               .                .                    .       .
               .                .                    .       .

             LOCATION-BIN     LOCATION_BIN         Z2      DECIMAL(2,0)   I
      new ⇒  PART-INFO        PART_ID_CODE         X4      CHAR(4)        S
      new ⇒  PART-INFO        PART_VERSION_NO      I1      SMALLINT       S
      new ⇒  PART-INFO        PART_NOTES           X54     CHAR(54)       S

NOTES:
  I:  Imprecise(float)/Incompatible(others) mapping between source and
      mapped data types
  S:  Source field has been split.
>>
```

The S in the NOTES section indicates that the source field, PART-INFO, has been split into separate mapped columns.

Task Reference

- Refer to Table 2-6 (Task 4) for alternative data type mapping information.
- SQL names can be up to 20 bytes in length and can be made up of any combination of letters (A to Z), decimal digits (0 to 9), $, #, @, or underscore (_). The first character cannot be an underscore or a decimal digit.
- It is desirable to split mapped columns (Task 5) before IMAGE/SQL users access the attached database. This is because when a mapped column is split, any user-created views containing the mapped column to be split are dropped.

Updating Information about IMAGE/SQL Users: Task 6

This task describes how to update IMAGE/SQL user information.

Getting Ready

To perform this task, you must be both the TurboIMAGE/XL DBC and a DBA of the attached DBEnvironment.

If you want to check the current users before adding new IMAGE/SQL users, issue the DISPLAY USER command. For example:

```
>>DISPLAY USER

TurboIMAGE/XL DB : SALES.SERED.ATC
DBEnvironment    : PARTSDBE.SERED.ATC

USER LOGON          DBOPEN MODE  USER PASSWORD  USER CLASS
----------          -----------  -------------  ----------

NANCY@ATC           5            ;              64
SMITH@ATC           6            CLERK          14

>>
```

Performing the Task

Use the UPDATE USER command to change the user password or DBOPEN mode associated with an IMAGE/SQL user.

For example:

```
>>UPDATE USER SMITH@ATC TO MODE=5
>>
```

Here, SMITH@ATC has DBOPEN mode 5 access to the database (see Task Reference). Note that because the PASS parameter was not specified, the user class does not change.

The DISPLAY USER command now reflects the updated information:

```
>>DISPLAY USER

TurboIMAGE/XL DB : SALES.SERED.ATC
DBEnvironment    : PARTSDBE.SERED.ATC

USER LOGON          DBOPEN MODE  USER PASSWORD  USER CLASS
----------          -----------  -------------  ----------

NANCY@ATC           5            ;              64
SMITH@ATC           5            CLERK          14

>>
```

Task Reference

- The SQL syntax *User@Account* is used to add an IMAGE/SQL user. This name, referred to as the DBEUserID, is made up of an MPE XL user and account name, connected with the @ symbol. It must contain valid logon syntax.
- The PASS= parameter of the UPDATE USER command is used to change the password associated with the IMAGE/SQL user. The password specified must exist in the TurboIMAGE/XL database schema.

Deleting IMAGE/SQL Users: Task 7

This task describes how to delete IMAGE/SQL users.

Getting Ready

To perform this task, you must be both the TurboIMAGE/XL DBC and an SQL DBA.

If you want to check the current users before adding new IMAGE/SQL users, issue the DISPLAY USER command. For example:

```
>>DISPLAY USER

TurboIMAGE/XL DB : SALES.SERED.ATC
DBEnvironment    : PARTSDBE.SERED.ATC

USER LOGON         DBOPEN MODE  USER PASSWORD  USER CLASS
----------         -----------  -------------  ----------

NANCY@ATC          5            ;              64
SMITH@ATC          5            CLERK          14

>>
```

Performing the Task

Use the DELETE USER command to delete an IMAGE/SQL user. For example:

```
>> DELETE USER SMITH@ATC
>>
```

Here, SMITH@ATC is deleted as an IMAGE/SQL user and removed from the corresponding authorization group.

The DISPLAY USER command now reflects the deletion.

```
>>DISPLAY USER

TurboIMAGE/XL DB : SALES.SERED.ATC
DBEnvironment    : PARTSDBE.SERED.ATC

USER LOGON        DBOPEN MODE  USER PASSWORD  USER CLASS
----------        -----------  -------------  ----------

NANCY@ATC         5            ;              64

>>
```

Note that SMITH@ATC is still configured as an SQL user because ALLBASE/SQL tables and views may be owned by this *User@Logon*.

Task Reference

- When the last SQL user logon associated with a TurboIMAGE/XL user class is deleted, the SQL authorization group (*OwnerName_UserClass#*) and views associated with this user class are not dropped. Doing so would invalidate any views that may have been created based on these IMAGE/SQL views.
- The SQL syntax *User@Account* is used to add an IMAGE/SQL user. This name, referred to as the DBEUserID, is made up of an MPE XL user and account name, connected with the @ symbol. It must contain valid logon syntax.

Detaching a TurboIMAGE/XL Database: Task 8

This task describes how to detach a TurboIMAGE/XL database from a DBEnvironment.

Getting Ready

Before detaching a TurboIMAGE/XL database, do the following:

- Make sure the appropriate SET SQLDBE and SET TURBODB commands have been issued. To check the status of these commands, use the DISPLAY OPTIONS command:

```
>> DISPLAY OPTIONS
Current Turbodb  :
Current SQLDBE   :
Echo             : ON
Command Logging  : ON
Log File         : ATCLOG.SERED.ATC
>>
```

- If necessary, issue the SET commands. For example:

```
>>SET SQLDBE PARTSDBE.SERED.ATC
>>SET TURBODB SALES.SERED.ATC
>>
```

Performing the Task

Once you have issued the appropriate SET commands, you are ready to detach the database from the DBEnvironment. For example:

```
>>DETACH
>>
```

This command detaches the SALES database from the PartsDBE DBEnvironment. If SALES is the only database attached to PartsDBE, the ATCINFO file will be deleted. If PartsDBE is the only DBEnvironment to which SALES is attached, the SALESTC file will also be deleted.

Task Reference

- There are several reasons to detach a TurboIMAGE/XL database from a DBEnvironment:
  - If the database is to be restructured. (This includes restructuring with DBChange and other third-party restructuring tools.)
  - If you want to reset all mapping information to default values.
- All mapped tables, all IMAGE/SQL views based on these tables, and all user-created views based on IMAGE/SQL views and tables are dropped when the database is detached.
- The ATCINFO file is purged when it no longer contains mapping information about any databases.
- The *DBaseName*TC file is deleted when the database is no longer attached to any DBEnvironments.

Displaying IMAGE/SQL Utility Information: Task 9

This task describes how to display IMAGE/SQL information using several IMAGE/SQL utility commands. These commands include:

DISPLAY OPTIONS	Displays the options in effect for your current IMAGE/SQL utility session.
DISPLAY TURBODB	Displays all the TurboIMAGE/XL databases associated with a specific DBEnvironment.
DISPLAY SQLDBE	Displays all the DBEnvironments associated with a specific TurboIMAGE/XL database.
DISPLAY MAP	Displays the current data type mapping information for a specific TurboIMAGE/XL database.
DISPLAY USER	Displays the current information about users in a specific TurboIMAGE/XL database.
HELP	Provides the syntax of IMAGE/SQL utility commands.

Getting Ready

- The display commands provide two options: either issue SET commands before displaying information or specify a particular TurboIMAGE/XL database or DBEnvironment as part of the display command.
- For DISPLAY SQLDBE and DISPLAY TURBODB to display useful information, at least one database should be attached.
- For DISPLAY MAP AND DISPLAY USER to display useful information, a database should be attached.

Performing the Task

Two examples using the DISPLAY commands are shown below.

Example 1: Displaying Database Information

To see all the TurboIMAGE/XL databases and mapped tables currently associated with PartsDBE, use the DISPLAY TURBODB command.

```
>> DISPLAY TURBODB TABLES FOR PARTSDBE.SERED.ATC


DBEnvironment     : PARTSDBE.SERED.ATC

TURBOIMAGE/XL DATABASE   OWNER            MAPPED TABLE
----------------------   -----            ------------

SALES.SERED.ATC          SALES            DATE_MASTER
                                          CUSTOMER
                                          PRODUCT
                                          VENDOR
                                          INVENTORY
                                          SALES

Total Databases : 1
>>
```

Any databases attached to the DBEnvironment and their associated mapped tables are displayed.

Example 2: Displaying Database Mapping Information

The DISPLAY MAP command shows how TurboIMAGE/XL data sets are mapped to SQL tables. In the following example, information about the mapped table INVENTORY is displayed.

```
>>DISPLAY MAP INVENTORY

TurboIMAGE/XL DB : SALES.SERED.ATC
DBEnvironment    : PARTSDBE.SERED.ATC
Owner Name       : SALES

MAPPED(SOURCE)  SOURCE           MAPPED               SOURCE   MAPPED          NOTES
   TABLE        FIELD            COLUMN                TYPE     TYPE
------------ ---------------- -------------------- ------- --------------- -----


INVENTORY (INVENTORY)
             PRODUCT#         PRODUCT#             U8      CHAR(8)
             ON-HAND-QTY      ON_HAND_QTY          J2      INTEGER
             VENDOR           VENDOR               X16     CHAR(16)
             OTHER-VENDORS    OTHER-VENDORS_1      X16     CHAR(16)         S
             OTHER-VENDORS    OTHER-VENDORS_2      X16     CHAR(16)         S
             OTHER-VENDORS    OTHER-VENDORS_3      X16     CHAR(16)         S
             UNIT-COST        UNIT_COST            P8      DECIMAL(7,0)
             LAST-SHIP-DATE   LAST_SHIP_DATE       X6      CHAR(6)
             LOCATION-BIN     LOCATION_BIN         Z2      DECIMAL(2,0)
             PART-INFO        PART_INFO            X60     CHAR(60)

NOTES:
  S: Source field has been split
```

Here, the S in the NOTES section indicates that the compound data item, OTHER_VENDORS, has been mapped and split into three mapped columns.

Issuing MPE XL Commands from the IMAGE/SQL Utility: Task 10

This task describes how to issue MPE XL commands from the IMAGE/SQL utility.

Performing the Task

To issue an MPE XL command from the IMAGE/SQL utility, enter a colon (:) and the name of the MPE XL command you want to issue.

For example, to issue the LISTF command:

```
>> :LISTF

FILENAME

ATCINFO     ATCUPROG    ATCUT000    ATCUTCAT    ATCUTIL     CREASQL
DBDUCB00    DBDUCB01    DBDUCB02    DBDUCB03    DBMON       DHSQLCT
ISQL        LOG1        MMXL        ORDERDF1    SALES       SALES01
SALES02     SALES03     SALES04     SALES05     SALES06     SALESTC
ORDERXF1    PARTSDBE    PARTSF0     PARTSLG1    PARTSLG2    PURCHDF1
PURCHXF1    READSQL     RECDF1      WAREHDF1    WAREHXF1

>>
```

The IMAGE/SQL utility prompt returns after the MPE XL command is executed.

Setting IMAGE/SQL File Equations: Task 11

This task describes how to set IMAGE/SQL utility file equations for two files: ATCINFO and ATCLOG.

(Performing the Task)

Setting a File Equation for ATCINFO

An ATCINFO file equation can only be set before the file is created (before any TurboIMAGE/XL databases are attached to the DBEnvironment; see (Task Reference)). Only the file name can be specified. Other parameters of the FILE command will not be valid at attach time.

For example:

```
:FILE ATCINFO = PARTSATC
:
```

Setting a File Equation for ATCLOG

A file equation for ATCLOG can be issued before beginning an IMAGE/SQL utility session.

For example:

```
:FILE ATCLOG = SALELOG1; SAVE
:
```

In the above example, when the logging option is on, IMAGE/SQL utility commands are logged to the permanent file SALELOG1.

A file equation for ATCLOG can also be set or reset from within the IMAGE/SQL utility.

For example:

```
>> :FILE ATCLOG = SALELOG2; SAVE
>>
```

Now when the logging option is on, IMAGE/SQL utility commands are logged to the permanent file SALELOG2 (see (Task Reference)).

Task Reference

ATCINFO Reference

- ATCINFO is a permanent privileged file containing mapping information about data set and field names, data types, and user security. Its formal file designator is ATCINFO.
- One ATCINFO file exists for each DBEnvironment. It is created in the same group and account as the DBEnvironment and is considered part of the DBEnvironment.
- If several DBEnvironments exist in the same group and account, the first attach may use the default file name ATCINFO. However, a file equation must be issued for ATCINFO before the first attach to each subsequent DBEnvironment or else an error message results.
- The ATCINFO file equation can only be used to specify a different file name. It cannot be used to override other ATCINFO file characteristics.

ATCLOG Reference

- ATCLOG is a temporary unnumbered ASCII file to which all IMAGE/SQL utility commands are written when the IMAGE/SQL utility logging is on. If this file does not already exist, it is created. If it already exists as a temporary or permanent file, log file records are appended to it. Its formal file designator is ATCLOG.
- When an IMAGE/SQL utility session begins, logging is on and the ATCLOG file is created (if it does not already exist) and opened in the user's logon group and account. By default, it is a temporary file named ATCLOG, but you may want to set a file equation for this file.
- If you want to save the temporary file, either specify SAVE as a part of the FILE command or save the file before ending your current MPE XL session.
- The FILE command can be used to override default ATCLOG file attributes, such as size and file domain. However, the log file must remain an unnumbered ASCII file.

Logging IMAGE/SQL Utility Commands: Task 12

This task describes how to log IMAGE/SQL utility commands and how to save frequently used command sequences in different log files so they can easily be reissued in batch or interactive mode.

Performing the Task

By default, IMAGE/SQL utility commands are logged to the ASCII file ATCLOG, which you can read and edit. You can change log files within the IMAGE/SQL utility by issuing a file equation for ATCLOG. For example, to rename and save the IMAGE/SQL utility log file as a permanent file, set a file equation for the ATCLOG file before ATCUTIL is run:

```
:FILE ATCLOG = DOATTACH; SAVE
:
```

When the IMAGE/SQL utility is run, the DISPLAY OPTIONS command confirms that commands are being logged to DOATTACH.

```
>>DISPLAY OPTIONS
Current Turbodb      :
Current SQLDBE       :
Echo                 : ON
Command Logging      : ON
Log File             : DOATTACH.SERED.ATC

*** Database is not attached.
>>
```

The SALES database is then attached to the PartsDBE DBEnvironment:

```
>>SET TURBODB SALES.SERED.ATC
>>SET SQLDBE PARTSDBE.SERED.ATC
>>ATTACH
>>
```

After the attach, the contents of the log file DOATTACH look like this:

```
DISPLAY OPTIONS
SET TURBODB SALES.SERED.ATC
SET SQLDBE PARTSDBE.SERED.ATC
ATTACH
```

To close this log file and write to a new one, issue another MPE XL FILE command from within the IMAGE/SQL utility. For example:

```
>>:FILE ATCLOG=UPDATYPE;SAVE
>>
```

The DISPLAY OPTIONS command confirms that commands are now being logged to UPDATYPE:

```
>>DISPLAY OPTIONS
Set Turbodb      : SALES.SERED.ATC
Set Sqldbe       : PARTSDBE.SERED.ATC
Echo             : ON
Command Logging  : ON
Log File         : UPDATYPE.SERED.ATC

*** Database is attached.
```

Any IMAGE/SQL utility commands now issued are written to UPDATYPE. For example, when the following command is issued,

```
>> UPDATE TYPE IN CUSTOMER.CREDIT_RATING TO CHAR(4)
Updated information in table CUSTOMER.
>>
```

the log file UPDATYPE contains the following commands:

```
DISPLAY OPTIONS
UPDATE TYPE IN CUSTOMER.CREDIT_RATING TO CHAR(4)
```

Using this technique, you can create several files containing often-used IMAGE/SQL utility commands. The commands in these files can then be executed using the XEQ command (see Task Reference).

Log files can be edited with a text editor. (Be sure to keep the edited file unnumbered or it cannot be used as a command file.)

Note

Many editors automatically insert an end-of-file marker at the end of the text in an edited file. This prevents the file from having log records appended to it. For this reason, if the original file is to be used as a log file, you should keep the edited file under a different name.

Task Reference

- Task 11, "Setting IMAGE/SQL Utility File Equations," contains more information about issuing IMAGE/SQL utility file equations.
- Task 13, "Using IMAGE/SQL Utility Command Files," contains more information about using the IMAGE/SQL utility XEQ command interactively or in batch to execute IMAGE/SQL utility commands.
- When an IMAGE/SQL utility session begins, logging is on. The temporary file ATCLOG is created (if it does not already exist) and opened in the user's logon group and account. If the log file already exists as a temporary or permanent file, log records are appended to it.
- If you want to save the temporary file, either save the file before ending your current MPE XL session or specify ;SAVE as a part of the FILE equation.
- The FILE command can be used to override default ATCLOG file attributes, such as size and file domain. However, the log file must remain an unnumbered ASCII file.

Using IMAGE/SQL Utility Command Files: Task 13

This task describes how to execute an IMAGE/SQL utility command file in interactive or batch mode.

Getting Ready

An IMAGE/SQL utility command file can be created with a text editor or can be produced as part of the logging process (see Task Reference). If you create or edit this file with an editor, note that it must be kept unnumbered.

In the following examples, the file UPDATYPE contains the following commands:

```
SET TURBODB SALES.SERED.ATC
SET SQLDBE PARTSDBE.SERED.ATC
UPDATE TYPE IN CUSTOMER.CREDIT_RATING TO CHAR(4)
EXIT
```

Note that the commands in this command file assume the TurboIMAGE/XL database is already attached to the DBEnvironment.

If you want to see commands and comments as the command file is executed, make sure the ECHO option is on (see Task Reference).

Performing the Task

The XEQ command allows you to specify a file containing IMAGE/SQL utility commands as its parameter. To interactively execute commands listed in a command file, run the IMAGE/SQL utility by typing IMAGESQL, then issue the XEQ command. Note that in this example ECHO is off.

```
:IMAGESQL

HP36385 B.F0.10          IMAGE/SQL Utility       FRI, DEC 18, 1992, 11:30 AM
(C) COPYRIGHT HEWLETT-PACKARD COMPANY 1992

>>XEQ UPDATYPE
Updated information in table CUSTOMER.
:
```

The SALES database is now attached to the PartsDBE DBEnvironment and data type mapping information has been updated for the CUSTOMER.CREDIT_RATING column of the INVENTORY table.

You can also issue XEQ commands in batch mode. The following job stream file contains XEQ commands that execute the commands in the UPDATYPE file.

```
!job JIMSQL,NANCY/KEVIN.ATC/MGR,SERED/ALL
!comment***********************************************************
!comment*      This job executes an IMAGESQL command file.
!comment***********************************************************
!
!tell NANCY.ATC;   /-->Start JIMSQL for SALES
!
!run IMAGESQL.PUB.SYS
!
!comment***********************************************************
!comment*      The UPDATYPE command file contains commands that SET
!comment*      the SALES database and the PartsDBE DBEnvironment.
!comment*      It then specifies alternative data type mapping for source
!comment*      data set fields and exits the IMAGE/SQL utility.
!comment***********************************************************
!
XEQ UPDATYPE
!
!tell NANCY.ATC;   /-->End JIMSQL for SALES
!
!eoj
```

If an error occurs in batch mode, the job terminates. The remaining commands are flushed.

Task Reference

- An IMAGE/SQL command file is an unnumbered file containing a list of IMAGE/SQL commands. If commands span more than one line, use an ampersand (&) to continue the command to the next line.
- Task 12, "Logging IMAGE/SQL Utility Commands," shows how to use the IMAGE/SQL utility logging facility to create and save files containing often-issued IMAGE/SQL utility commands.
- For the syntax of the ECHO command, refer to chapter 4, "IMAGE/SQL Utility Command Syntax."

Selecting TurboIMAGE/XL Data with SQL: Task 14

This task explains how IMAGE/SQL users select TurboIMAGE/XL data with SQL.

Getting Ready

To successfully select TurboIMAGE/XL data with IMAGE/SQL, users need to know the following:

- How to use their available SQL interface. The examples in this manual use ISQL, which also requires familiarity with the SQL SELECT statement.
- The names of the mapped tables and/or views to which they have access (see Task Reference).
- Which columns map to TurboIMAGE/XL search items. Under certain circumstances, using these mapped columns when selecting data can improve performance (see Task Reference).
- Which data is of type FLOAT. When selecting this data, users should specify a range of values rather than a particular number. This is necessary because some precision is lost when converting to FLOAT.

Performing the Task

In the example below, a CONNECT statement for PartsDBE is issued from the ISQL prompt. A select statement then retrieves all the data from the view SALES.VENDOR_V13.

```
isql=> CONNECT TO 'PartsDBE';
isql=> SELECT * FROM SALES.VENDOR_V13;

select * from sales.vendor_v13;
----------------+--------------------------+------------+-----+------
VENDOR          |STREET                    |CITY        |STATE|ZIP
----------------+--------------------------+------------+-----+------
Celtic Graphics |105 19th Ave.             |Seattle     |WA   |98115
Trident 3D      |55 Homestead Road         |Cupertino   |CA   |95014
Ablrn Tech.     |90 Marina Way             |Berkeley    |CA   |94708
Space Ent.      |110 Homestead Ave.        |Cupertino   |CA   |95014
Cutler Micro    |9442 E. 57th Ave.         |Seattle     |WA   |98115
Seminational Co.|5000 Marina Way           |San Diego   |CA   |92093
 .                .                         .         .      .
 .                .                         .         .      .
```

Users can also join data from more than one view. The query in the following example retrieves data from two views, both with a column containing product numbers. The product number, the quantity, and the name of an alternative vendor is selected when the product number appears in both views.

Specifically, the query selects the following columns:

- OTHER_VENDORS_1 from view SALES.INVENTORY_14
- QUANTITY from view SALES.SALES_V14
- SALES.SALES.PRODUCT# from view SALES.SALES_V14

Note that to eliminate ambiguity, because PRODUCT# exists in both views, the fully qualified column name must always be specified.

```
isql=> SELECT OTHER_VENDORS_1, QUANTITY, SALES.SALESV_14.PRODUCT#
>      FROM SALES.INVENTORY_V14, SALES.SALES_V14
>      WHERE SALES.INVENTORY_V14.PRODUCT#=SALES.SALES_V14.PRODUCT#;

select other_vendors_1, quantity, sales.salesv_14.product# from sales.inventor ...
----------------+---------+--------
OTHER_VENDORS_1 |QUANTITY |PRODUCT#
----------------+---------+--------
Ablrn Tech.     |        4 |P4943
Celtic Graphics |        2 |P6644
Celtic Graphics |    10050 |P3523
.          .         .
.          .         .
```

In this example, whenever the product numbers in the two views match, ISQL displays columns PRODUCT#, OTHER_VENDORS_1, and QUANTITY.

Task Reference

- The structure of the TurboIMAGE/XL database cannot be changed with IMAGE/SQL commands. Therefore, SQL statements that alter the structure of the database are not available to IMAGE/SQL users.
- When users have access to the entire data entry, they can select data from the table itself. If they do not have access to the entire data entry, they must select data from a view of the table created for them by IMAGE/SQL. Table names are of the form *OwnerName.MappedTableName*. View names are of the form *OwnerName.MappedTableName_V UserClass#*.

- In WHERE clauses, specifying columns that map to TurboIMAGE/XL search items will improve performance under the following conditions:
  - The source search item is not of type Z or P.
  - The WHERE clause compares a mapped column and a value for equality:

    ```
    isql=> SELECT * FROM SALES.SALES_V11
    >      WHERE PRODUCT# = '235'
    > ...
    ```

  - The WHERE clause has more than one expression, each containing a different mapped column. These subexpressions are connected with the AND operator.

    ```
    isql=> SELECT * FROM SALES.SALES_V11
    >      WHERE (product# = '234')
    >        AND (purchased_date = '032189')
    > ...
    ```

  - The WHERE clause has more than one expression, each containing the same mapped column. These subexpressions either use the IN operator or are connected with the OR operator.

    ```
    isql=> SELECT * FROM SALES.SALES_V11
    >      WHERE (product# IN ('224', '321'))
    > ...
    ```

Maintaining the ATCINFO File: Task 15

This task describes how to maintain the ATCINFO file.

Getting Ready

Maintenance for the ATCINFO file may be necessary in either of the following situations:

- If a crash occurs while the ATCINFO file is being modified. This may be the case if a crash takes place when the IMAGE/SQL administrator is in the midst of an IMAGE/SQL utility command that updates the ATCINFO file. When this occurs, the RECOVER command can be used to reconstruct the ATCINFO file.
- If the ATCINFO file contains too much free space. This may be the case if multiple databases are attached and then some are detached from the DBEnvironment. When this occurs, the RECOVER command can be used to compact the data in the ATCINFO file and return the free space to the file system.

Performing the Task

To recover the ATCINFO file associated with the PartsDBE DBEnvironment, issue the following commands:

```
>>SET SQLDBE PartsDBE
>>RECOVER
Checking physical file consistency and recovering free space.
Deleting unused mapped table entries.
Checking external cross references.
>>
```

Task Reference

- For the syntax of the RECOVER command, refer to chapter 4, "IMAGE/SQL Utility Command Syntax."

3

Understanding IMAGE/SQL

This chapter explains how IMAGE/SQL works and outlines the SQL functionality available to IMAGE/SQL users.

This chapter describes:

- Files created by IMAGE/SQL
- Events that take place during an attach
- Events that take place during a detach
- IMAGE/SQL security
- IMAGE/SQL data type mapping
- Run-time events
- Mapped table access with SQL

How IMAGE/SQL Works

IMAGE/SQL users can select data in mapped tables in the same way that data in ALLBASE/SQL tables is selected.

To understand how this is accomplished, you need to know:

- What files are used by IMAGE/SQL
- How IMAGE/SQL files are used
- What takes place during the attach/detach process
- How IMAGE/SQL maps TurboIMAGE/XL security
- How IMAGE/SQL maps TurboIMAGE/XL data types
- What takes place at run time

IMAGE/SQL Files

IMAGE/SQL creates two files: ATCINFO in the same group and account as the DBEnvironment and *DBName*TC in the same group and account as the TurboIMAGE/XL database. This is shown in Figure 3-1.

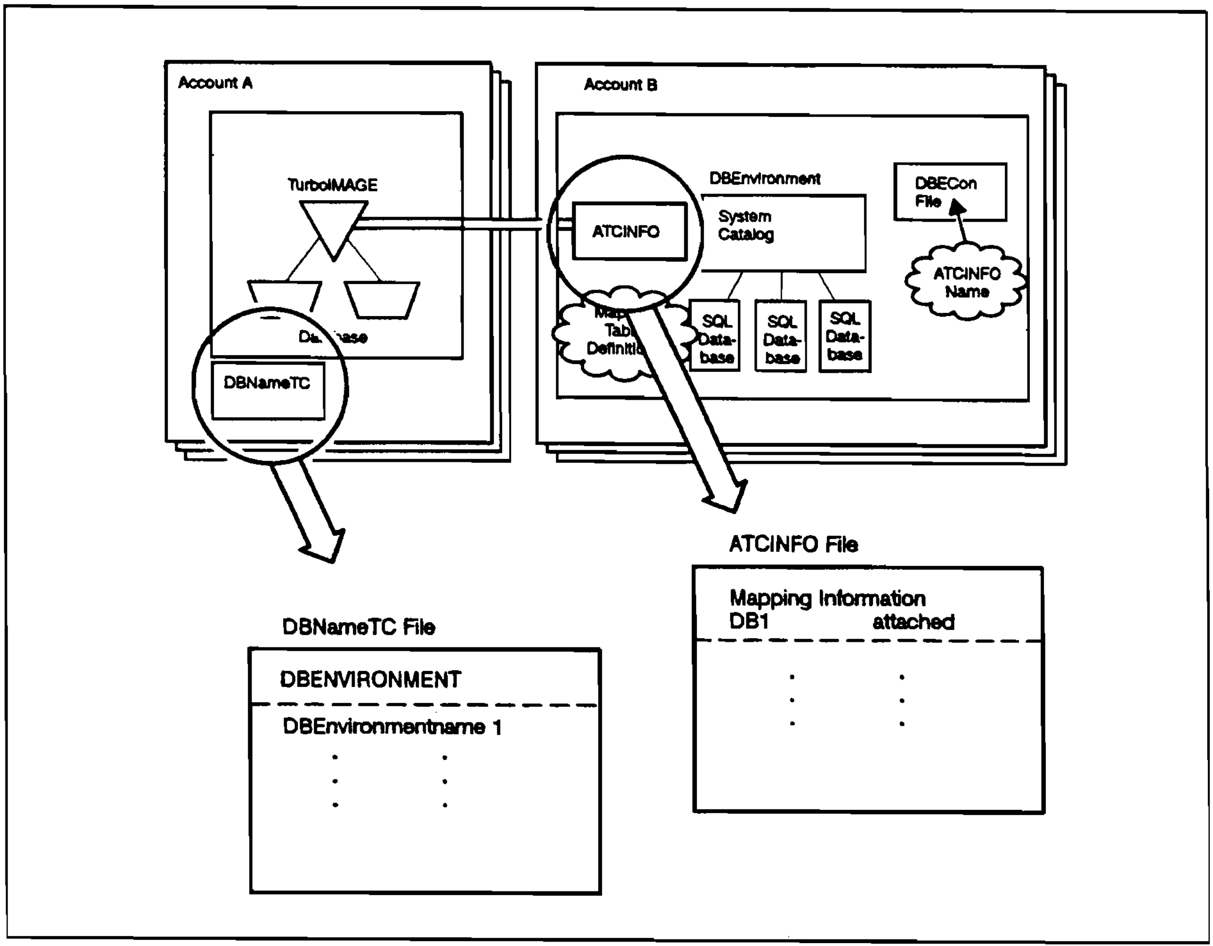


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Figure 3-1. Files Created by IMAGE/SQL

These files contain information about the relationships between all attached TurboIMAGE/XL databases and their DBEnvironments. Specifically:

ATCINFO is a permanent privileged file in the same group and account as the DBEnvironment. It contains mapping information about each TurboIMAGE/XL database attached to the DBEnvironment. One ATCINFO file exists for each DBEnvironment.

It is named ATCINFO unless a file equation has been set before the attach. Its name is placed in the DBECon file of the DBEnvironment so that it can be located whenever IMAGE/SQL needs to use or update the information in this file.

*DBName*TC is a permanent privileged file in the same group and account as the TurboIMAGE/XL database. It contains the fully qualified names of the DBEnvironments to which the TurboIMAGE/XL database is attached. This information is used to let external utilities such as DBUTIL know that the database is attached to one or more DBEnvironments.

What Takes Place During an Attach?

An attach is the process that establishes the connection between the TurboIMAGE/XL database and the DBEnvironment. Figure 3-2 shows a TurboIMAGE/XL database and DBEnvironment before the TurboIMAGE/XL database is attached.

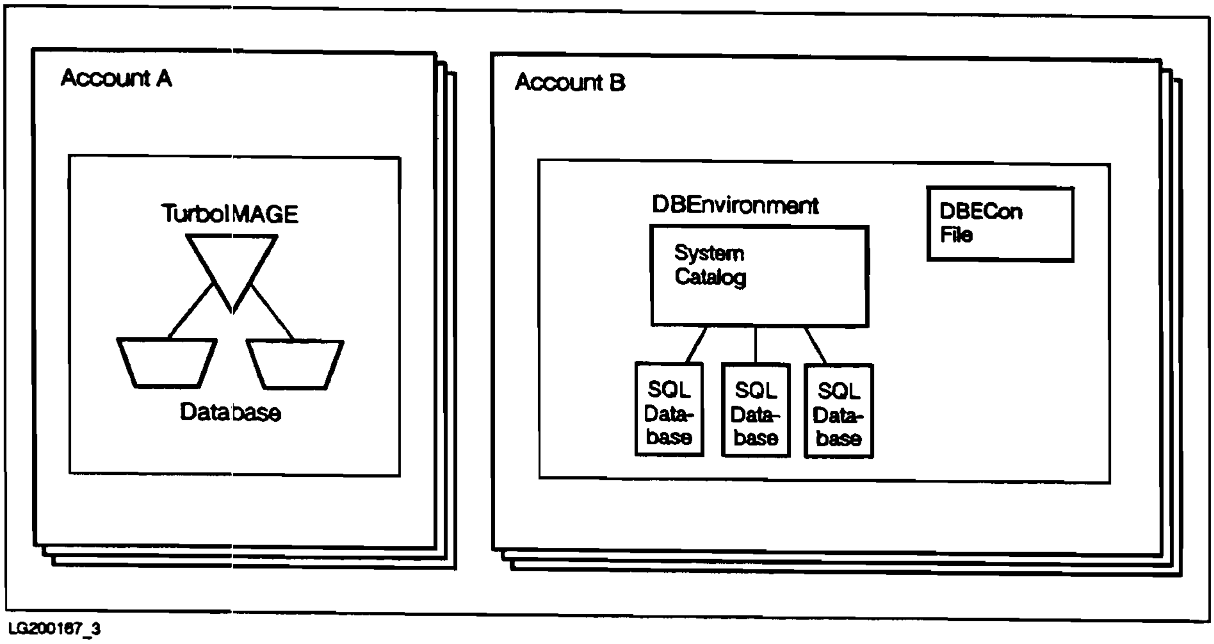

Figure 3-2. A TurboIMAGE/XL Database and a DBEnvironment Before the Attach

When the TurboIMAGE/XL database is attached to the DBEnvironment, several events take place:

1. The ATCINFO and *DBName*TC files are created.
2. Definitions of the TurboIMAGE/XL mapped tables are placed in the system catalog of the DBEnvironment. These entries in the system catalog identify the tables as mapped tables. The naming convention for SQL tables is *OwnerName.TableName*. By default, in mapped tables, IMAGE/SQL specifies the database name as the owner name and the data set name as the table name. Thus, the naming convention for mapped tables is *MappedDatabaseName.MappedDataSetName*. (At attach time, you must substitute a different owner name if an already attached database has the same name.)
3. The TurboIMAGE/XL database creator (DBC) is defined in the ATCINFO file as an IMAGE/SQL user. (For security reasons, all other IMAGE/SQL users must be explicitly added by the DBC.)

Figure 3-3 shows an attached database.

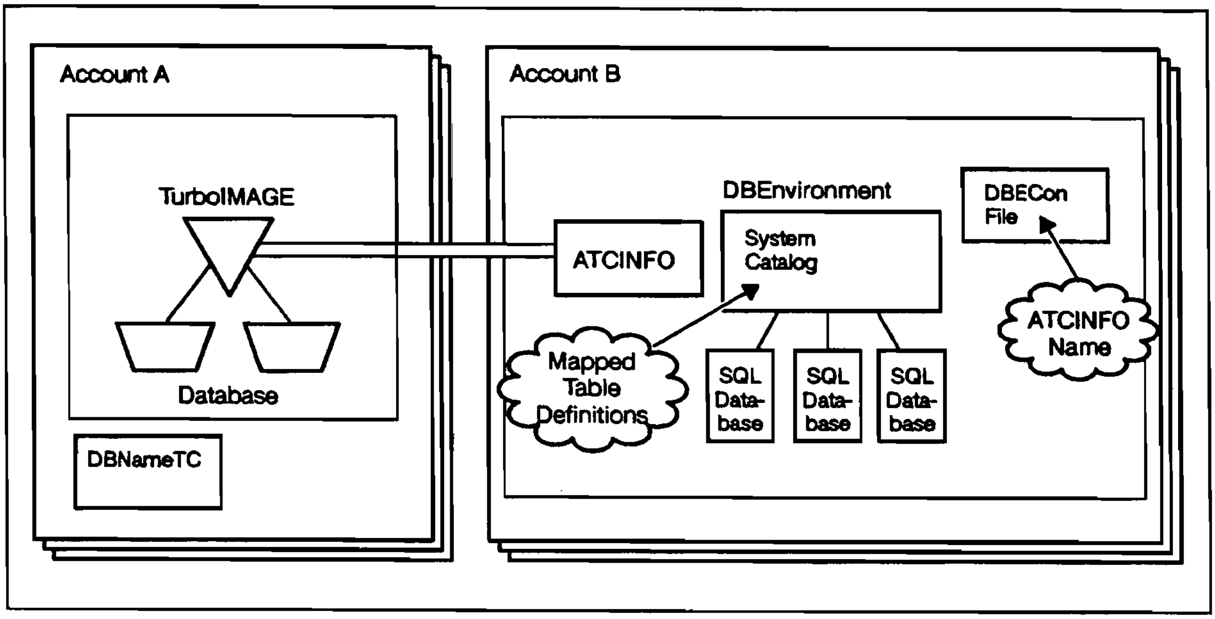

Figure 3-3. An Attached TurboIMAGE/XL Database

What Takes Place During a Detach?

When a database is detached, you can no longer use SQL to access TurboIMAGE/XL data. All views based on mapped tables are dropped. This includes views created by users, as well as IMAGE/SQL-created views. Mapped table definitions are removed from the system catalog and all mapping information about the detached TurboIMAGE/XL database is removed from the ATCINFO file.

If you are detaching the only TurboIMAGE/XL database attached to the DBEnvironment, the ATCINFO file is deleted and its name is removed from the DBECon file. If you are detaching the TurboIMAGE/XL database from the only DBEnvironment it is attached to, the *DBNameTC* file is deleted.

Detach if you plan to restructure the database or if you want to remove all mapping information about the database from the ATCINFO file.

When the database is detached, all customized mapping information (alternative data types and added IMAGE/SQL users) is lost and must be remapped when the database is reattached. IMAGE/SQL utility command files are useful for this purpose (refer to Tasks 12 and 13 in Chapter 2). but to protect database security, be sure command files that contain passwords and other sensitive information are carefully controlled. (A message notifies you when IMAGE/SQL commands containing maintenance words or passwords have been logged.)

About IMAGE/SQL Security

IMAGE/SQL enforces TurboIMAGE/XL database security. That is, SQL users can access only the data defined for them in the TurboIMAGE/XL database schema.

To accomplish this, during an attach, only the DBC is defined as an SQL user. This user has access to all the mapped tables in the database. The DBC must explicitly add all other IMAGE/SQL users by associating each password with a DBEUser_ID. A view is then created for each mapped table to which the DBEUser_ID has access. This view is based on information in the TurboIMAGE/XL root file and permits user classes to see the data defined for them in the TurboIMAGE/XL schema. Users, including user class 0, must know the names of the views to which they have access.

IMAGE/SQL utility security can be modified only by someone who is both the DBC and a DBA of the respective database management systems.

Controlling IMAGE/SQL User Access

IMAGE/SQL takes the following steps to control users' access to TurboIMAGE/XL data (see Figure 3-4):

- When an SQL user is added, IMAGE/SQL creates an SQL authorization group. The name of this group is based on the user class of the password named in the ADD USER command. The naming convention for this group is *OwnerName_UserClass#*. The new DBEUserID (*User@Account*) is then added to this group.

  One view is then created for each data set the user class is allowed to access. The naming convention for these views is *OwnerName.MappedTableName_V UserClass#*.

  If data is not password-protected, user class 0 is assumed and views of this data are created for user class 0.

- When an SQL user is deleted, the DBEUserID is removed from the SQL group associated with the TurboIMAGE/XL user class. Note that the group itself and the corresponding views remain in the DBEnvironment because other user-created views may be based on these views.

- When the database is detached, all views based on mapped tables, including user-created views, are dropped.

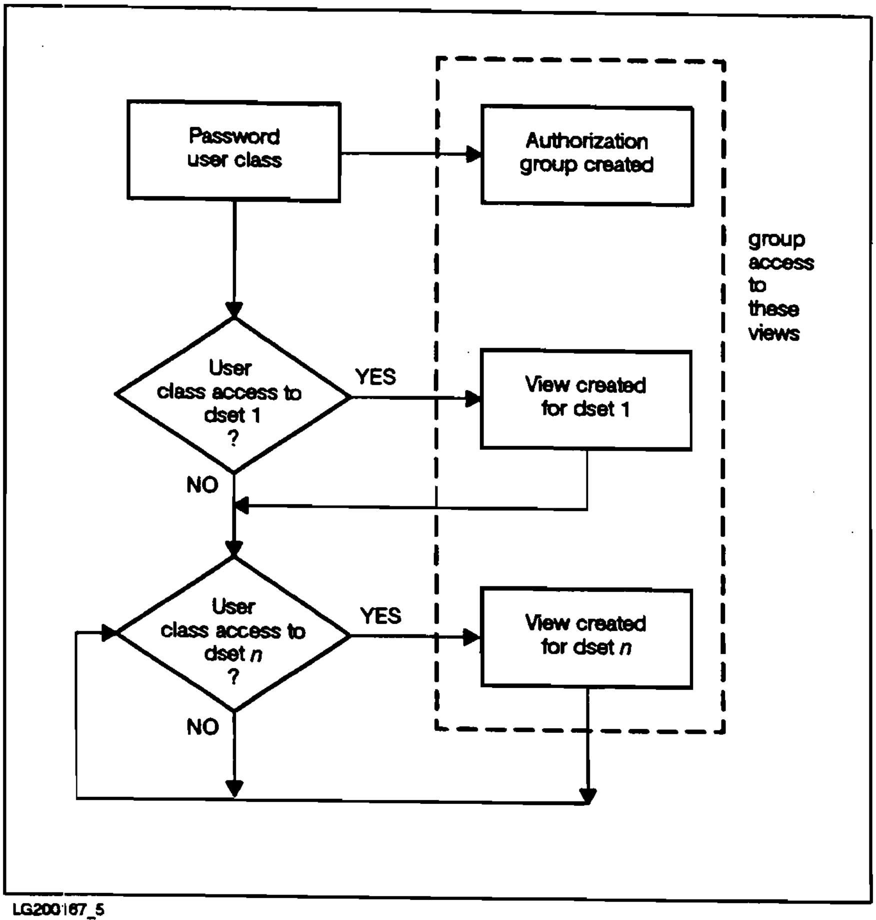
Password user class
Authorization group created
group access to these views
User class access to dset 1 ?
YES
View created for dset 1
NO
User class access to dset *n* ?
YES
View created for dset *n*
NO
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Figure 3-4. IMAGE/SQL Security Mapping

IMAGE/SQL Data Type Mapping

IMAGE/SQL maps all TurboIMAGE/XL data types to the closest equivalent SQL data types. Sometimes completely compatible choices are not available, or more than one viable alternative exists. In these cases, IMAGE/SQL chooses default data types for you, but also provides alternative data type mapping that you can select if it more closely meets your particular needs.

Note that when alternative data type mapping is selected, all user-created views containing the mapped data type are dropped. Therefore, it is advisable to perform alternative data type mapping before users have had the opportunity to create views.

For specific information about IMAGE/SQL default data type mapping and alternative choices, refer to Table 2-6 in Chapter 2 (Task 4).

At Run Time

At run time, SQL turns all mapped table queries over to IMAGE/SQL. Using the mapping information in the ATCINFO file, IMAGE/SQL makes the appropriate TurboIMAGE/XL calls, retrieves the data from the TurboIMAGE/XL database, and returns the data to SQL in the correct SQL format (see Figure 3-5.)

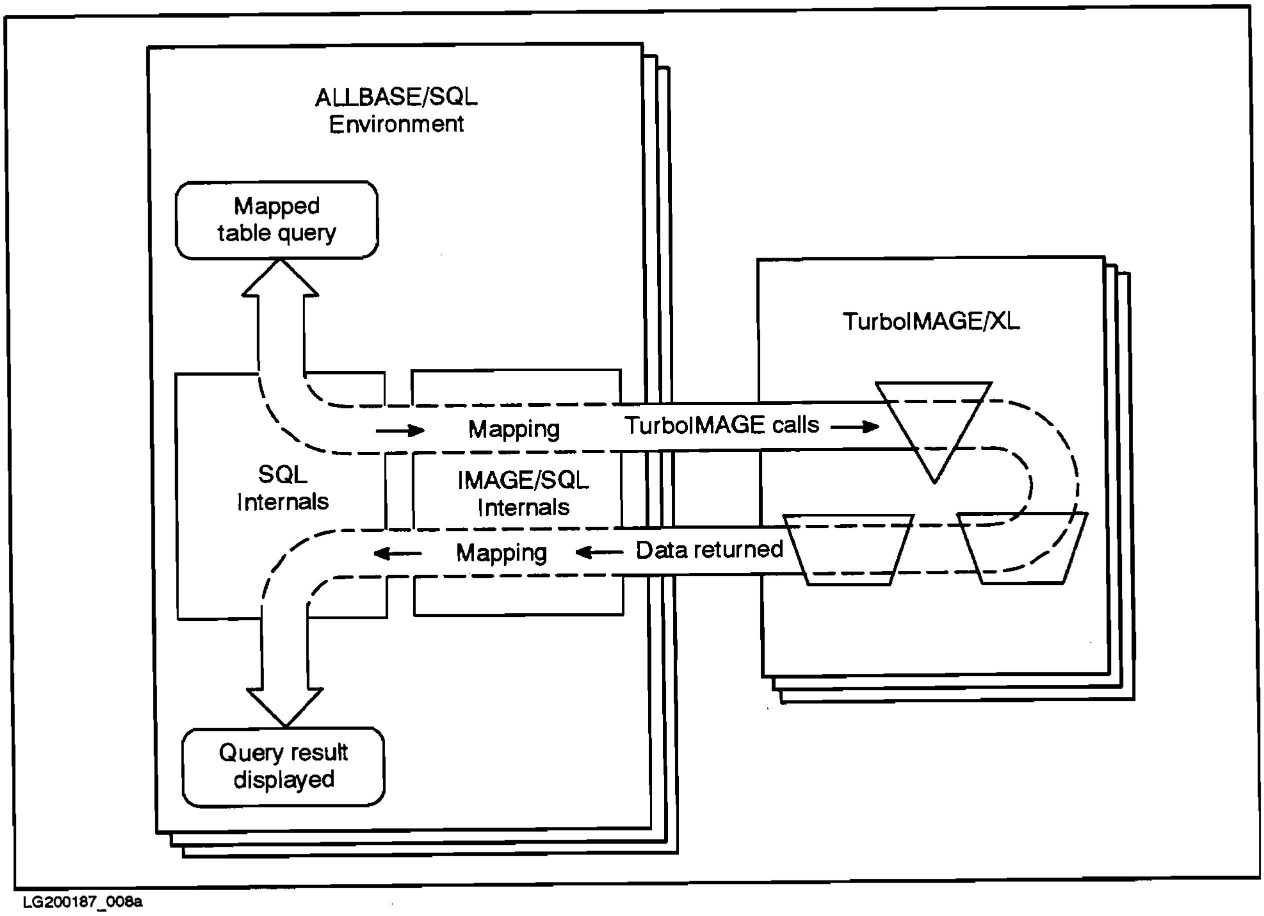

Figure 3-5. IMAGE/SQL at Run Time

Note that the data is retrieved from the TurboIMAGE/XL database. Only the mapped table definitions actually reside in the DBEnvironment.

Accessing Mapped Tables

IMAGE/SQL provides transparent access to TurboIMAGE/XL data. However, IMAGE/SQL users should keep in mind the considerations described in this section when accessing TurboIMAGE/XL data.

Performance Considerations

The following factors can affect IMAGE/SQL performance:

Up-to-Date Information

When data from two or more tables is combined (joined), it is important to have accurate statistics on these tables. Use the SQL UPDATE STATISTICS statement to ensure that this information is up-to-date. Mapped table statistics should be updated immediately after the database is attached and again when the number of data entries in mapped tables has changed significantly. Refer to the *ALLBASE/SQL Database Administration Guide* for information about how to use this statement.

Search Items in Queries

When a mapped column represents a TurboIMAGE/XL search item, IMAGE/SQL uses the search item to retrieve the data more efficiently whenever possible. (An exception: if the search item is of type P or Z, it is not used; a serial read is always done.) Because of this, using a mapped column that represents a search item in the WHERE clause of an SQL SELECT statement can improve performance in certain circumstances. Task 14, "Selecting TurboIMAGE/XL Data with SQL" in Chapter 2 describes these circumstances and gives examples of their use.

4

IMAGE/SQL Utility Command Syntax

IMAGE/SQL Utility Commands

This chapter contains detailed information about IMAGE/SQL utility commands.

The following is included for each command:

- Command syntax
- Explanation of the command's parameters
- Prerequisites needed to execute the command
- Discussion of the command's functionality
- Example(s)

In all examples, the TurboIMAGE/XL database shown is SALES and the DBEnvironment is PartsDBE. Refer to Figure 2-1 in Chapter 2 to see a summary of the prerequisites necessary to execute IMAGE/SQL utility commands.

ADD USER

Adds an IMAGE/SQL user.

Syntax

```
AD[D] USER User@Account WITH PASS=Password
[,MODE=ModeNumber]
```

Parameters

User@Account is the name used to identify the new user to IMAGE/SQL. This name, referred to in SQL as the DBEUserID, is made up of an MPE XL user and account name, connected with the @ symbol. It must contain valid logon syntax.

Password is a password in the TurboIMAGE/XL schema. The new IMAGE/SQL user has the same access to TurboIMAGE/XL data as the user class associated with this password. The password is case-sensitive.

ModeNumber is the DBOPEN mode with which the TurboIMAGE/XL database is opened for this user. Valid DBOPEN modes supported by IMAGE/SQL are 1 through 8. If this parameter is omitted, the mode defaults to 5. Refer to the *TurboIMAGE/XL Database Management System Reference Manual* for information about these DBOPEN modes.

Prerequisites

- SET SQLDBE issued.
- SET TURBODB issued.
- DBC status.
- DBA authority.
- Database attached.

Description

Use the ADD USER command to add a new IMAGE/SQL user. When a user is added, an SQL authorization group is created that corresponds to the user class of the password given in the command. The new DBEUserID (*User@Account*) is then added to this group. The group is named according to the following conventions:

OwnerName_UserClassNumber

By default, *OwnerName* is the name of the database (unqualified by its group and account), but a different *OwnerName* can be specified at attach time. For example, for a database owned by MKTG, the group created for user class 11 is named MKTG_11.

To enforce TurboIMAGE/XL security, one view is created for each data set the user class is allowed to access. The view is named according to the following conventions:

OwnerName.MappedTableName_VUserClassNumber

For example, for a database owned by MKTG, the view created for the mapped table ACCOUNTS is MKTG.ACCOUNTS_V11 for user class 11. Each view contains only those mapped columns that correspond to the fields in the data set the user class can read. The corresponding authorization group is then granted access to these views.

Example

In the following example, user RYAN@ATC is being added as an IMAGE/SQL user. The database will be opened in DBOPEN mode 1. His access to data is the same as that allowed to the password "manager". Because the password "manager" is associated with user class 18, this number appears at the end of each view name.

```
>>ADD USER RYAN@ATC WITH PASS=manager, MODE=1
Warning: command containing a password has been logged (ATCWARN 32069).
ALLBASE/SQL group SALES_18 created.
View SALES.DATE_MASTER_V18 created.
View SALES.CUSTOMER_V18 created.
View SALES.PRODUCT_V18 created.
View SALES.VENDOR_V18 created.
View SALES.INVENTORY_V18 created.
View SALES.SALES_V18 created.
>>
```

ATTACH

Attaches a TurboIMAGE/XL database to an SQL DBEnvironment.

Syntax

```
AT[TACH] [WITH OWNER=OwnerName]
```

Parameters

OwnerName specifies an owner for all SQL objects that need to be created for the attached TurboIMAGE/XL database. This name can be up to 17 bytes in length and can be made up of any combination of letters (A to Z), decimal digits (0 to 9), $, #, @, or _ (underscore). However, the first character cannot be a decimal digit or an underscore. Lowercase letters are automatically converted to uppercase letters. Note that group and account names are not included in the *OwnerName* parameter.

If this parameter is omitted, the owner name defaults to the name of the TurboIMAGE/XL database defined in the most recent SET TURBODB command.

Prerequisites

- SET SQLDBE issued.
- SET TURBODB issued.
- DBA authority.
- Database detached.

Description

Use the ATTACH command to attach a TurboIMAGE/XL database to a DBEnvironment. This command can only be used after the database name and the DBEnvironment name have been specified with SET commands.

When a database is attached to a DBEnvironment, only the DBC is defined as an IMAGE/SQL user and default data type mapping is performed. Once attached, ATCUtil commands can be used to update this default information. Refer to the ADD USER, UPDATE USER, UPDATE TYPE, and SPLIT commands for more information.

A database already attached to a specific DBEnvironment cannot be reattached. If you attempt to do this, an error message is issued.

To attach databases with the same database name but in different groups and accounts to the same DBEnvironment, you must use the *OwnerName* parameter to specify a different owner name for all but the first such database you attach.

If the DBEnvironment does not exist, IMAGE/SQL displays this message:

```
DBE does not exist, do you want to create one? [Y/N] :
```

If you reply 'Y', a DBEnvironment and DBE files are automatically created for you. The files created are:

File Created	File Name
DBE CON file	*DBEnvironment-name*
DBE FILE	*DBEnvironment-name*FL
LOG FILE	*DBEnvironment-name*LG
ATCINFO file	*DBEnvironment-name*CR

For example, if you issue the command

```
SET SQLDBE MYDBE
```

and the DBEnvironment MYDBE does not exist, these files are created: MYDBE, MYDBEFL, MYDBELG, and MYDBECR.

The default size of DBE FILE and LOG FILE is 1000 pages.

Example

In the following example, SALES is attached to PARTSDBE. The accompanying message summarizes the mapping that took place during the attach.

```
>>SET TURBODB SALES
>>SET SQLDBE PARTSDBE
>>ATTACH
Split 1 compound source field(s) (ATCWARN 32063).
Mapped 15 source table/source field name(s) (ATCWARN 32062).
Mapped 1 incompatible source type(s) (ATCWARN 32061).
>>
```

To see the specific mapping for each data set and field, use the DISPLAY MAP command. In the example below, the display notes that the data type mapping performed for the mapped column CREDIT_RATING is imprecise. Also noted is the splitting of the compound source field OTHER_VENDORS into three mapped columns.

```
>>DISPLAY MAP

TurboIMAGE/XL DB : SALES.SERED.ATC
DBEnvironment    : PARTSDBE.SERED.ATC
Owner Name       : SALES

MAPPED(SOURCE)   SOURCE             MAPPED          SOURCE     MAPPED
   TABLE         FIELD              COLUMN           TYPE       TYPE        NOTES
------------ ---------------- -------------------- ------- -------------- -----

DATE_MASTER (DATE-MASTER)
             DATE             DATE                 X6      CHAR(6)

CUSTOMER (CUSTOMER)
             CUSTOMER#        CUSTOMER#            J2      INTEGER
             LAST-NAME        LAST_NAME            X16     CHAR(16)
             FIRST-NAME       FIRST_NAME           X10     CHAR(10)
             INITIAL          INITIAL              U2      CHAR(2)
             STREET           STREET               X26     CHAR(26)
             CITY             CITY                 X12     CHAR(12)
             STATE            STATE                X2      CHAR(2)
             ZIP              ZIP                  X6      CHAR(6)
             CREDIT-RATING    CREDIT_RATING        R2      FLOAT            I
```

(Example continued on next page)

```
PRODUCT (PRODUCT)
                PRODUCT#         PRODUCT#             U8      CHAR(8)
                PRODUCT-DESCRIPT PRODUCT-DESCRIPT     X20     CHAR(20)


VENDOR (VENDOR)
                VENDOR           VENDOR               X16     CHAR(16)
                STREET           STREET               X26     CHAR(26)
                CITY             CITY                 X12     CHAR(12)
                STATE            STATE                X2      CHAR(2)

INVENTORY (INVENTORY)
                PRODUCT#         PRODUCT#             U8      CHAR(8)
                ON-HAND-QTY      ON_HAND_QTY          J2      INTEGER
                VENDOR           VENDOR               X16     CHAR(16)
                OTHER-VENDORS    OTHER_VENDORS_1      X16     CHAR(16)      S
                OTHER-VENDORS    OTHER_VENDORS_2      X16     CHAR(16)      S
                OTHER-VENDORS    OTHER_VENDORS_3      X16     CHAR(16)      S
                UNIT-COST        UNIT_COST            P8      DECIMAL(7,0)
                LAST-SHIP-DATE   LAST_SHIP_DATE       X6      CHAR(6)
                LOCATION-BIN     LOCATION_BIN         Z2      DECIMAL(2,0)
                PART-INFO        PART_INFO            X60     CHAR(60)

SALES (SALES)
                CUSTOMER#        CUSTOMER#            J2      INTEGER
                PRODUCT#         PRODUCT#             U8      CHAR(8)
                QUANTITY         QUANTITY             I1      SMALLINT
                PRICE            PRICE                J2      INTEGER
                TAX              TAX                  J2      INTEGER
                TOTAL            TOTAL                J2      INTEGER
                PURCHASED-DATE   PURCHASED_DATE       X6      CHAR(6)
                DELIVERED-DATE   DELIVERED_DATE       X6      CHAR(6)

NOTES:
  I: Imprecise(float)/Incompatible(others) mapping between source and
     mapped data types
  S: Source field has been split
>>
```

DELETE USER

Deletes an IMAGE/SQL user.

Syntax

```
DEL[ETE] USER User@Account
```

Parameters

User@Account is the name used to identify the IMAGE/SQL user to SQL. This name, referred to as the DBEUserID, is made up of an MPE XL user and account name, connected with the @ symbol. This user and account must be a valid existing logon.

Prerequisites

- SET SQLDBE issued.
- SET TURBODB issued.
- DBC status.
- DBA authority.
- Database attached.

Description

Use the DELETE USER command to delete an IMAGE/SQL user from a DBEnvironment. When a user is deleted, the DBEUserID (*User@Account*) is removed from the SQL group associated with the TurboIMAGE/XL user class. Note that the group itself and the corresponding view(s) remain in the DBEnvironment because other user-created views may be based on views created by IMAGE/SQL.

Example

In the example below, once the DELETE USER command is issued, user RYAN@ATC can no longer access the SALES database with IMAGE/SQL.

```
>>DELETE USER RYAN@ATC
>>
```

DETACH

Detaches a TurboIMAGE/XL database from a DBEnvironment.

Syntax

```
DET[ACH]
```

Command Prerequisites

- SET SQLDBE issued.
- SET TURBODB issued.
- DBA authority.
- Database attached.

Description

Use the DETACH command to detach a TurboIMAGE/XL database from a DBEnvironment. SET TURBODB and SET SQLDBE commands must be issued before the detach can take place. The database named in the most recent SET TURBODB is detached from the DBEnvironment named in the most recent SET SQLDBE command.

You must detach the database before performing any restructuring tasks and reattach when the restructuring is complete.

When a database is detached, all mapping information about it is removed from the ATCINFO file. If it is the only database attached to the DBEnvironment, the ATCINFO file itself is purged. If the TurboIMAGE/XL database is no longer attached to any DBEnvironment, the *DBName*TC file is also purged.

In addition, all mapped table definitions are removed from the DBEnvironment system catalog. All IMAGE/SQL views and user-created views based on IMAGE/SQL tables and views are dropped. Note that DBUTIL can be used to purge and detach a database that is attached to a DBEnvironment.

Example

In this example, SALES is detached from PartsDBE. When this occurs, all mapping information about SALES is removed from the ATCINFO file. If SALES is the only database attached to PartsDBE, the ATCINFO file itself is purged. If SALES is no longer attached to any DBEnvironment, the SALESTC file is also purged.

```
>>SET SQLDBE PARTSDBE
>>SET TURBODB SALES
>>DETACH
>>
```

DISPLAY MAP

Displays the current data type mapping information for a specified TurboIMAGE/XL database.

Syntax

```
DI[SPLAY] MAP [FOR TurboDB [,MAINT=TurboMaintWord]]
[MappedTable[.MappedCol]] [,...]
```

Parameters

TurboDB is the name of the TurboIMAGE/XL database whose data type mapping information you want to display. This name can be a fully qualified group and account name. If this parameter is omitted, the name of the database defined in the most recent SET TURBODB command is used.

TurboMaintWord is the maintenance word for the TurboIMAGE/XL database. This parameter can be omitted if you are the database creator (DBC).

MappedTable is the name of a mapped table whose data type mapping information you want to display. If this parameter is omitted, information about all mapped tables is displayed.

MappedCol is the name of a specific mapped column in the table whose data type mapping information you want to display. If this parameter is omitted, information about all columns in the table is displayed.

Prerequisites

- SET SQLDBE issued.
- SET TURBODB issued or TurboIMAGE/XL database (and maintenance word, if not DBC) specified as part of the command.
- DBA authority.
- Database attached.

Description

Use the DISPLAY MAP command to display name and data type mapping information for a TurboIMAGE/XL database attached to an SQL DBEnvironment. Information is displayed about the DBEnvironment named in the most recent SET SQLDBE command.

If the database is attached to more than one DBEnvironment, issue additional SET SQLDBE commands to see the data type mapping for each DBEnvironment to which it is attached.

In the display generated by this command:

- An I in the NOTES section next to a particular mapping indicates that the default data type mapping is inexact or imprecise.
- An S in the NOTES section next to a particular mapping indicates that the mapped column has been split. This occurs by default when the source field is a compound data item. The SPLIT

command may also have been used to explicitly split a mapped column into smaller mapped columns. In this case, a U also appears in the NOTES section.

- A U in the NOTES section next to a particular mapping indicates that the default data type mapping has been updated with the UPDATE TYPE command.

Refer to the SPLIT and UPDATE TYPE commands for information about how to select alternative data type mapping.

Example

In the following example, mapping information for the mapped table INVENTORY is displayed. The compound source field OTHER-VENDORS has been split into three mapped columns: OTHER_VENDORS_1, OTHER_VENDORS_2, and OTHER_VENDORS_3. Note that the source data set name, in this case INVENTORY, is shown in parentheses after the name of the mapped table.

```
>>DISPLAY MAP INVENTORY

TurboIMAGE/XL DB : SALES.SERED.ATC
DBEnvironment    : PARTSDBE.SERED.ATC
Owner Name       : SALES

MAPPED(SOURCE)   SOURCE              MAPPED           SOURCE     MAPPED
   TABLE         FIELD               COLUMN            TYPE       TYPE        NOTES
------------ ---------------- -------------------- ------- -------------- -----



INVENTORY (INVENTORY)
             STOCK#           STOCK#               U8      CHAR(8)
             ONHANDQTY        ONHANDQTY            J2      INTEGER
             SUPPLIER         SUPPLIER             X16     CHAR(16)
             OTHER-VENDORS    OTHER_VENDORS_1      X16     CHAR(16)        S
             OTHER-VENDORS    OTHER_VENDORS_2      X16     CHAR(16)        S
             OTHER-VENDORS    OTHER_VENDORS_3      X16     CHAR(16)        S
             UNIT-COST        UNIT_COST            P8      DECIMAL(7,0)
             LASTSHIPDATE     LASTSHIPDATE         X6      CHAR(6)
             BINNUM           BINNUM               Z2      DECIMAL(2,0)
             PART-INFO        PART_INFO            X60     CHAR(60)

NOTES:
  S: Source field has been split
>>
```

DISPLAY OPTIONS

Displays the options in effect for the current IMAGE/SQL utility session.

Syntax

```
DI[SPLAY] OPTIONS
```

Prerequisites

None.

Description

Use the DISPLAY OPTIONS command to display the options in effect for the current IMAGE/SQL utility session. The following information is displayed:

- The database named in the last SET TURBODB command.
- The DBEnvironment named in the last SET SQLDBE command.
- The condition specified in the last LOG command (on or off).
- The condition specified in the last ECHO command (on or off).
- The name of the IMAGE/SQL utility log file (only if logging is on).
- The attached/detached status of the database named in the SET TURBODB command.

Example

In this example, SALES.SERED.ATC is the database named in the most recent SET TURBODB command and PARTSDBE.SERED.ATC is the DBEnvironment named in the most recent SET SQLDBE command. Echo is on, logging is on, and the database is attached to the DBEnvironment.

```
>>DISPLAY OPTIONS
Current TurboDB      : SALES.SERED.ATC
Current SQLDBE       : PARTSDBE.SERED.ATC
Echo                 : ON
Command Logging      : ON
Log File             : ATCLOG.SERED.ATC

*** Database is attached.
>>
```

DISPLAY SQLDBES

Displays all the DBEnvironments currently attached to a TurboIMAGE/XL database.

Syntax

DI[SPLAY] SQLDBE[S] [FOR *TurboDB*
[,MAINT=*TurboMaintWord*]]

Parameters

TurboDB is the name of the TurboIMAGE/XL database whose associated DBEnvironments you want to display. If this parameter is omitted, the database must be previously specified with the SET TURBODB command or else an error message is issued.

TurboMaintWord is the maintenance word for the TurboIMAGE/XL database. This parameter can be omitted if you are the database creator (DBC).

Prerequisites

SET TURBODB issued or TurboIMAGE/XL database (and maintenance word, if not DBC) specified as part of the command.

Description

Use the DISPLAY SQLDBES command to display the DBEnvironments to which the TurboIMAGE/XL database is currently attached.

Example

In the following example, SALES.SERED.ATC is only associated with PARTSDBE.SERED.ATC.

```
>>DISPLAY SQLDBES FOR SALES.SERED.ATC

TurboIMAGE/XL DB : SALES.SERED.ATC

DBENVIRONMENT
-------------
PARTSDBE.SERED.ATC

>>
```

DISPLAY TURBODBS

Displays all TurboIMAGE/XL databases currently attached to a DBEnvironment and, optionally, their associated mapped tables.

Syntax

```
DI[SPLAY] TURBODB[S] [TABLES] [FOR DBEnvironment
[,MAINT=DBE_MaintWord]]
```

Parameters

TABLES is an option that displays all mapped tables in each TurboIMAGE/XL database attached to the DBEnvironment. If this parameter is omitted, no table information is displayed.

DBEnvironment is the name of the DBEnvironment whose attached TurboIMAGE/XL databases you want to see. If this parameter is omitted, the DBEnvironment must have been previously specified with the SET SQLDBE command or else an error message is issued.

DBE_MaintWord is the maintenance word for the DBEnvironment. This parameter can be omitted if you are the DBECreator.

Prerequisites

- SET SQLDBE issued or DBEnvironment (and maintenance word, if not DBECreator) specified as part of the command.

Description

Use the DISPLAY TURBODBS command to display information about all of the TurboIMAGE/XL databases attached to a DBEnvironment. Optionally, all tables in each TurboIMAGE/XL database are also listed.

Example

In the following example, the databases currently attached to the PARTSDBE.SERED.ATC DBEnvironment are listed.

```
>>DISPLAY TURBODBS FOR PARTSDBE.SERED.ATC

DBEnvironment     : PARTSDBE.SERED.ATC

BASE FILE               OWNER          BASE TYPE
---------               -----          ---------

SALES1.SERED.ATC        SALES1         TurboIMAGE
SALES2.SERED.ATC        SALES2         TurboIMAGE
DB1.SERED.ATC           SERED          TurboIMAGE
DB2.SERED.ATC           DB2            TurboIMAGE

Total Databases : 4
>>
```

DISPLAY USERS

Displays current user information for a specific TurboIMAGE/XL database.

Syntax

```
DI[SPLAY] USER[S] [FOR TurboDB]
[USER= User@Account[,...]]
```

Parameters

TurboDB is the name of the TurboIMAGE/XL database whose user information you want to display. If this parameter is omitted, the name of the database defined in the most recent SET TURBODB command is used.

User@Account is the name used to identify a particular user in the DBEnvironment. This name, referred to as the DBEUserID, is made up of the user's MPE XL user and account names, connected with the @ symbol. If this parameter is omitted, information about all currently defined users is displayed.

Prerequisites

- SET SQLDBE issued.
- SET TURBODB issued or TurboIMAGE/XL database specified as part of the command.
- DBC status.
- Database attached.

Description

Use the DISPLAY USERS command to display information about users of the TurboIMAGE/XL database named in the last SET TURBODB command. For the named TurboIMAGE/XL database, the DBOPEN mode and the TurboIMAGE/XL database passwords are displayed for all IMAGE/SQL users or for those users specified by the *User@Account* parameter.

To change the DBOPEN mode or the user class for a specified user, refer to the UPDATE USER command. To add or delete users, refer to the ADD USER and DELETE USER commands.

Example In the following example, information is displayed about user NANCY@ATC.

```
>>DISPLAY USER USER=NANCY@ATC

TurboIMAGE/XL DB : SALES.SERED.ATC
DBEnvironment    : PARTSDBE.SERED.ATC

USER LOGON          DBOPEN MODE  USER PASSWORD  USER CLASS
----------          -----------  -----------    ----------

NANCY@ATC           1            ;              64

>>
```

ECHO

Determines if commands and comments are echoed during the execution of a command file.

Syntax

```
        ( ON  )
EC[HO]  {     }
        ( OFF )
```

Parameters

`ON` turns echo on. This is the default.

`OFF` turns echo off.

Prerequisites

None.

Description

Use the ECHO command to turn the IMAGE/SQL utility echo on or off. In session mode, when echo is on, all commands issued from a command file and any accompanying comments are displayed at the terminal. Regardless of the setting of this command, however, normal command output and error messages are displayed at the terminal.

When the IMAGE/SQL utility is run, echo is initially on. To see the current echo status, use the DISPLAY OPTIONS command.

Example

In this example, the DISPLAY OPTIONS command first shows that echo is on. The ECHO OFF command is then issued. The DISPLAY OPTIONS command confirms that echo is now off.

```
>>DISPLAY OPTIONS
Current TurboDB       : SALES.SERED.ATC
Current SQLDBE        : PARTSDBE.SERED.ATC
Echo                  : ON
Command Logging       : ON
Log File              : ATCLOG.SERED.ATC

*** Database is attached.
>>ECHO OFF
>>DISPLAY OPTIONS
Current TurboDB       : SALES.SERED.ATC
Current SQLDBE        : PARTSDBE.SERED.ATC
Echo                  : OFF
Command Logging       : ON
Log File              : ATCLOG.SERED.ATC

*** Database is attached.
>>
```

EXIT

Stops execution of the IMAGE/SQL utility program.

Syntax

```
EX[IT]
```

Prerequisites

None.

Description

Use the EXIT command to leave the IMAGE/SQL utility program. This command provides the same functionality as the QUIT command.

Example

In the following example, the IMAGE/SQL utility stops execution and returns you to the MPE XL prompt.

```
>> EXIT

END OF PROGRAM
:
```

HELP

Provides information about IMAGE/SQL utility commands.

Syntax

$\left\{\begin{array}{l}\texttt{H[ELP]}\\ \texttt{?}\end{array}\right\}$ [*CommandName* [*KeyWord*]]

Parameters

CommandName is the name of the IMAGE/SQL utility command about which you want information. The abbreviated form of the command can be used. If this parameter is omitted, syntax information about all IMAGE/SQL utility commands is displayed.

KeyWord is a word that further defines some commands. For example, in the DISPLAY MAP command, MAP is a keyword. If this parameter is omitted, help is displayed for all keywords associated with a particular command name.

Prerequisites

None.

Description

Use the HELP command to display information about IMAGE/SQL utility commands.

Example 1

In the following example, because no IMAGE/SQL utility command name has been specified as a parameter of the HELP command, the syntax for all IMAGE/SQL utility commands is displayed.

```
>>HELP
The following commands are available:

AD[D] USER                  AT[TACH]                 DEL[ETE] USER
DET[ACH]                    DI[SPLAY] MAP            DI[SPLAY] OPTIONS
DI[SPLAY] SQLDBE[S]         DI[SPLAY] TURBODB[S]     DI[SPLAY] USER[S]
EC[HO]                      EX[IT]                   H[ELP]
L[OG]                       Q[UIT]                   RECOVER
REDO                        SE[T] SQLDBE             SE[T] TURBODB
SP[LIT]                     U[PDATE] TYPE            U[PDATE] USER
X[EQ]

For help on a particular command, type : 'HELP CommandName [KeyWord]'
>>
```

Example 2 In the following example, the HELP command is qualified with the IMAGE/SQL utility command DISPLAY and the keyword SQLDBES. The syntax and an example of this command/keyword are displayed.

```
>>HELP DISPLAY SQLDBES
DI[SPLAY] SQLDBE[S]
----------------
   Displays all the DBEnvironments associated with a specific TurboIMAGE/XL
   database.

SYNTAX
   DI[SPLAY] SQLDBE[S] [FOR TurboDBName  [,MAINT = TurboMaintWord]]

EXAMPLE
   DISPLAY SQLDBES FOR MYTURBODB
>>
```

LOG

Turns IMAGE/SQL command logging on or off.

Syntax

```
      { ON  }
L[OG] {     }
      { OFF }
```

Parameters

`ON` turns command logging on. This is the default.

`OFF` turns command logging off.

Prerequisites

None.

Description

Use the LOG command to turn IMAGE/SQL utility command logging on or off. When logging is on, all commands entered are logged to the ATCLOG file.

When the IMAGE/SQL utility is run, logging is initially on. The temporary file ATCLOG is created (if it does not already exist) and opened in the user's logon group and account. A file equation may be set for this file (:FILE ATCLOG=LOG1). If you want to save the temporary file, either save the file before ending your current MPE XL session or specify ;SAVE as a part of a file equation. If the log file already exists, log records are appended to it.

To see the current logging status, use the DISPLAY OPTIONS command.

When you issue an MPE XL command from within IMAGE/SQL, the command is written to the log file and the log file is closed. This means that you can save this file, edit this file, or set a file equation for this file from within IMAGE/SQL. Refer to Chapter 2, "Logging IMAGE/SQL Utility Commands: Task 12," for more information. The log file is reopened after the execution of the MPE XL command.

Example

In the following example, logging is initially on. The LOG OFF command is then issued. The DISPLAY OPTIONS command then confirms that logging is off.

```
>>DISPLAY OPTIONS
Current TurboDB       : SALES.SERED.ATC
Current SQLDBE        : PARTSDBE.SERED.ATC
Echo                  : ON
Command Logging       : ON
Current Log File      : ATCLOG.SERED.ATC
>>LOG OFF
>>DISPLAY OPTIONS
Current TurboDB       : SALES.SERED.ATC
Current SQLDBE        : PARTSDBE.SERED.ATC
Echo                  : ON
Command Logging       : OFF
>>
```

QUIT

Stops the execution of the IMAGE/SQL utility program.

Syntax

```
Q[UIT]
```

Prerequisites

None.

Description

Use the QUIT command to leave the IMAGE/SQL utility program. This command provides the same functionality as the EXIT command.

Example

In the following example, the IMAGE/SQL utility stops execution and returns you to the MPE XL prompt.

```
>>QUIT

END OF PROGRAM
:
```

RECOVER

Performs maintenance on the ATCINFO file.

Syntax

```
RECOVER
```

Prerequisites

None.

Description

Use the RECOVER command to perform maintenance on the ATCINFO file. Maintenance for the ATCINFO file may be necessary in either of the following situations:

- If a crash occurs while the ATCINFO file is being modified. This may be the case if a crash takes place when the IMAGE/SQL administrator is in the midst of an IMAGE/SQL utility command that updates the ATCINFO file. When this occurs, the RECOVER command can be used to reconstruct the ATCINFO file.
- If the ATCINFO file contains too much free space. This may be the case if multiple databases are attached and then some are detached from the DBEnvironment. When this occurs, the RECOVER command can be used to compact the data in the ATCINFO file and return the free space to the file system.

Example

In the following example, the ATCINFO file associated with the PartsDBE DBEnvironment is recovered.

```
>>SET SQLDBE PartsDBE
>>RECOVER
Checking physical file consistency and recovering free space.
Deleting unused mapped table entries.
Checking external cross references.
>>
```

REDO

Allows a user to correct or modify the last IMAGE/SQL utility command.

Syntax

```
REDO
```

Prerequisites

None.

Description

Use this command to display the last IMAGE/SQL utility command entered. Use the associated subcommands to correct or change the displayed command. The REDO command applies only to the last command entered and is available only in interactive mode. It is ignored with a warning in batch mode.

Subcommands

`D` deletes the character above the cursor. If D is repeated, each character above each D is deleted.

`I` inserts one or more characters immediately preceding the character above the cursor. The D and I subcommands can be used in conjunction to delete characters and then insert new characters.

`R` replaces the characters above the cursor with new characters. If one character is entered, the character above the cursor is replaced; if two characters are entered, two characters (the character above the cursor and the character to the right) are replaced; and so forth for additional characters. R is the default subcommand and is only required when the character to be replaced is a D, I, R, or U.

`U` undoes the effect of the previous D, I, or R subcommand. Entering a U, carriage return, then another U cancels all previous subcommands for this REDO command and restores the line being corrected to its original form.

Once the command is corrected, enter a carriage return to issue the command.

Example

In the following example, the DISPLAY MAP command is corrected using the R subcommand.

```
>>DISPLAY MPA       ⇐ incorrect command entered

DISPLAY MPA
        ^
Syntax Error  (ATCERR 32435).
>>REDO              ⇐ request to REDO command
DISPLAY MPA         ⇐ command displayed for corrections
         RAP        ⇐ error replaced by correction
DISPLAY MAP         ⇐ corrected command displayed
```

SET SQLDBE

Defines the SQL DBEnvironment to be used by other IMAGE/SQL utility commands.

Syntax

```
SE[T] SQLDBE DBEnvironment [,MAINT=DBE_MaintWord]
```

Parameters

DBEnvironment is the name of the DBEnvironment with which you want to work.

DBE_MaintWord is the maintenance word for the DBEnvironment. This parameter can be omitted if you are an SQL database administrator (DBA).

Prerequisites

DBECreator status or DBEnvironment maintenance word specified as part of the command.

Description

Use the SET SQLDBE command to indicate the name of the SQL DBEnvironment with which you want to work. This name remains in effect until you exit the program or issue a new SET SQLDBE command. Note that because the IMAGE/SQL utility supports standard MPE XL user, group, and account security rules, to issue this command for a DBEnvironment in a different group and account, be sure you have the correct capabilities.

To work with another DBEnvironment associated with the same TurboIMAGE/XL database, issue another SET SQLDBE command specifying the new DBEnvironment.

If the DBEnvironment does not exist, IMAGE/SQL displays this message:

```
DBE does not exist, do you want to create one? [Y/N] :
```

If you reply 'Y', a DBEnvironment and DBE files are automatically created for you. The files created are:

File Created	File Name
DBE CON file	*DBEnvironment-name*
DBE FILE	*DBEnvironment-name*FL
LOG FILE	*DBEnvironment-name*LG
ATCINFO file	*DBEnvironment-name*CR

For example, if you issue the command

```
SET SQLDBE MYDBE
```

and the DBEnvironment MYDBE does not exist, these files are created: MYDBE, MYDBEFL, MYDBELG, and MYDBECR.

The default size of DBE FILE and LOG FILE is 1000 pages.

Example

In the following example, the PARTSDBE DBEnvironment is specified and is in effect until you exit the IMAGE/SQL utility or issue another SET SQLDBE command.

```
>>SET SQLDBE PARTSDBE
>>
```

SET TURBODB

Defines the TurboIMAGE/XL database to be used by other IMAGE/SQL utility commands.

Syntax

SE[T] TURBODB *TurboDB* [,MAINT=*TurboMaintWord*]

Parameters

TurboDB is the name of the TurboIMAGE/XL database with which you want to work.

TurboMaintWord is the maintenance word for the TurboIMAGE/XL database. This parameter can be omitted if you are the TurboIMAGE/XL database creator (DBC).

Prerequisites

DBC status or TurboIMAGE/XL maintenance word specified as part of the command.

Description

Use the SET TURBODB command to indicate the name of the TurboIMAGE/XL database with which you want to work. This name remains in effect until you exit the program or issue a new SET TURBODB command. Note that because the IMAGE/SQL utility supports standard MPE XL user, group, and account security rules, to issue this command for a TurboIMAGE/XL database in a different group and account, be sure you have the correct capabilities.

To work with another TurboIMAGE/XL database associated with the same DBEnvironment, issue another SET TURBODB command specifying the new database.

Example

In this example, the SALES TurboIMAGE/XL database is specified.

```
>>SET TURBODB SALES
>>
```

SPLIT

Divides a mapped column into two or more smaller mapped columns.

Syntax

```
SP[LIT] MapTable.MapCol
INTO NewColSpec [,...]
```

Parameters

MapTable is the name of the mapped table containing the mapped column.

MapCol is the name of the mapped column to be split into smaller units.

NewColSpec is the specification of the new mapped column. Repeat this parameter for each new mapped column. The following syntax is used for the new mapped columns:

NewMapCol:SourceType[:*MappedType*]

NewMapCol is the new mapped column name. This name can be up to 20 bytes in length and can be made up of any combination of letters (A to Z), decimal digits (0 to 9), $, #, @, or _ (underscore). However, the first character cannot be a decimal digit or an underscore. (Note that lowercase letters are automatically converted to uppercase letters.)

SourceType is the TurboIMAGE/XL type the new mapped column would have if it were a data item in a TurboIMAGE/XL database.

MappedType is the new mapped column's SQL type. Refer to Table 2-6 for default and alternative data type mappings. If omitted, default type mapping is supplied.

Prerequisites

- SET SQLDBE issued.
- SET TURBODB issued.
- DBA authority.
- Database attached.

Description

Use the SPLIT command to divide mapped columns into smaller units. This is sometimes necessary because one data item can be used to contain information about several logically discrete units.

When a TurboIMAGE/XL database becomes part of a DBEnvironment, it is no longer necessary to keep logically separate information in one mapped column. The SPLIT command can be used to divide mapped columns of this kind into several smaller more logically discrete mapped columns.

Use the following guidelines when using the SPLIT command:

1. To use this command, you must first determine what each new mapped column's data type would be if it were a source field in a TurboIMAGE/XL database.
2. Each new mapped column must appear in the SPLIT command in the same order in which it is stored in the original source field.
3. Only certain data type conversions are allowed from TurboIMAGE/XL to SQL. Refer to Table 2-6 for recommended and alternative data type conversions.
4. The total length of the proposed new source fields must match the length of the original source field or an error message is issued.

It is desirable to split mapped columns before IMAGE/SQL users access the attached database because when a mapped column is split, all user-created views containing the mapped column are dropped.

Example

The mapped column INVENTORY.PART_INFO is of type CHAR(60) and contains the following units of information about parts in the order shown:

- A code identifying the part.
- The version number of the part.
- Brief listing of any special considerations regarding the part.

To split this mapped column into its logical units, issue the following command:

```
>>SPLIT INVENTORY.PART_INFO INTO PART_ID_CODE:X4,&
                                 PART_VERSION_NO:I1,&
                                 PART_NOTES:X54

Updated information in table INVENTORY.
>>
```

In the above example, INVENTORY.PART_INFO is split into three mapped columns. No alternative data type mapping exists for the specified data types. Therefore, it is not necessary to specify the :*MappedType* parameter because in this case the mapped types default to the following types:

- PART_ID_CODE of type CHAR(4)
- PART_VERSION_NO of type SMALLINT
- PART_NOTES of type CHAR(54)

Note that the combined length of these three mapped columns equals the total length of the original mapped column, INVENTORY.PART_INFO.

UPDATE TYPE

Updates data type mapping information.

Syntax

$$\texttt{U[PDATE] TYPE} \left\{ \begin{array}{l} \textit{SourceType}\ \texttt{IN} \left\{ \begin{array}{l} * \\ \textit{MappedTable} \end{array} \right\} \\ \texttt{IN}\ \textit{MappedTable.Col} \end{array} \right\}$$

[TO *NewMappedType*]

Parameters

SourceType is a TurboIMAGE/XL data item type whose data type mapping information you want to update. Use either this parameter or the *MappedTable.Col* parameter.

* (asterisk) indicates that you want to update data type mapping for a source data type in all mapped tables where it occurs. Use either this option or specify the individual table to be updated.

MappedTable is the name of a mapped table containing a data type whose mapping you want to update. Use either this parameter or the asterisk (*) option.

MappedTable.Col is the name of a column in a specific mapped table whose data type mapping you want to update. Use either this parameter or the *SourceType* parameter.

NewMappedType is the new data type you want to assign. If this parameter is omitted, default IMAGE/SQL utility data type mapping is used. (See Table 2-6 for allowed data type mappings.)

Prerequisites

- SET SQLDBE issued.
- SET TURBODB issued.
- DBA authority.
- Database attached.

Description

Use the UPDATE TYPE command to update the data type mapping information in one of the following situations:

- For all occurrences of a specified source data type in the database.
- For all occurrences of the source data type in a specified mapped table.
- For one occurence of the source data type in a particular column of a specified table.

To return the TurboIMAGE/XL data type or mapped column to default IMAGE/SQL utility data type mapping values, omit the TO *NewMappedType* parameter.

Update data type mapping before IMAGE/SQL users access the database because when a mapped column is updated, all user-created views containing these mapped columns are dropped.

UPDATE TYPE stores the new data type mapping information in the ATCINFO file. The DISPLAY MAP command reflects the updated type information. Data type updates are restricted to those data types that have alternative data type mapping.

Table 2-2 in Chapter 2 summarizes IMAGE/SQL data type mapping defaults and alternatives.

Example

In the following example, the UPDATE TYPE command is used to specify the alternative mapping ALLBASE/SQL CHAR(4). This is a byte-by-byte transfer (R2 is 4 bytes long). No data conversion is performed.

```
>>UPDATE TYPE R2 IN CUSTOMER TO CHAR(4)
Updated information in table CUSTOMER.
>>
```

After the data type update, the DISPLAY MAP command reflects the change:

```
>>DISPLAY MAP CUSTOMER

TurboIMAGE/XL DB : SALES.SERED.ATC
DBEnvironment    : PARTSDBE.SERED.ATC
Owner Name       : SALES

MAPPED(SOURCE)   SOURCE             MAPPED              SOURCE     MAPPED
   TABLE         FIELD              COLUMN               TYPE       TYPE        NOTES
------------ ---------------- -------------------- ------- ------------- -----


CUSTOMER (CUSTOMER)
             CUSTOMER#        CUSTOMER#            J2      INTEGER
             LAST-NAME        LAST_NAME            X16     CHAR(16)
             FIRST-NAME       FIRST_NAME           X10     CHAR(10)
             INITIAL          INITIAL              U2      CHAR(2)
             STREET           STREET               X26     CHAR(26)
             CITY             CITY                 X12     CHAR(12)
             STATE            STATE                X2      CHAR(2)
             ZIP              ZIP                  X6      CHAR(6)
             CREDIT-RATING    CREDIT_RATING        R2      CHAR(4)        IU

NOTES:
  I: Imprecise(float)/Incompatible(others) mapping between source and
     mapped data types
  U: Source field has been updated
>>
```

In the above example, the NOTES column indicates that the data type mapping for CREDIT_RATING, the only mapped column whose source data type is R2, has been updated. The I indicates that the updated data type mapping is incompatible with the original data type.

UPDATE USER

Updates an IMAGE/SQL user's class number and/or DBOPEN mode in a DBEnvironment.

Syntax

$$\texttt{U[PDATE] USER } \textit{User@Acct} \texttt{ TO } \left\{ \begin{array}{l} \texttt{PASS=}\textit{Password} \\ \texttt{MODE=}\textit{ModeNumber} \end{array} \right\} \; |,\ldots|$$

Parameters

User@Acct is the name used to identify the user in the DBEnvironment. This name, referred to as the DBEUserID, is made up of the MPE/XL user and account name, connected with the @ symbol.

Password is a password in the TurboIMAGE/XL schema. The new IMAGE/SQL user has the same access to the TurboIMAGE/XL data as the user class associated with this password. You must specify this parameter and/or the *ModeNumber* parameter.

ModeNumber is the DBOPEN mode with which the database is opened for this user. You must specify this parameter and/or the *ClassNumber* parameter. Valid DBOPEN modes are 1 through 8. If this parameter is omitted, the mode defaults to 5.

Prerequisites

- SET SQLDBE issued.
- SET TURBODB issued.
- DBC required.
- DBA authority.
- Database attached.

Description

Use the UPDATE USER command to update user information stored in the ATCINFO file. Information about the user password and the user's DBOPEN mode can be updated.

When a user password is updated, the associated DBEUserID (*User@Account*) is automatically deleted from the old group and added to a new group whose name is derived from the new user class given in the command. (For example, the password corresponding to user class 12 produces a group named *OwnerName_12*.) If this group does not exist, it is created.

To enforce TurboIMAGE/XL security, views are created for this group. These views limit this group's access to those data sets and data items defined for the corresponding user class/password in the TurboIMAGE/XL database schema.

Example

In the following example, user RYAN@ATC is updated to DBOPEN mode 1 with password “dockhand”.

```
UPDATE USER RYAN@ATC TO MODE=1, PASSWORD=dockhand
Warning: command containing a password has been logged (ATCWARN 32069).
ALLBASE/SQL group SALES_13 created.
View SALES.DATE_MASTER_V13 created.
View SALES.DATE_PRODUCT_V13 created.
View SALES.DATE_VENDOR_V13 created.
View SALES.DATE_INVENTORY_V13 created.
>>
```

XEQ

Executes IMAGE/SQL utility commands from a command file instead of the standard input device.

Syntax

```
X[EQ] FileName
```

Parameters

FileName is the name of an ASCII file containing commands and parameters.

Prerequisites

None, but for successful execution of the command file, you must meet prerequisites of all commands in the command file.

Description

Use the XEQ command to execute IMAGE/SQL utility commands from a file instead of the standard input device. For example, if an ATCLOG file has been saved as a permanent file, it can be used to reissue the commands stored in the log file.

When an XEQ command is entered, the IMAGE/SQL utility reads the specified file and executes the commands until it reaches the end-of-file. When the end-of-file is reached, control returns to the original command input device (in session mode, the terminal, or in batch mode, the batch input device). Note that unless the command file contains an EXIT or QUIT command, you remain in the IMAGE/SQL utility when the XEQ command terminates.

During the execution of command files, what you see at the terminal depends on the setting of the ECHO command. When ECHO is on, the IMAGE/SQL utility displays lines at the terminal as they are read from the command files. Both comments and commands in the file are displayed. Regardless of the setting of the ECHO command, normal command output and error messages are displayed at the terminal.

In batch mode, if an error occurs during the execution of an XEQ file, the IMAGE/SQL utility closes the XEQ file and terminates the job.

Example In the following example, the contents of the file DOATTACH are listed using the MPE XL PRINT command. The XEQ command then executes the commands stored in the DOATTACH file. Because commands are not displayed as they are executed, it can be assumed that the ECHO command option is off.

```
>>:PRINT DOATTACH
SET TURBODB ORDER4          ⇐ contents of XEQ file
SET SQLDBE PARTSDBE         ⇐    ”         ”
ATTACH                      ⇐    ”         ”
QUIT                        ⇐    ”         ”
>>
>>XEQ DOATTACH     ⇐ XEQ command issued
Split 1 compound source field(s) (ATCWARN 32063).
Mapped 15 source table/source field name(s) (ATCWARN 32062).
Mapped 1 incompatible source type(s) (ATCWARN 32061).

END OF PROGRAM
:
```

5

IMAGE/SQL Locking

This chapter describes how IMAGE/SQL assigns locks on IMAGE/SQL tables and how IMAGE/SQL handles deadlocks.

Note

For detailed information on TurboIMAGE/XL and ALLBASE/SQL locking concepts, refer to the *TurboIMAGE/XL Database Management System Reference Manual* and the *ALLBASE/SQL Reference Manual.*

Lock Assignment

Locks are assigned to IMAGE/SQL tables in two ways. First, you can explicitly set a lock with the LOCK TABLE statement. Second, you can implicitly assign locks on PUBLIC tables depending on the operation and DBOPEN mode, as shown in Table 5-1.

Table 5-1. Assigned Locks

IMAGE/SQL or ALLBASE/SQL Operation	TurboIMAGE/XL DBOPEN Mode	ALLBASE/SQL Isolation Level	Lock Assigned
Any operation that modifies the TurboIMAGE/XL table	1 through 4	Any isolation level	Exclusive data set lock
Read (SELECT)	1 through 4	RR, CS, or RC	Exclusive data set lock
		RU	None
	5 through 8	Any isolation level	None

Locks are released when a COMMIT WORK or ROLLBACK WORK statement is issued. Therefore, to release any locks, issue a COMMIT WORK statement as frequently as possible.

See the next page for further information on Table 5-1.

The operations that can modify TurboIMAGE/XL tables are an INSERT, UPDATE, or DELETE.

The DBOPEN mode is assigned at ATTACH time. To see what mode is assigned, use the IMAGESQL DISPLAY USERS command. If you have DBA authority, you can change the mode with the UPDATE USER command.

The isolation levels are established with a BEGIN WORK statement.

Locks always hold an exclusive dataset level lock until the end of a transaction.

IMAGE/SQL Deadlocks

A deadlock occurs when two or more transactions are in a simultaneous wait state and each needs data that is held and locked by the other.

When a deadlock is encountered, the TurboIMAGE/XL intrinsic DBLOCK returns an error to IMAGE/SQL. IMAGE/SQL then aborts the IMAGE/SQL transaction that caused the deadlock. Transaction priorities are not considered in determining which transaction is aborted—the IMAGE/SQL transaction that caused the deadlock is aborted.

6

IMAGE/SQL Transactions

This chapter describes IMAGE/SQL transactions, repeatable reads, and IMAGE/SQL aborted transactions.

Note For detailed information on ALLBASE/SQL transactions, refer to the *ALLBASE/SQL Reference Manual.*

Definition

A transaction is a unit of work consisting of one or more SQL statements referencing one or more databases in a DBEnvironment. Work done within a transaction can be committed (made permanent) or undone (rolled back). A transaction is started with an implicit or explicit BEGIN WORK statement and is either committed with COMMIT WORK or rolled back with ROLLBACK WORK.

An IMAGE/SQL transaction is started by the first SQL statement that results in a modification or repeatable read of an IMAGE/SQL table.

Repeatable Read

A repeatable read guarantees that data pages (for ALLBASE/SQL) or an IMAGE/SQL dataset (for IMAGE/SQL) selected or updated by the current transaction are not changed by other transactions until the current transaction ends with a COMMIT WORK or ROLLBACK WORK statement.

For ALLBASE/SQL, a repeatable read is specified with the RR isolation level in the BEGIN WORK statement.

For IMAGE/SQL, a repeatable read occurs if both of the following conditions are met:

- The IMAGE/SQL database is opened in DBOPEN mode 1, 2, 3, or 4. The DBOPEN mode used by IMAGE/SQL is determined by the MODE attribute of the IMAGE/SQL user, which can be seen with the IMAGESQL DISPLAY USERS command, and modified with UPDATE USER.
- The transaction was started with a BEGIN WORK statement using the isolation level RR.

Restrictions

You can only modify one type of data in a transaction. That is, you can do the following within the same transaction:

- Read a TurboIMAGE/XL and/or ALLBASE/SQL database *and* modify a TurboIMAGE/XL database.
- Read a TurboIMAGE/XL and/or ALLBASE/SQL database *and* modify an ALLBASE/SQL database.

However, you cannot update an ALLBASE/SQL database and update a TurboIMAGE/XL database within the same transaction. Such an attempt will produce an error.

Within a transaction, avoid a terminal read with locks in effect (DBOPEN mode 1 through 4 and isolation level of RR, CS, or RC) because the database could be locked for a lengthy period of time. See Table 5-1 for details on locking assignment.

The limitation of transaction size depends on the Transaction Management (XM) limit and the DBE LOG SIZE limit. The XM limit for every transaction cannot exceed 2MBytes, which is approximately 100 “normal” DBPUT, DBDELETE, and DBUPDATE intrinsics combinations.

Note

Any TurboIMAGE/XL activity is not logged to DBELOG.

IMAGE/SQL Aborted Transaction

If a modification error occurs within an IMAGE/SQL transaction, the transaction is aborted. While a transaction is in an aborted state, any locks acquired during the transaction are still held, and any work performed during the transaction remains in effect until a ROLLBACK WORK statement is executed. In an aborted transaction, all statements except ROLLBACK WORK are disallowed. SQL statements that result in TurboIMAGE/XL intrinsic calls will fail with TurboIMAGE/XL error -222.

A

IMAGE/SQL Error Messages

13501 MESSAGE `Invalid TurboIMAGE database access. TurboIMAGE intrinsic` *intrinsic number*`. (DBERR 13501)`

CAUSE The TurboIMAGE/XL intrinsic named in the message has returned an error code (-21) indicating a bad password or maintenance word.

ACTION

1. Make sure the user logon is a valid IMAGE/SQL user for this TurboIMAGE/XL database and the password for the user logon is correct. (Use the DISPLAY USERS command and DBUTIL's SHOW *dbname* PASSWORDS command.)
2. Verify the user's access to the data set(s) in the query by checking the read/write list for each data set in the TurboIMAGE/XL schema file.
3. If the password and read/write list security are correct, make sure the user is referencing the correct view. See Chapter 2, Task 3, for information regarding the views that the IMAGE/SQL utility creates and their correct usage.

13502	MESSAGE	Command not allowed on TurboIMAGE table. (DBERR 13502)
	CAUSE	This command is not supported by IMAGE/SQL.
	ACTION	Do not issue this command against a mapped table.
13503	MESSAGE	TurboIMAGE database subsystem access has been disabled. (DBERR 13503)
	CAUSE	Subsystem access of the TurboIMAGE/XL database has been disabled.
	ACTION	Contact your DBA to enable the subsystem access to the TurboIMAGE/XL database. Refer to the discussion of the DBUTIL SET command in the *TurboIMAGE/XL Database Management System Reference Manual*
13504	MESSAGE	TurboIMAGE database has been disabled for access. (DBERR 13504)
	CAUSE	Access to the TurboIMAGE/XL database has been disabled.
	ACTION	Contact your DBA to enable access to the TurboIMAGE/XL database. Refer to the discussion of the DBUTIL ENABLE command in the *TurboIMAGE/XL Database Management System Reference Manual*.

13505 MESSAGE IMAGE/SQL data conversion error *error number*, *error number*, *error number*, *error number*. (DBERR 13505)

CAUSE An internal data conversion error has occurred.

ACTION Copy down the error numbers and call the HP Response Center.

13506 MESSAGE IMAGE/SQL conversion overflow: set *data set number*, item *data item number*, column *column number*, record *turboIMAGE record number*. (DBERR 13506)

CAUSE Data conversion from TurboIMAGE/XL format to ALLBASE/SQL format resulted in an overflow.

ACTION Identify the TurboIMAGE/XL record and the data item that caused the conversion overflow and use the IMAGE/SQL utility DISPLAY MAP command to find out the current mapping. Then, either use the IMAGE/SQL utility's UPDATE TYPE command to change the mapping or correct the TurboIMAGE/XL data for that record.

The *data set number* is determined by the set's position in the SETS part of the TurboIMAGE/XL schema. The *data item number* is determined by the item's position in the ITEMS part of the TurboIMAGE/XL schema. The *column number* is determined by the column's position in the mapped table. The *record number* is the record number for the TurboIMAGE/XL data entry causing the conversion overflow.

13507 MESSAGE Invalid IMAGE/SQL data format: set *data set number*, item *data item number*, column *column number*, record *turbo record number*. (DBERR 13507)

CAUSE Data conversion from TurboIMAGE/XL format to ALLBASE/SQL format for ZONED data type found an illegal overpunch in the data.

ACTION Identify the TurboIMAGE/XL record and the data items that contains the illegal overpunch, and use IMAGE/SQL utility's DISPLAY MAP command to find out the current mapping. Then, either use IMAGE/SQL utility's UPDATE TYPE command to change the mapping or correct the TurboIMAGE/XL data for that record.

The *data set number* is determined by the set's position in the SET part of the TurboIMAGE/XL schema. The *data item number* is determined by the item's position in the ITEMS part of the TurboIMAGE/XL schema. The *column number* is determined by the column's position in the mapped table. The *record number* is the record number for the TurboIMAGE/XL data entry containing the illegal overpunch.

13508 MESSAGE IMAGE/SQL conversion truncated; set *data set number*, item *data item number*, column *column number*, record *turboIMAGE record number*. (DBERR 13508)

CAUSE An internal error has occurred.

ACTION Copy the numbers down and call the HP Response Center.

13509	MESSAGE	TurboIMAGE language id does not match the DBE language id. (DBERR 13509)
	CAUSE	The TurboIMAGE language id and the DBE language id are not the same.
	ACTION	Set the TurboIMAGE language id and the DBE language id to the same value.
13510	MESSAGE	ATCINFO file needs recovery. (DBERR 13510)
	CAUSE	The ATCINFO file may be inconsistent.
	ACTION	Use the IMAGE/SQL utility RECOVER command to recover the ATCINFO file. See Chapter 2, Task 15, for a discussion of the RECOVER process.
13511	MESSAGE	Update Statistics failed. IMAGE/SQL error *error number*; DBINFO error *error number*. (DBERR 13511)
	CAUSE	A call to the TurboIMAGE/XL procedure DBINFO on the data set failed. The most likely reason is that the user does not have any access to the data set.
	ACTION	Check the *TurboIMAGE/XL Database Management System Reference Manual* for the DBINFO error number and make sure the user has read access to the TurboIMAGE/XL data set. Refer to the discussion of DBINFO modes in Chapter 5 of the *TurboIMAGE/XL Reference Manual*.

13551 MESSAGE Unexpected IMAGE/SQL runtime error *error number*, *error number*, *error number*, *error number*. (DBERR 13551)

CAUSE An IMAGE/SQL utility internal error has occurred.

ACTION Copy down the error number and call the HP Response Center.

13552 MESSAGE IMAGE/SQL error *error number*; TurboIMAGE error *error number*; TurboIMAGE intrinsic *intrinsic number*, Auxiliary error *error number*. (DBERR 13552)

CAUSE The TurboIMAGE/XL intrinsic indicated by the intrinsic number failed.

ACTION Check the *TurboIMAGE/XL Database Management System Reference Manual* and correct the problem. For example:

```
ATC error 129; TurboIMAGE error
-1; TurboIMAGE intrinsic 401,
Auxiliary error 93. (DBERR 13552)
```

is the result of a DBOPEN failure (intrinsic number 401) because the HPFOPEN or FOPEN intrinsic failed with error 93, which means "security violation." The action in this case would be to check and correct the MPE XL group or account level security setup.

The IMAGE/SQL error number is for Hewlett-Packard internal use only.

Error codes returned by each TurboIMAGE/XL intrinsic are documented in Chapter 5 of the *TurboIMAGE/XL Database Management System Reference Manual* as part of the description of that intrinsic. The intrinsics and their asociated numbers are listed below:

401	DBOPEN
402	DBINFO
403	DBCLOSE
404	DBFIND
405	DBGET
406	DBUPDATE
407	DBPUT
408	DBDELETE
409	DBLOCK
410	DBUNLOCK
411	DBCONTROL
412	DBBEGIN
413	DBEND
414	DBMEMO
415	DBMAINT
418	DBEXPLAIN
419	DBERROR
420	DBXBEGIN
421	DBXEND
422	DBXUNDO

The auxiliary error number is the lower level subsystem error number, such as the MPE XL file system error number.

13553	MESSAGE	`IMAGE/SQL internal error` *error number*, *error number*, *error number*, *error number*. `(DBERR 13553)`
	CAUSE	An IMAGE/SQL internal error has occurred.
	ACTION	Copy down the error numbers and call the HP Response Center.

13554	MESSAGE	`IMAGE/SQL internal error` *error number*, *error number*, *error number*, *error number*. `(DBERR 13554)`
	CAUSE	An IMAGE/SQL internal error has occurred.
	ACTION	Copy down the error numbers and call the HP Response Center.

13555 MESSAGE `IMAGE/SQL internal error` *error number*, *error number*, *error number*, *error number*. `(DBERR 13555)`

CAUSE An IMAGE/SQL internal error has occurred.

ACTION Copy down the error numbers and call the HP Response Center.

IMAGE/SQL Warning Messages

32051	MESSAGE	`Database already attached (ATCWARN 32051).`
	CAUSE	The database was already attached prior to executing the latest ATTACH.
	ACTION	No action is necessary. This is an advisory message only.

32052	MESSAGE	`Database not attached (ATCWARN 32052).`
	CAUSE	You attempted to execute a command that requires the database to be attached.
	ACTION	Attach the database and re-execute the command that gave this warning.

32059	MESSAGE	`Exceeded 3996 bytes. Columns omitted in` *table name* `(ATCWARN 32059).`
	CAUSE	The maximum limit of column width in an ALLBASE/SQL table is 3996 bytes. This limit was exceeded while creating mapped tables, so one or more columns had to be omitted in the definition of mapped table *table name*.
	ACTION	Restructure the database so that the total length of fields in a data set does not exceed 3996 bytes.

32060 MESSAGE `Exceeded 255 columns. Columns omitted in` *mapped table name* `(ATCWARN 32060).`

CAUSE The maximum number of columns in an ALLBASE/SQL table is 255. This limit was exceeded while creating mapped tables, so one or more columns had to be omitted in the definition of the specified mapped table.

ACTION Restructure the database so that the total number of fields in the data set does not exceed 255, or group one or more fields into a compound field. Refer to "Data Entries" in Chapter 2 of the *TurboIMAGE/XL Database Management System Reference Manual.*

32061 MESSAGE `Mapped` *number* `incompatible/imprecise source type(s) (ATCWARN 32061).`

CAUSE An exact mapping was not found for the specified number of source fields.

ACTION No remedial action required. Use DISPLAY MAP to review all the mappings.

32062 MESSAGE `Mapped` *number* `source table/source field name(s) (ATCWARN 32062).`

CAUSE The specified number of source data set names had to be mapped because characters not allowed by ALLBASE/SQL were encountered.

ACTION No remedial action required. Use DISPLAY MAP to review all the mappings.

32063	MESSAGE	Split *number* compound source field(s) (ATCWARN 32063).
	CAUSE	The specified number of compound source fields have been split into constituent components.
	ACTION	No remedial action is required. Use the DISPLAY MAP command to review all the mappings.
32066	MESSAGE	Duplicate user name (ATCWARN 32066).
	CAUSE	The user name you specified already exists in the ATCINFO file.
	ACTION	No action is necessary. This is an advisory message only.
32067	MESSAGE	No database attached to the DBEnvironment (ATCWARN 32067).
	CAUSE	No TurboIMAGE/XL database is attached to the DBEnvironment.
	ACTION	Attach a TurboIMAGE/XL database.
32068	MESSAGE	Warning: command containing a maintenance word has been logged (ATCWARN 32068).
	CAUSE	A command containing a TurboIMAGE/XL or ALLBASE/SQL DBEnvironment maintenance word was logged in ATCLOG.
	ACTION	Secure the ATCLOG file if security is a concern.

32069	MESSAGE	Warning: command containing a password has been logged (ATCWARN 32069).
	CAUSE	A command containing a TurboIMAGE/XL database password was logged in ATCLOG.
	ACTION	Secure the ATCLOG file if security is a concern.

File System Error Messages

32203	MESSAGE	Privileged File Error (ATCERR 32203, FSERR *error number*).
	CAUSE	The specified file did not have the expected file code.
	ACTION	Specify the correct file. For example, in the SET TURBODB command, only a TurboIMAGE/XL database name is valid.
32204	MESSAGE	*filename* - Non Existent File (ATCERR 32204, FSERR *error number*).
	CAUSE	The specified file does not exist.
	ACTION	Specify the correct file name. For further reference, look up the file system error number in the *MPE XL Intrinsics Reference Manual*.
32205	MESSAGE	*filename* - Duplicate Permanent File (ATCERR 32205, FSERR *error number*).
	CAUSE	The specified file already exists in the permanent file domain.
	ACTION	Specify a unique file name.

32206

MESSAGE *filename* - Duplicate Temporary File (ATCERR 32206, FSERR *error number*).

CAUSE The specified file already exists in the temporary file domain.

ACTION Specify a unique file name.

32207

MESSAGE File System Error on *filename* (ATCERR 32207, FSERR *error number*).

CAUSE A file system error related to the specified file has occurred.

ACTION Look up the file system error number in the *MPE XL Intrinsics Reference Manual*.

32208

MESSAGE *filename* - Security Violation (ATCERR 32208, FSERR *error number*).

CAUSE A MPE XL security violation occurred while doing an operation on the specified file.

ACTION Check your group/account capabilities and security access to the specified file.

32209

MESSAGE *filename* - FWRITE Error. Condition code is CCL (ATCERR 32209).

CAUSE An error occurred when writing to the specified file.

ACTION If the specified file is an ATCLOG file, file equate ATCLOG to a different file. Persistent occurrence of this error should be reported to the HP Response Center.

32210 MESSAGE *filename* - End-of-File encountered (ATCERR 32210).

CAUSE The physical end-of-file has been found in the specified file. If the ATCLOG file has been edited, this error can occur when the IMAGE/SQL utility attempts to write log records because some editors automatically insert end-of-file markers.

ACTION If this happens with the ATCLOG file, file equate ATCLOG to a new file and turn the logging on. If this happens with another file, contact the HP Response Center.

32211 MESSAGE *filename* - FREAD Error. Condition code is CCL (ATCERR 32211).

CAUSE An error occurred when reading from the specified file.

ACTION Contact the HP Response Center.

32212 MESSAGE *filename* - FLOCK Error. Condition code is CCL (ATCERR 32212).

CAUSE Failed to FLOCK the specified file.

ACTION Contact the HP Response Center.

32213 MESSAGE *filename* - FUNLOCK Error. Condition code is CCL (ATCERR 32213).

CAUSE Failed to FUNLOCK the specified file.

ACTION Contact the HP Response Center.

32214	MESSAGE	*filename* - File being used by IMAGE/SQL Utility (ATCERR 32214).
	CAUSE	The specified file is being used by the utility.
	ACTION	This occurs if you try to XEQ a file that is already opened by the IMAGE/SQL utility for logging. File equate ATCLOG to a different file.
32215	MESSAGE	Cannot close *filename* (ATCERR 32215, FSERR *error number*).
	CAUSE	The specified file could not be closed.
	ACTION	Contact the HP Response Center.
32216	MESSAGE	Error in CATREAD. Returned status is *number* (ATCERR 32216).
	CAUSE	Error in reading a message from the IMAGE/SQL message catalog (ATCUT000.PUB.SYS).
	ACTION	Contact the HP Response Center.
32217	MESSAGE	*filename* - File name identifier > 8 chars (ATCERR 32217).
	CAUSE	The file specified is more than eight characters long.
	ACTION	Specify a file name less than or equal to eight characters.

32218	MESSAGE	*user name* - User name identifier > 8 chars (ATCERR 32218).
	CAUSE	The user name specified is more than eight characters long.
	ACTION	Specify a user name less than or equal to eight characters.
32219	MESSAGE	*filename* - Group name identifier > 8 chars (ATCERR 32219).
	CAUSE	The group name in the specified file name is more than eight characters long.
	ACTION	Specify a group name less than or equal to eight characters.
32220	MESSAGE	*filename* - Account name identifier > 8 chars (ATCERR 32220).
	CAUSE	The account name in the specified file name is more than eight characters long.
	ACTION	Specify an account name less than or equal to eight characters.
32221	MESSAGE	*filename* - Cannot set the creator (ATCERR 32221).
	CAUSE	Failed to set the creator for the specified file.
	ACTION	Contact the HP Response Center.

DBCORE Errors

32301	MESSAGE	Unexpected DBCORE error (ATCERR 32301, DBCORE *error number*, *error number*, *error number*, *error number*).
	CAUSE	A DBCORE subsystem error has occurred.
	ACTION	Copy down the error numbers and contact the HP Response Center.

32306	MESSAGE	Cannot read DBECon file (ATCERR 32306, DBCORE *error number*).
	CAUSE	An error occurred when reading the DBECon file of DBEnvironment.
	ACTION	Contact the HP Response Center.

32307	MESSAGE	Invalid DBECon file (ATCERR 32307, DBCORE *error number*).
	CAUSE	The file specified is not a DBECon file.
	ACTION	Check the spelling specified in the SET SQLDBE or DISPLAY TURBODBS command.

Preprocessor Errors

32351	MESSAGE	ALLBASE/SQL CONNECT command failed (ATCERR 32351).
	CAUSE	A preprocessed CONNECT failed.
	ACTION	This message is followed by an ALLBASE/SQL error message. Refer to the *ALLBASE/SQL Message Manual* for more information.

32352 MESSAGE `ALLBASE/SQL RELEASE command failed (ATCERR 32352).`

CAUSE A preprocessed RELEASE failed.

ACTION This message is followed by an ALLBASE/SQL error message. Refer to the *ALLBASE/SQL Message Manual* for more information.

32353 MESSAGE `ALLBASE/SQL CREATE TABLE command failed (ATCERR 32353).`

CAUSE A preprocessed CREATE TABLE failed.

ACTION This message is followed by an ALLBASE/SQL error message. Refer to the *ALLBASE/SQL Message Manual* for more information.

32354 MESSAGE `ALLBASE/SQL BEGIN WORK command failed (ATCERR 32354).`

CAUSE A preprocessed BEGIN WORK failed.

ACTION This message is followed by an ALLBASE/SQL error message. Refer to the *ALLBASE/SQL Message Manual* for more information.

32355 MESSAGE `ALLBASE/SQL DROP TABLE command failed (ATCERR 32355).`

CAUSE A preprocessed DROP TABLE failed.

ACTION This message is followed by an ALLBASE/SQL error message. Refer to the *ALLBASE/SQL Message Manual* for more information.

32356	MESSAGE	ALLBASE/SQL COMMIT WORK command failed (ATCERR 32356).
	CAUSE	A preprocessed COMMIT WORK failed.
	ACTION	This message is followed by an ALLBASE/SQL error message. Refer to the *ALLBASE/SQL Message Manual* for more information.
32357	MESSAGE	ALLBASE/SQL CREATE VIEW command failed (ATCERR 32357).
	CAUSE	A preprocessed CREATE VIEW failed.
	ACTION	This message is followed by an ALLBASE/SQL error message. Refer to the *ALLBASE/SQL Message Manual* for more information.
32358	MESSAGE	ALLBASE/SQL ROLLBACK WORK command failed (ATCERR 32358).
	CAUSE	A preprocessed ROLLBACK WORK failed.
	ACTION	This message is followed by an ALLBASE/SQL error message. Refer to the *ALLBASE/SQL Message Manual* for more information.
32359	MESSAGE	ALLBASE/SQL ADD user TO GROUP command failed (ATCERR 32359).
	CAUSE	A preprocessed ADD user failed.
	ACTION	This message is followed by an ALLBASE/SQL error message. Refer to the *ALLBASE/SQL Message Manual* for more information.

32360 MESSAGE `ALLBASE/SQL REMOVE user FROM GROUP command failed (ATCERR 32360).`

CAUSE A preprocessed REMOVE user failed.

ACTION This message is followed by an ALLBASE/SQL error message. Refer to the *ALLBASE/SQL Message Manual* for more information.

32361 MESSAGE `ALLBASE/SQL CREATE GROUP command failed (ATCERR 32361).`

CAUSE A preprocessed CREATE GROUP failed.

ACTION This message is followed by an ALLBASE/SQL error message. Refer to the *ALLBASE/SQL Message Manual* for more information.

32362 MESSAGE `ALLBASE/SQL GRANT SELECT ON table command failed (ATCERR 32362).`

CAUSE A preprocessed GRANT SELECT failed.

ACTION This message is followed by an ALLBASE/SQL error message. Refer to the *ALLBASE/SQL Message Manual* for more information.

32363 MESSAGE `ALLBASE/SQL GRANT CONNECT TO user command failed (ATCERR 32363).`

CAUSE A preprocessed GRANT CONNECT failed.

ACTION This message is followed by an ALLBASE/SQL error message. Refer to the *ALLBASE/SQL Message Manual* for more information.

32364	MESSAGE	ALLBASE/SQL REVOKE SELECT FROM table command failed (ATCERR 32364).
	CAUSE	A preprocessed REVOKE SELECT failed.
	ACTION	This message is followed by an ALLBASE/SQL error message. Refer to the *ALLBASE/SQL Message Manual* for more information.

General Errors

32401	MESSAGE	Unknown Error. Escapecode - *number* (ATCERR 32401).
	CAUSE	An internal error has occurred.
	ACTION	Contact the HP Response Center.
32402	MESSAGE	Bad Maintenance Word (ATCERR 32402).
	CAUSE	An incorrect maintenance word was supplied.
	ACTION	Supply the correct maintenance word.
32403	MESSAGE	Maintenance word not specified (ATCERR 32403).
	CAUSE	A maintenance word is required, but was not specified.
	ACTION	Specify the maintenance word.

32404

MESSAGE `Non creator access. Command disallowed (ATCERR 32404).`

CAUSE The command cannot be executed by anyone other than the TurboIMAGE/XL database creator.

ACTION Have the TurboIMAGE/XL database creator execute the command.

32405

MESSAGE `Column/Table/TurboIMAGE type not found (ATCERR 32405).`

CAUSE The column name, table name, or TurboIMAGE/XL type supplied in SPLIT/UPDATE TYPE does not exist.

ACTION Specify the correct information.

32407

MESSAGE `Invalid password (ATCERR 32407).`

CAUSE The password specified in the ADD/UPDATE USER command could not be associated with any class defined in the database.

ACTION Specify the correct password.

32408

MESSAGE `Invalid DBOPEN mode (ATCERR 32408).`

CAUSE The DPOPEN mode specified in ADD/UPDATE USER command is not valid.

ACTION Specify a DBOPEN mode greater than or equal to five and less than or equal to eight.

32409	MESSAGE	Invalid user name (ATCERR 32409).
	CAUSE	The user name is not in the correct format.
	ACTION	Specify the correct user name format *username@accountname*.
32410	MESSAGE	Cannot create ATCINFO file (ATCERR 32410, FSERR *error number*).
	CAUSE	Failed to create the ATCINFO file. This happens at the first attach to a SQLDBE when the ATCINFO file needs to be created.
	ACTION	You should not have a pre-existing file with actual file designator the same as that of ATCINFO. For further reference, look up File System *error number* in *MPE XL Intrinsics Reference Manual.*
32411	MESSAGE	Cannot open ATCINFO file (ATCERR 32411, FSERR *error number*).
	CAUSE	Failed to open the ATCINFO file due to the specified file system error.
	ACTION	Look up the file system error number in the *MPE XL Intrinsics Reference Manual.*
32412	MESSAGE	Cannot purge ATCINFO file (ATCERR 32412, FSERR *error number*).
	CAUSE	Failed to purge the ATCINFO file due to the specified file system error.
	ACTION	Look up the file system error number in the *MPE XL Intrinsics Reference Manual.*

32413	MESSAGE	Cannot close ATCINFO file (ATCERR 32413, FSERR *error number*).
	CAUSE	Failed to close the ATCINFO file due to the specified file system error.
	ACTION	Look up the file system error number in the *MPE XL Intrinsics Reference Manual*.
32417	MESSAGE	Out of directory space in ATCINFO file (ATCERR 32417).
	CAUSE	Too many databases are attached to one SQL DBEnvironment.
	ACTION	Detach one or more databases, or consider attaching the database to a different SQL DBEnvironment that has fewer databases attached to it.
32418	MESSAGE	Out of free space in ATCINFO file (ATCERR 32418).
	CAUSE	Too many databases are attached to one SQL DBEnvironment.
	ACTION	Detach one or more databases.
32419	MESSAGE	Region is busy (ATCERR 32419).
	CAUSE	The current TurboIMAGE/XL database is in use by some other process.
	ACTION	Wait a while and retry the command.
32421	MESSAGE	ATCINFO procedure error (ATCERR 32421, ATCSTAT *error number*, FSERR *error number*).
	CAUSE	An internal error has occurred.
	ACTION	Call the HP Response Center.

32422	MESSAGE	Error in getting ATCU pointer (ATCERR 32422, ATCSTAT *error number*).
	CAUSE	An internal error has occurred.
	ACTION	Call the HP Response Center.
32423	MESSAGE	Region disabled. Detach before proceeding (ATCERR 32423).
	CAUSE	A previous command or a system crash caused the information in the ATCINFO file to become unstable.
	ACTION	Detach and then attach the database. Then, retry the command. Caution: the detaching of a disabled region unmaps all customized mapping. The detach is required to "clean up" the environment.
32424	MESSAGE	Owner name > 17 chars (ATCERR 32424).
	CAUSE	An owner name longer than 17 characters was specified.
	ACTION	Specify an owner name less than or equal to 17 characters.
32425	MESSAGE	Invalid TurboIMAGE type (ATCERR 32425).
	CAUSE	The TurboIMAGE/XL data type specified is not valid.
	ACTION	Specify a valid TurboIMAGE/XL data type. For further reference, see the *TurboIMAGE/XL Database Management System Reference Manual.*

32426	MESSAGE	Invalid Mapping (ATCERR 32426).
	CAUSE	The data type mapping specified in the UPDATE TYPE or SPLIT command is not correct.
	ACTION	Specify a valid mapping; for further reference see Chapter 2, Tasks 4 and 5.
32427	MESSAGE	Maximum number of columns (255) exceeded (ATCERR 32427).
	CAUSE	The maximum number of columns in an ALLBASE/SQL table is 255. This limit was exceeded while trying to split an item.
	ACTION	Reduce the number of split fields.
32428	MESSAGE	Maximum length of columns (3996 bytes) exceeded (ARCERR 32428).
	CAUSE	The maximum limit of column width in an ALLBASE/SQL table is 3996 bytes. This limit was exceeded while trying to do SPLIT/UPDATE TYPE.
	ACTION	Make sure that the total width of mapped columns does not exceed 3996 bytes.
32429	MESSAGE	Illegal Mapping - component length mismatch (ATCERR 32429).
	CAUSE	The TurboIMAGE/XL data type length of the source field does not match the total of split (target) fields in the SPLIT command.
	ACTION	Make sure that the total length of split fields is equal to that of the source field.

32430	MESSAGE	*TurboIMAGE/XL database name* - no subsystem access (ATCERR 32430).
	CAUSE	The subsystem access to *TurboIMAGE/XL database* has been disabled.
	ACTION	Contact your DBA to enable the subsystem access to the TurboIMAGE/XL database.
32431	MESSAGE	*name* - Invalid ALLBASE/SQL name (ATCERR 32431).
	CAUSE	The name specified contains illegal characters or has an illegal format.
	ACTION	Specify a legal ALLBASE/SQL name. For further reference see the *ALLBASE/SQL Reference Manual*.
32432	MESSAGE	*name* - Duplicate name (ATCERR 32432).
	CAUSE	The specified name has already been defined.
	ACTION	Specify a unique name.
32434	MESSAGE	MPE status error (ATCERR 32434, MPESTAT *error number*, *error number*).
	CAUSE	An internal error has occurred.
	ACTION	Contact the HP Response Center.
32435	MESSAGE	Syntax Error (ATCERR 32435).
	CAUSE	The command entered is syntactically wrong.
	ACTION	Use the HELP command to see the correct syntax for the command.

32436 MESSAGE `TurboDB not set (ATCERR 32436).`

CAUSE The SET TURBODB command has not been issued.

ACTION Issue a SET TURBODB *turbodbname* command.

32437 MESSAGE `SQLDBE not set (ATCERR 32437).`

CAUSE The SET SQLDBE *dbenvironment* command has not been issued.

ACTION Issue a SET SQLDBE *dbenvironment* command.

32438 MESSAGE `ALLBASE/SQL DBE language does not match the TurboIMAGE language (ATCERR 32438).`

CAUSE The native language of the DBEnvironment and the TurboIMAGE/XL database do not match.

ACTION Contact your DBA to change the native language of either one of the databases so they match.

32439 MESSAGE `Cannot map TurboIMAGE type P1. Attach aborted (ATCERR 32439).`

CAUSE A P1 TurboIMAGE/XL data type cannot be mapped into any SQL data type.

ACTION Avoid the P1 data type in your TurboIMAGE/XL database.

32440	MESSAGE	ATCINFO file needs recovery (ATCERR 32440).
	CAUSE	The ATCINFO file may be inconsistent.
	ACTION	Use ATCUtil RECOVER command to recover the ATCINFO file. See Chapter 2, Task 15, for a discussion of the RECOVER command.
32441	MESSAGE	User name not found (ATCERR 32441).
	CAUSE	The user name specified in the DELETE/UPDATE USER command does not exist.
	ACTION	Specify the correct user name.
32442	MESSAGE	*TurboIMAGE/XL database* - Access is disabled (ATCERR 32442).
	CAUSE	Access to the TurboIMAGE/XL database has been disabled.
	ACTION	Contact your DBA to enable access to the TurboIMAGE/XL database. Refer to the discussion of the DBUTIL ENABLE command in the *TurboIMAGE/XL Database Management System Reference Manual*.
32443	MESSAGE	Cannot recover ATCINFO file. Error *error number*, *error number* (ATCERR 32443).
	CAUSE	An internal error has occurred.
	ACTION	Copy down the error numbers and call the HP Response Center.

32444	MESSAGE	*table/column name* - `Table/Column not found (ATCERR 32444).`
	CAUSE	The table or column name specified was not found in the ATCINFO file.
	ACTION	Check the spelling of the name you entered.

B

SALES Database Schema

The SALES database is used in the examples throughout this guide. The schema for this database is shown below:

```
BEGIN DATA BASE SALES ;
PASSWORDS:
  11  CREDIT   ;
  12  BUYER    ;
  13  dockhand;
  14  CLERK    ;
  18  manager ;

ITEMS:
  CITY              , X12(12,13,14/11);
  CREDIT-RATING     , R2(/14);
  CUSTOMER#         , J2;
  DATE              , X6;
  DELIVERED-DATE    , X6(/14);
  FIRST-NAME        , X10(14/11);
  INITIAL           , U2(14/11);
  LAST-NAME         , X16(14/11);
  LAST-SHIP-DATE    , X6(12/);
  LOCATION-BIN      , Z2(/13);
  ON-HAND-QTY       , J2(14/12);
  OTHER-VENDORS     , 3X16;
  PART-INFO         , X60;
  PRICE             , J2(14/);
  PRODUCT#          , U8;
  PRODUCT-DESCRIPT  , X20;
  PURCHASED-DATE    , X6(11/14);
  QUANTITY          , I1(/14);
  STATE             , X2(12,13,14/11);
  STREET            , X26(12,13,14/11);
  TAX               , J2(14/);
  TOTAL             , J2(11,14/);
  UNIT-COST         , P8(/12);
  VENDOR            , X16(12,13/);
  ZIP               , X6(12,13,14/11);
```

```
SETS:

  NAME:    DATE-MASTER     ,A;
  ENTRY:   DATE             (3)                                  ;
  CAPACITY: 365(19);


  NAME:    CUSTOMER        ,M(14/11,18);
  ENTRY:   CUSTOMER#        (1)                                  ,
           LAST-NAME                                             ,
           FIRST-NAME                                            ,
           INITIAL                                               ,
           STREET                                                ,
           CITY                                                  ,
           STATE                                                 ,
           ZIP                                                   ,
           CREDIT-RATING                                         ;
  CAPACITY: 201(7);


  NAME:    PRODUCT         ,M(13,14/12,18);
  ENTRY:   PRODUCT#         (2)                                  ,
           PRODUCT-DESCRIPT                                      ;
  CAPACITY: 300(16);


  NAME:    VENDOR          ,M(13/12,18);
  ENTRY:   VENDOR           (1)                                  ,
           STREET                                                ,
           CITY                                                  ,
           STATE                                                 ,
           ZIP                                                   ;
  CAPACITY: 201(12);


  NAME:    INVENTORY       ,D(12,14/13,18);
  ENTRY:   PRODUCT#         ( PRODUCT                           ),
           ON-HAND-QTY                                           ,
           VENDOR           (!VENDOR                            ),
           OTHER-VENDORS                                         ,
           UNIT-COST                                             ,
           LAST-SHIP-DATE   ( DATE-MASTER                       ),
           LOCATION-BIN                                          ,
           PART-INFO                                             ;
  CAPACITY: 452(4);
  NAME:    SALES           ,D(11/14,18);
  ENTRY:   CUSTOMER#        ( CUSTOMER        (PURCHASED-DATE  )),
           PRODUCT#         (!PRODUCT                           ),
           QUANTITY                                              ,
           PRICE                                                 ,
           TAX                                                   ,
           TOTAL                                                 ,
           PURCHASED-DATE   ( DATE-MASTER                       ),
           DELIVERED-DATE   ( DATE-MASTER                       );
  CAPACITY: 504(14);

END.
```

C

IMAGE/SQL and Database Utilities

DBUTIL

DBUTIL contains several enhancements to support IMAGE/SQL.

Displaying Information

If the TurboIMAGE/XL database is attached to any DBEnvironments, the ALL parameter of the SHOW command displays this information, as the following example illustrates:

```
:DBUTIL
HP30391C.00.92 TurboIMAGE/XL:  DBUTIL (C) COPYRIGHT HEWLETT-PACKARD COMPANY 1987
>>SHOW SALES ALL
  For database SALES

  Maintenance word is not present.

  Access is enabled.
     .      .      .

     .      .      .
  No other users are accessing the database.

  Attached to these HP SQL DBEnvironments:
    PARTSDBE.SERED.ATC
>>
```

Purging an Attached Database

If you want to purge a TurboIMAGE/XL database that is attached to a DBEnvironment, a new parameter of the PURGE command allows you to detach and purge the database:

```
>>PURGE ORDERS DETACH

  Database has been detached from these HP SQL DBEnvironments:
    PARTSDBE.SERED.ATC

  Database has been PURGED.
>>
```

SQLUtil

SQLUtil contains two enhancements to support IMAGE/SQL:

- The ALL option of the SHOWDBE command displays the name of the ATCINFO file if any TurboIMAGE/XL databases are attached.
- If any TurboIMAGE/XL databases are attached and you purge the DBEnvironment, the PURGEDBE command automatically detaches them.

The following example illustrates these enhancements:

```
:SQLUTIL

                                          SAT, MAY 12, 1990,  2:59 PM
HP36216-02A.21.05            DBE Utility/3000            HP SQL/XL
(C)COPYRIGHT HEWLETT-PACKARD CO. 1982,1983,1984,1985,1986,1987,1988,
1989. ALL RIGHTS RESERVED.

>>SHOWDBE
DBEnvironment Name: PartsDBE
Maintenance Word: usr
Output File Name (opt): Carriage Return
-> ALL

Maintenance word:
DBEnvironment Language:  NATIVE-3000
AutoStart:  ON
User Mode:  MULTI
DBEFile0 Name:  DBEFILE0
Log File Name(s):  DBELOG1
Archive Mode:  OFF
DDL Enabled:  YES
No. of Runtime Control Block Pages:  37
No. of Data Buffer Pages:  100
No. of Log Buffer Pages:  24
Max. Transactions:  2
TurboIMAGE Information File:  ATCINFO

-> EXIT

>> PURGEDBE
DBEnvironment Name: SALESDBE
Purge DBEnvironment (y/n)? Y

DBEnvironment purged.
>>
```

SQLGEN

SQLGEN also contains some enhancements for IMAGE/SQL. The following commands includes mapped table definitions if any TurboIMAGE/XL databases are attached to the DBEnvironment.

- GENERATE TABLES
- GENERATE

SQL Exceptions

When SQL is used to access a TurboIMAGE/XL database, certain statements and options are unavailable or do not behave exactly as described in the *ALLBASE/SQL Reference Manual.* This appendix lists the known exceptions and also lists the SQL statements without exceptions.

SQL Statements with Exceptions

ALTER TABLE

- ALTER TABLE cannot be used to add a column to an IMAGE/SQL table. For example, the command

  ```
  isql=> alter table sales.customer add (newcol float);
  ```

  results in the following error:

  ```
  Operation not allowed on non-SQL table.  (DBERR 2454)
  ```

- ALTER TABLE cannot add a UNIQUE constraint to an IMAGE/SQL table. The command

  ```
  isql=> alter table sales.customer
         add constraint unique (last_name);
  ```

  results in this error:

  ```
  Command not allowed on a TurboIMAGE table.  (DBERR 13502)
  ```

- The ALTER TABLE DROP CONSTRAINT specification is also not supported.
- ALTER TABLE cannot add a CHECK constraint to an IMAGE/SQL table. The command

  ```
  isql=> alter table sales.customer
         add constraint check (last_name < 'SMITH')
         constraint checkname;
  ```

  is not allowed.

- ALTER TABLE cannot add a referential constraint to an IMAGE/SQL table.

BEGIN ARCHIVE

SQL archive logging does not capture modifications made to IMAGE/SQL databases.

TURBOSTORE Online Backup requires special procedures when TurboIMAGE/XL databases (and therefore IMAGE/SQL databases) are in use during the store operation.

BEGIN WORK

IMAGE/SQL transactions are managed by using the TurboIMAGE/XL intrinsics DBXBEGIN and DBXEND. The BEGIN WORK statement does not invoke DBXBEGIN when the first modification or repeatable read is requested for an IMAGE/SQL table.

The priority specified in a BEGIN WORK statement is ignored by IMAGE/SQL. IMAGE/SQL uses priority 100 for all lock requests involving IMAGE/SQL tables.

If isolation level RR (repeatable read), CS (cursor stability), or RC (read commited) is specified and the IMAGE/SQL user has a MODE attribute of 1, 2, 3, or 4, all read operations within the transaction will be repeatable reads.

If isolation level RU (read uncommitted) is specified, all read operations within the transaction will be read-uncommitted.

CHECKPOINT

Contents of log buffers are written to the log file or files, but contain no IMAGE/SQL work.

Data buffers containing changed pages are written to DBEFiles, but contain no IMAGE/SQL data.

COMMIT ARCHIVE

SQL archive logging does not capture modifications made to IMAGE/SQL databases.

COMMIT WORK

The KEEP CURSOR option of the OPEN statement cannot be used with a cursor that references an IMAGE/SQL table. Because KEEP CURSOR does not apply to IMAGE/SQL tables, COMMIT WORK:

- releases all IMAGE/SQL locks acquired during the current transaction
- closes all cursors that reference IMAGE/SQL tables
- does not implicitly start a new IMAGE/SQL transaction

COMMIT WORK ends an IMAGE/SQL transaction by calling DBXEND and then calls DBUNLOCK to release all locks acquired during the transaction.

CREATE INDEX

CREATE INDEX cannot be used to create an index on an IMAGE/SQL table. The command

```
isql => create index sales.newindex on
 sales.customer (last_name asc);
```

invokes this error:

```
Operation not allowed on non-sql table.  (DBERR 2454)
```

CREATE SCHEMA

CREATE SCHEMA cannot be used to define an IMAGE/SQL database, but can be used to define a view.

CREATE TABLE

CREATE TABLE is not supported.

DECLARE CURSOR

A cursor that references an IMAGE/SQL table (in the *QueryEXPRESSION* or *StatementName* of the FOR clause) cannot be opened with the KEEP CURSOR option of the OPEN statement.

DELETE

If SQL detects an error during a DELETE statement that references an IMAGE/SQL table, the current transaction is aborted regardless of the setting of the SET DML ATOMICITY and SET CONSTRAINTS statements.

The set of rows to be affected by the DELETE statement is determined before any rule fires, and this set remains fixed until completion of the rule. If the rule adds to the set, the additional rows will not be deleted. If the rule deletes from the set, a TurboIMAGE/XL intrinsic error will result and the current transaction will be aborted.

If an error occurs during the processing of any rule considered during execution of this statement, the current transaction will be aborted.

DELETE WHERE CURRENT

This has the same considerations as DELETE.

DROP DBEFILE

DROP DBEFILE cannot be used to drop DBEFiles containing IMAGE/SQL objects.

DROP TABLE

DROP TABLE cannot be used to drop an IMAGE/SQL table. An IMAGE/SQL table can be dropped only by detaching the database with the IMAGE/SQL DETACH statement.

DROP VIEW

Cannot be used to drop a view created by IMAGESQL. A view created by IMAGE/SQL can be dropped only by detaching the database with the IMAGE/SQL DETACH command.

INSERT

If SQL detects an error during an INSERT statement that references an IMAGE/SQL table, the current transaction is aborted regardless of the setting of the SET DML ATOMICITY and SET CONSTRAINTS statements.

If an error occurs during the processing of any rule considered during execution of this statement, the current transaction will be aborted.

IMAGE/SQL columns are defined as NOT NULL with default values. Default values are based on IMAGE/SQL item types. If columns are omitted from the column name list of an INSERT statement, the missing columns will be defined using the default values. The default values are listed in Table 2-5.

LOCK TABLE

A LOCK TABLE statement always provides an EXCLUSIVE lock to a TurboIMAGE/XL data set.

OPEN

A cursor referencing an IMAGE/SQL table (in the *QueryExpression* or *StatementName* of the DECLARE CURSOR statement) cannot be opened with the KEEP CURSOR option.

IMAGE/SQL columns are defined as NOT NULL. The INDICATOR option of the OPEN statement therefore cannot be used with IMAGE/SQL.

REVOKE

REVOKE cannot be used to revoke authorities granted by the IMAGE/SQL ATTACH statement.

ROLLBACK WORK

Savepoints cannot be defined in an IMAGE/SQL transaction. The TO clause of ROLLBACK WORK therefore cannot be used with an IMAGE/SQL transaction.

SAVEPOINTS

Savepoints cannot be defined in an IMAGE/SQL transaction.

SELECT

IMAGE/SQL columns are defined as NOT NULL. The INDICATOR option of the SELECT statement therefore cannot be used with IMAGE/SQL.

SET CONSTRAINTS

If a modification error occurs within an IMAGE/SQL transaction, the current transaction is aborted regardless of the setting of SET CONSTRAINTS.

SET DML ATOMICITY

If a modification error occurs within an IMAGE/SQL transaction, the current transaction is aborted regardless of the setting of SET DML AUTOMICITY.

START DBE NEW

The default page size of 1000 pages used by START DBE NEW may not be sufficient to allow a database to be attached with IMAGESQL.

TRANSFER OWNERSHIP

IMAGE/SQL objects created by the IMAGESQL ATTACH statement cannot be transferred to another owner.

UPDATE

If ALLBASE/SQL detects an error during an UPDATE statement that references an IMAGE/SQL table, the current transaction is aborted regardless of the setting of the SET DML ATOMICITY and SET CONSTRAINTS statements.

The set of rows to be affected by the UPDATE statement is determined before any rule fires, and this set remains fixed until completion of the rule. If the rule adds to the set, the additional rows will not be updated. If the rule deletes from the set, a TurboIMAGE/XL intrinsic error will result and the current transaction will be aborted.

If an error occurs during the processing of any rule considered during execution of this statement, the current transaction will be aborted.

IMAGE/SQL columns are defined as NOT NULL. The NULL option of the SET clause therefore cannot be used with IMAGE/SQL columns.

If an IMAGE/SQL column specified in an UPDATE statement corresponds to a search or sort item in a TurboIMAGE/XL detail data set, the database's Critical Item Update flag must be set to ON. If an IMAGE/SQL column specified in an UPDATE statement corresponds to a search item in a TurboIMAGE/XL detail data set and the corresponding master data set is a manual master, the new column value must already exist as a chain head in the master data set.

UPDATE WHERE CURRENT

This has the same considerations as UPDATE.

SQL Statements without Exceptions

The following SQL statements behave as documented in the *ALLBASE/SQL Reference Manual*:

- ADD DBEFILE
- ADD TO GRUOP
- ALTER DBEFILE
- ASSIGNMENT (=)
- BEGIN
- BEGIN DECLARE SECTION
- CLOSE
- CONNECT
- CREATE DBEFILE
- CREATE DBEFILESET
- CREATE GROUP
- CREATE PROCEDURE
- CREATE RULE
- CREATE TEMPSPACE
- CREATE VIEW
- DECLARE
- DESCRIBE
- DISABLE RULES
- DISCONNECT
- DROP DBEFILESET
- DROP GROUP
- DROP INDEX
- DROP MODULE
- DROP PROCEDURE
- DROP RULE
- DROP TEMPSPACE
- DROP VIEW
- ENABLE RULES
- END DECLARE SECTION
- EXECUTE
- EXECUTE IMMEDIATE
- EXECUTE PROCEDURE
- FETCH
- GENPLAN
- GOTO
- GRANT
- IF
- INCLUDE
- PREPARE
- PRINT

- RAISE ERROR
- REFETCH
- RELEASE
- REMOVE DBEFILE
- REMOVE FROM GROUP
- RESET
- RETURN
- SET CONNECTION
- SET MULTITRANSACTION
- SET PRINTRULES
- SET USER TIMEOUT
- SQLEXPLAIN
- START DBE
- START DBE NEWLOG
- STOP DBE
- TERMINATE USER
- UPDATE STATISTICS
- VALIDATE
- WHENEVER
- WHILE

Glossary

ATCINFO
a permanent privileged file containing mapping information about data types and user security. By default, it is named ATCINFO. If you want to set a file equation for this file, you must do so before attaching any TurboIMAGE/XL databases.

ATCLOG
A temporary unnumbered ASCII file. If IMAGE/SQL utility logging is on (the default), all IMAGE/SQL utility commands are written to this file. If it does not already exist, it is created. If it exists, log records are appended to it. By default, it is named ATCLOG. However, you can set a file equation for this file.

Attached Database
A TurboIMAGE/XL database whose data can be accessed through a DBEnvironment. Information about the attached TurboIMAGE/XL database is stored in the DBEnvironment.

Column
The vertical component of a table.

DBA (Database Administrator)
A database administrator of the DBEnvironment. You must be a DBA of the DBEnvironment to which the TurboIMAGE/XL database is attached to issue most IMAGE/SQL utility commands. The creator of the DBEnvironment is automatically a DBA. Other ALLBASE/SQL users can be granted DBA authority by a DBA.

DBC (Database Creator)
The creator of the TurboIMAGE/XL database. You must be either the database creator or give the TurboIMAGE/XL database maintenance word to attach a database to a DBEnvironment. Commands that add users, or display or modify user information can only be executed by the DBC.

DBECon File
The DBEnvironment configuration file. It contains startup parameters for the DBEnvironment. The contents of this file are initially determined at the time you issue the START DBE NEW command. The owner of this file is the DBECreator.

DBECreator
The individual who originally configured the DBEnvironment.

DBEUserID
A name used to identify DBEnvironment users. It is made up of an MPE XL user and account name connected with the @ sign.

DBEnvironment
A collection of related files consisting of one or more ALLBASE/SQL databases that share the same logging and recovery process.

*DBName***TC File**
A permanent privileged file in the same group and account as the TurboIMAGE/XL database. It contains the fully qualified names of the DBEnvironments to which the TurboIMAGE/XL database is attached. This information is used to let utilities such as DBUTIL know that the database is attached to one or more DBEnvironments.

Detached Database
A TurboIMAGE/XL database whose data cannot be accessed through a DBEnvironment. No information about the TurboIMAGE/XL database is stored in the DBEnvironment. A TurboIMAGE/XL database must be detached from a DBEnvironment before it is restructured.

IMAGE/SQL View
A view created by IMAGE/SQL based on mapped tables.

Mapped Column
An ALLBASE/SQL column created in the ALLBASE/SQL DBEnvironment by the IMAGE/SQL utility from the source data set field. Characteristics of the source field are mapped by the IMAGE/SQL utility to ALLBASE/SQL characteristics.

Mapped Table
A table defined in the DBEnvironment based on a TurboIMAGE/XL data set. Data set characteristics are mapped by the IMAGE/SQL utility to ALLBASE/SQL characteristics. The naming convention for ALLBASE/SQL tables is *Owner.Table*. By default, IMAGE/SQL specifies the database name as the owner and the data set name as the table. Thus, the IMAGE/SQL convention for mapped table names is *MappedDatabaseName.MappedDataSetName*. At attach time you must substitute a different owner name if an already attached database has the same name.

Mapping
The process IMAGE/SQL uses to allow a TurboIMAGE/XL database to emulate a DBEnvironment database. Mapping takes place for TurboIMAGE/XL names, data sets, data items, data item types, and data security.

Native SQL Column

A column belonging to an ALLBASE/SQL table.

Native SQL Table

A table created by ALLBASE/SQL.

Owner

A term used to define ownership of ALLBASE/SQL tables, views, and other ALLBASE/SQL objects. For mapped tables, the owner is by default the TurboIMAGE/XL database name (*DatabaseName.Table*). If two or more TurboIMAGE/XL databases with the same name, but residing in different groups and accounts, are to be attached to the same ALLBASE/SQL DBEnvironment, an alternative owner name must be specified at ATTACH time.

Row

The horizontal component of a table.

Source Field

A data set field in an attached TurboIMAGE/XL database.

SQL Database

A logical entity consisting of all tables, views, and other SQL objects in a DBEnvironment having the same owner.

SQLUtil

A utility program that assists the database administrator with DBEnvironment maintenance, backup, and recovery. SQLUtil also lets you modify the startup parameters for a DBEnvironment.

System Catalog

An ALLBASE/SQL database of information about the DBEnvironment. It is owned by SYSTEM. It consists of several system views that contain data about the DBEnvironment. It differs from the DBECon file, which contains startup parameters, not definitions.

Table

The basic unit of storage in an ALLBASE/SQL database. Tables are made up of horizontal **rows** and vertical **columns** of data. The ALLBASE/SQL naming convention for a table is *Owner.TableName* where the owner is the creator of the table.

User-Created View

A view created by the IMAGE/SQL user on mapped tables or IMAGE/SQL views. This term is used to contrast these views with IMAGE/SQL views.

View

A table derived by placing a “window” over one or more tables. The derivation of a view is a SELECT command. View names are governed by the same rules as table names.

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