

# **Informix Guide to SQL**

Reference

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**T**his chapter introduces the *Informix Guide to SQL: Reference* manual. Read this chapter for an overview of the information provided in this manual and for an understanding of the conventions used throughout this manual.

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## About This Manual

The *Informix Guide to SQL: Reference* is intended to be used as a companion volume to the *Informix Guide to SQL: Tutorial* and the *Informix Guide to SQL: Syntax*. This volume and the *Informix Guide to SQL: Syntax* are references that you can use on a daily basis after you finish reading and experimenting with the *Informix Guide to SQL: Tutorial*. This guide includes information regarding individual system catalog tables, data types, and environment variables used by Informix products. It also includes information on designing and using ANSI-compliant databases and a description of the demonstration database, **stores7**.

This manual assumes that you are using INFORMIX-OnLine Dynamic Server as your database server. Features and behavior specific to INFORMIX-SE are noted throughout the manual.

**Important:** *This manual does not cover the product called INFORMIX-SQL or any other Informix application development tool.*



## Organization of This Manual

The *Informix Guide to SQL: Reference* includes the following chapters:

- This Introduction provides general information about the manual, introduces the demonstration database from which the product examples are drawn, lists the new features for Version 7.2 of Informix database server products, describes the documentation conventions used, and lists additional reference materials that will help you understand Structured Query Language (SQL) concepts.
- [Chapter 1, “Informix Databases,”](#) explains differences between the INFORMIX-OnLine Dynamic Server and INFORMIX-SE database servers and provides information about ANSI-compliant databases.
- [Chapter 2, “System Catalog,”](#) provides details of the Informix system catalog, which is a collection of system catalog tables that describe the structure of **stores7** and other Informix databases. The chapter explains how to access and update statistics in the system catalog, shows the system catalog structure, and lists the name and data type for each column in each table. This chapter also includes information about Information Schema Views.
- [Chapter 3, “Data Types,”](#) defines the column data types supported by Informix products, tells how to convert between different data types, and describes how to use specific values in arithmetic and relational expressions.
- [Chapter 4, “Environment Variables,”](#) describes the various environment variables that you can or should set to properly use your Informix products. These variables identify your terminal, specify the location of your software, and define other parameters of your product environment.
- [Appendix A, “The stores7 Database,”](#) describes the structure and contents of the **stores7** demonstration database that is installed with the Informix database server products. It includes a map of the nine tables in the database, illustrates the columns on which they are joined, and displays the data in them.
- A [Glossary](#) of common database terms follows the chapters, and a comprehensive index directs you to areas of particular interest.

## Types of Users

This manual is written for people who use Informix products and SQL on a regular basis.

## Software Dependencies

You must have the following Informix software to enter and execute SQL and SPL statements:

- An INFORMIX-OnLine Dynamic Server database server or an INFORMIX-SE database server.

The database server either must be installed on your computer or on another computer to which your computer is connected over a network.

- Either an Informix application development tool, such as INFORMIX-NewEra; an SQL application programming interface (API), such as INFORMIX-ESQL/C; or the DB-Access database access utility, which is shipped as part of your database server.

The application development tool, the SQL API, or the DB-Access utility enables you to compose queries, send them to the database server, and view the results that the database server returns.

## Demonstration Database

The DB-Access utility, which is provided with your Informix database server products, includes a demonstration database called **stores7** that contains information about a fictitious wholesale sporting-goods distributor. The sample command files that make up a demonstration application are also included.

Most examples in this manual are based on the **stores7** demonstration database. The **stores7** database is described in detail and its contents are listed in Appendix A of this volume.

The script that you use to install the demonstration database is called **dbaccessdemo7** and is located in the **\$INFORMIXDIR/bin** directory. The database name that you supply is the name given to the demonstration database. If you do not supply a database name, the name defaults to **stores7**. Use the following rules for naming your database:

- Names can have a maximum of 18 characters for INFORMIX-OnLine Dynamic Server databases and a maximum of 10 characters for INFORMIX-SE databases.
- The first character of a name must be a letter or an underscore (\_).
- You can use letters, characters, and underscores (\_) for the rest of the name.
- DB-Access makes no distinction between uppercase and lowercase letters.
- The database name must be unique.

When you run **dbaccessdemo7**, you are, as the creator of the database, the owner and Database Administrator (DBA) of that database.

If you install your Informix database server according to the installation instructions, the files that constitute the demonstration database are protected so that you cannot make any changes to the original database.

You can run the **dbaccessdemo7** script again whenever you want to work with a fresh demonstration database. The script prompts you when the creation of the database is complete and asks if you would like to copy the sample command files to the current directory. Enter **N** if you have made changes to the sample files and do not want them replaced with the original versions. Enter **Y** if you want to copy over the sample command files.

#### To create and populate the stores7 demonstration database

1. Set the **INFORMIXDIR** environment variable so that it contains the name of the directory in which your Informix products are installed.
2. Set **INFORMIXSERVER** to the name of the default database server.

The name of the default database server must exist in the **\$INFORMIXDIR/etc/sqlhosts** file. (For a full description of environment variables, see [Chapter 4, “Environment Variables.”](#)) For information about **sqlhosts**, see the *INFORMIX-OnLine Dynamic Server Administrator’s Guide* or the *INFORMIX-SE Administrator’s Guide*.

3. Create a new directory for the SQL command files. Create the directory by entering the following command:

```
mkdir dirname
```

4. Make the new directory the current directory by entering the following command:

```
cd dirname
```

5. Create the demonstration database and copy over the sample command files by entering the **dbaccessdemo7** command.

To create the database without logging, enter the following command:

```
dbaccessdemo7 dbname
```

To create the demonstration database with logging, enter the following command:

```
dbaccessdemo7 -log dbname
```

If you are using INFORMIX-OnLine Dynamic Server, by default the data for the database is put into the root dbspace. If you wish, you can specify a dbspace for the demonstration database.

To create a demonstration database in a particular dbspace, enter the following command:

```
dbaccessdemo7 dbname -dbspace dbspacename
```

You can specify all of the options in one command, as shown in the following command:

```
dbaccessdemo7 -log dbname -dbspace dbspacename
```

If you are using INFORMIX-SE, a subdirectory called ***dbname.dbs*** is created in your current directory and the database files associated with **stores7** are placed there. You will see both data (**.dat**) and index (**.idx**) files in the ***dbname.dbs*** directory. (If you specify a dbspace name, it is ignored.)

To use the database and the command files that have been copied to your directory, you must have UNIX read and execute permissions for each directory in the pathname of the directory from which you ran the **dbaccessdemo7** script. Check with your system administrator for more information about operating-system file and directory permissions. UNIX permissions are discussed in the [INFORMIX-OnLine Dynamic Server Administrator's Guide](#) and the [INFORMIX-SE Administrator's Guide](#).

6. To give someone else the permissions to access the command files in your directory, use the UNIX **chmod** command.
7. To give someone else access to the database that you have created, grant them the appropriate privileges using the GRANT statement. To revoke privileges, use the REVOKE statement. The GRANT and REVOKE statements are described in [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.

---

## New Features of This Product

The Introduction to each Version 7.2 product manual contains a list of new features for that product. The Introduction to each manual in the Version 7.2 *Informix Guide to SQL* series contains a list of new SQL features.

A comprehensive list of all of the new features for Version 7.2 Informix products is in the release-notes file called **SERVERS\_7.2**.

This section highlights the major new features implemented in Version 7.2 of Informix products that use SQL:

- **Addition of Global Language Support (GLS)**

The GLS feature allows you to work in any supported language and to conform to the customs of a specific territory by setting certain environment variables. In support of GLS, CHAR and VARCHAR, columns of the system catalog tables are created as NCHAR and NVARCHAR columns in this release. In addition, hidden rows have been added to the **systables** system catalog table. See the discussion of GLS in [Chapter 1](#) of the *Informix Guide to SQL: Reference*.

- **ANSI flagger**

The ANSI flagger that Informix products use has been modified to eliminate the flagging of certain SQL items as Informix extensions. These items include the AS keyword in the SELECT clause of the SELECT statement and delimited identifiers in the Identifier segment.



- Bidirectional indexes

The database server can now traverse an index in either ascending or descending order. So you no longer need to create both an ascending index and a descending index for a column when you use this column in both `SELECT...ORDER BY column name ASC` statements and `SELECT...ORDER BY column name DESC` statements. You only need to create a single ascending or descending index for these queries. See the `CREATE INDEX` and `SELECT` statements.

- Column matches in conditions

When you specify a `LIKE` or `MATCHES` condition in the `SELECT` statement or other statements, you can specify a column name on both sides of the `LIKE` or `MATCHES` keyword. The database server retrieves a row when the values of the specified columns match. See the `Condition` segment and the `SELECT` statement.

- Column substrings in queries

You can specify column subscripts for the column named in a `SELECT...ORDER BY` statement. The database server sorts the query results by the value of the column substring rather than the value of the entire column.

- Column updates after a fetch

When you use the `FOR UPDATE` clause of the `SELECT` statement, you can use the `OF column name` option of this clause to limit the columns that can be updated after a fetch.

- Connectivity information

You can use the `INFORMIXSQLHOSTS` environment variable to specify the pathname of the file where the client or the database server looks for connectivity information.

- COUNT function

The `ALL column name` option of the `COUNT` function returns the total number of non-null values in the specified column or expression. See the `Expression` segment.

- **Data distributions**

You can suppress the construction of index information in the MEDIUM and HIGH modes of the UPDATE STATISTICS statement. When you use the new DISTRIBUTIONS ONLY option of this statement, the database server gathers only distributions information and table information.

- **Database renaming**

You can rename local databases. See the new RENAME DATABASE statement.

- **DBINFO function**

You can use the 'sessionid' option of the DBINFO function to return the session ID of your current session. See the Expression segment.

- **Decimal digits in client applications**

Informix client applications (including the DB-Access utility or any ESQL program that you write) by default display 16 decimal digits of data types FLOAT, SMALLFLOAT, and DECIMAL. The actual digits that are displayed can vary according to the size of the character buffer. The new **DBFLTMASK** environment variable allows you to override the default of 16 decimal digits in the display.

- **Default privileges on tables**

You can use the new **NODEFDAC** environment variable to prevent default table privileges from being granted to PUBLIC when a new table is created in a database that is not ANSI compliant.

- **Fragment authorization**

You can grant and revoke privileges on individual fragments of tables. See the new GRANT FRAGMENT and REVOKE FRAGMENT statements and the new **sysfragauth** system catalog table.

- **High-Performance Loader (HPL) configuration**

You can use the new **DBONPLOAD** and **PLCONFIG** environment variables to specify the names of files and databases to be used by HPL.

- **In-place alter algorithm**

INFORMIX-OnLine Dynamic Server uses a new in-place alter algorithm for altering tables when you add a column to the end of the table. See the ALTER TABLE statement.

- **Next century in year values**

You can use the next century to expand two-digit year values. See the new **DBCENTURY** environment variable, the Literal DATETIME segment, the DATE data type, and the DATETIME data type.
- **Not null constraints**

You can now create not null constraints with the CREATE TABLE and ALTER TABLE statements. The database server records not null constraints in the **sysconstraints** and **syscoldepend** system catalog tables.
- **Object modes**

You can specify the object mode of database objects with the new SET statement. This statement permits you to set the object mode of constraints, indexes, and triggers or the transaction mode of constraints. See the SET statement, the new **sysobjstate** system catalog table, and the new syntax for object modes in ALTER TABLE, CREATE INDEX, CREATE TABLE, and CREATE TRIGGER.
- **Optical StageBlob area**

You can use the new **INFORMIXOPCACHE** environment variable to specify the size of the memory cache for the Optical StageBlob area of the client application.
- **RANGE, STDEV, and VARIANCE functions**

You can use the new aggregate functions RANGE, STDEV, and VARIANCE. See the new syntax for Aggregate Expressions in the Expression segment.
- **Roles**

You can create, drop, and enable roles. You can grant roles to individual users and to other roles, and you can grant privileges to roles. You can revoke a role from individual users and from another role, and you can revoke privileges from a role. See the new CREATE ROLE, DROP ROLE, and SET ROLE statements and the new **sysroleauth** system catalog table. Also see the new syntax for roles in the GRANT and REVOKE statements and the new information in the **sysusers** system catalog table.

- Separation of administrative tasks  
The security feature of role separation allows you to separate administrative tasks performed by different groups that are running and auditing OnLine. The `INF_ROLE_SEP` environment variable allows you to implement role separation during installation of OnLine.
- Session authorization  
You can change the user name under which database operations are performed in the current session and thus assume the privileges of the specified user during the session. See the new `SET SESSION AUTHORIZATION` statement.
- Table access after loads  
The `FOR READ ONLY` clause of the `SELECT` statement allows you to access data in the tables of an ANSI-mode database after you have loaded the data with the High-Performance Loader but before you have performed a level-0 backup of the data. After you have performed the level-0 backup, you no longer need to use the `FOR READ ONLY` clause. See the `SELECT` and `DECLARE` statements.
- Thread-safe applications  
You can use the new `THREADLIB` environment variable to compile thread-safe ESQL/C applications. In a thread-safe ESQL/C application, you can use the `DORMANT` option of the `SET CONNECTION` statement to make an active connection dormant.
- Tutorials  
Tutorial information on new features has been added to the [Informix Guide to SQL: Tutorial](#). The new tutorials cover Global Language Support (GLS), thread-safe applications, object modes, violation detection, fragment authorization, and roles.
- Utilities  
The `dbexport`, `dbimport`, `dbload`, and `dbschema` utilities have been moved from the *Informix Guide to SQL: Reference* to the [Informix Migration Guide](#).
- Violation detection  
You can create special tables called violations and diagnostics tables to detect integrity violations. See the new `START VIOLATIONS TABLE` and `STOP VIOLATIONS TABLE` statements and the new `sysviolations` system catalog table.

- XPG4 compliance

SQL statements and data structures have been modified to provide enhanced compliance with the *X/Open Portability Guide 4* (XPG4) specification for SQL. The **sqlwarn** array within the SQL Communications Area (SQLCA) has been modified. A new SQLSTATE code (01007) has been added. The behavior of the ALL keyword in the GRANT statement and the behavior of the ALL and RESTRICT keywords in the REVOKE statement has changed.

For data types, system catalog tables, and environment variables, see this manual. For SQL statements and segments, see the [Informix Guide to SQL: Syntax](#). For tutorial information, see the [Informix Guide to SQL: Tutorial](#).

---

## Conventions

This section describes the conventions that are used in this manual. By becoming familiar with these conventions, you will find it easier to gather information from this and other volumes in the documentation set.

The following conventions are covered:

- Typographical conventions
- Icon conventions
- Command-line conventions
- Sample-code conventions

### Typographical Conventions

This manual uses a standard set of conventions to introduce new terms, illustrate screen displays, describe command-line syntax, and so forth. The following typographical conventions are used throughout this manual.

Convention	Meaning
<i>italics</i>	Within text, new terms and emphasized words are printed in italics. Within syntax diagrams, values that you are to specify are printed in italics.
<b>boldface</b>	Identifiers (names of classes, objects, constants, events, functions, program variables, forms, labels, and reports), environment variables, database names, table names, column names, menu items, command names, and other similar terms are printed in boldface.
monospace	Information that the product displays and information that you enter are printed in a monospace typeface.
KEYWORD	All keywords appear in uppercase letters.
◆	This symbol indicates the end of product- or platform-specific information.






*Tip: When you are instructed to “enter” characters or to “execute” a command, immediately press RETURN after the entry. When you are instructed to “type” the text or to “press” other keys, no RETURN is required.*

## Icon Conventions

Throughout the documentation, you will find text that is identified by several different types of icons. This section describes these icons.



### ***Comment Icons***

Comment icons identify three types of information, as described in the following table. This information is always displayed in *italics*.

<b>Icon</b>	<b>Description</b>
	Identifies paragraphs that contain vital instructions, cautions, or critical information.
	Identifies paragraphs that contain significant information about the feature or operation that is being described.
	Identifies paragraphs that offer additional details or shortcuts for the functionality that is being described.

### ***Compliance Icons***

Compliance icons indicate paragraphs that provide guidelines for complying with a standard.

<b>Icon</b>	<b>Description</b>
	Identifies information that is specific to an ANSI-compliant database.
	Identifies information that is valid only if your database or application uses a nondefault GLS locale.

These icons can apply to a row in a table, one or more paragraphs, or an entire section. A ♦ symbol indicates the end of the compliance information.

## Command-Line Conventions

This section defines and illustrates the format of the commands available in Informix products. These commands have their own conventions, which might include alternative forms of a command, required and optional parts of the command, and so on.

Each diagram displays the sequences of required and optional elements that are valid in a command. A diagram begins at the upper left with a command. It ends at the upper right with a vertical line. Between these points, you can trace any path that does not stop or back up. Each path describes a valid form of the command. You must supply a value for words that are in italics.

Element	Description
command	This required element is usually the product name or other short word that invokes the product or calls the compiler or preprocessor script for a compiled Informix product. It might appear alone or precede one or more options. You must spell a command exactly as shown and must use lowercase letters.
<i>variable</i>	A word in italics represents a value that you must supply, such as a database, file, or program name. A table following the diagram explains the value.
-flag	A flag is usually an abbreviation for a function, menu, or option name or for a compiler or preprocessor argument. You must enter a flag exactly as shown, including the preceding hyphen.
.ext	A filename extension, such as <b>.sql</b> or <b>.cob</b> , might follow a variable that represents a filename. Type this extension exactly as shown, immediately after the name of the file and a period. The extension might be optional in certain products.
(.,;+*-/)	Punctuation and mathematical notations are literal symbols that you must enter exactly as shown.
' '	Single quotes are literal symbols that you must enter as shown.

(1 of 2)



Element	Description
	A reference in a box represents a subdiagram on the same page (if no page is supplied) or another page. Imagine that the subdiagram is spliced into the main diagram at this point.
	A shaded option is the default. If you do not explicitly type the option, the default will be in effect unless you choose another option.
	Syntax enclosed in a pair of arrows indicates that this is a subdiagram.
	The vertical line is a terminator and indicates that the statement is complete.
	A branch below the main line indicates an optional path. (Any term on the main path is required, unless a branch can circumvent it.)
	A loop indicates a path that you can repeat. Punctuation along the top of the loop indicates the separator symbol for list items, as in this example.
	A gate ( $\sqrt{3}$ ) on a path indicates that you can only use that path the indicated number of times, even if it is part of a larger loop. Here you can specify <i>size</i> no more than three times within this statement segment.

(2 of 2)

Figure 1 shows how you read the command-line diagram for setting the **INFORMIXC** environment variable.

**Figure 1**  
An Example Command-Line Diagram



To construct a correct command, start at the top left with the command `setenv`. Then follow the diagram to the right, including the elements that you want. The elements in the diagram are case sensitive.

### To read the example command-line diagram

1. Type the word `setenv`.
2. Type the word `INFORMIXC`.
3. Supply either a compiler name or pathname.  
After you choose *compiler* or *pathname*, you come to the terminator.  
Your command is complete.
4. Press ENTER to execute the command.

## Sample-Code Conventions

Examples of SQL code occur throughout this manual. Except where noted, the code is not specific to any single Informix application development tool. If only SQL statements are listed in the example, they are not delimited by semicolons. To use this SQL code for a specific product, you must apply the syntax rules for that product. For example, if you are using the Query-language option of DB-Access, you must delimit multiple statements with semicolons. If you are using an SQL API, you must use EXEC SQL and a semicolon (or other appropriate delimiters) at the start and end of each statement, respectively.

For instance, you might see the code in the following example:

```
CONNECT TO stores7
.
.
.
DELETE FROM customer
      WHERE customer_num = 121
.
.
.
COMMIT WORK
DISCONNECT CURRENT
```

Dots in the example indicate that more code would be added in a full application, but it is not necessary to show it to describe the concept being discussed.

For detailed directions on using SQL statements for a particular application development tool or SQL API, see the manual for your product.

---

## Additional Documentation

This section describes the following pieces of the documentation set:

- Printed documentation
- On-line documentation
- Related reading

### Printed Documentation

You can refer to the following related Informix documents that complement this manual:

- A companion volume to the Reference, the *Informix Guide to SQL: Tutorial*, provides a tutorial on SQL as it is implemented by Informix products. It describes the fundamental ideas and terminology that are used when planning, using, and implementing a relational database.
- An additional companion volume to the Reference, the *Informix Guide to SQL: Syntax*, provides a detailed description of all the SQL statements supported by Informix products. This guide also provides a detailed description of Stored Procedure Language (SPL) statements.
- The *SQL Quick Syntax Guide* contains syntax diagrams for all statements and segments described in this manual.
- You, or whoever installs your Informix products, should refer to the *UNIX Products Installation Guide* for your particular release to ensure that your Informix product is properly set up before you begin to work with it. A matrix depicting possible client/server configurations is included in the *UNIX Products Installation Guide*.
- Depending on the database server you are using, you or your system administrator need either the *INFORMIX-SE Administrator's Guide* or the *INFORMIX-OnLine Dynamic Server Administrator's Guide*.

- The *DB-Access User Manual* describes how to invoke the DB-Access utility to access, modify, and retrieve information from Informix database servers.
- When errors occur, you can look them up by number and learn their cause and solution in the *Informix Error Messages* manual. If you prefer, you can look up the error messages in the on-line message file described in the section later in this Introduction and in the Introduction to the *Informix Error Messages* manual.
- The *Guide to GLS Functionality* explains the impact of the GLS feature on Informix products. This manual includes a chapter on SQL features and a chapter on GLS environment variables.
- *Getting Started with Informix Database Server Products* provides an orientation to the Informix client/server environment and describes the manuals for Informix products. If you are a new user of Informix products, it is helpful to read this manual before you read any of the manuals in the SQL manual series.

## On-Line Documentation

The following on-line files supplement this document:

- On-line error messages
- Release notes, documentation notes, and machine notes

### *Error Message Files*

Informix software products provide ASCII files that contain all of the Informix error messages and their corrective actions. To read the error messages in the ASCII file, Informix provides scripts that let you display error messages on the screen (**finderr**) or print formatted error messages (**rofferr**). See the Introduction to the *Informix Error Messages* manual for a detailed description of these scripts.

The optional Informix Messages and Corrections product provides PostScript files that contain the error messages and their corrective actions. If you have installed this product, you can print the PostScript files on a PostScript printer. The PostScript error messages are distributed in a number of files of the format **errmsg1.ps**, **errmsg2.ps**, and so on. These files are located in the **\$INFORMIXDIR/msg** directory.

### ***Release Notes, Documentation Notes, Machine Notes***

In addition to the Informix set of manuals, the following on-line files, located in the `$INFORMIXDIR/release/en_us/0333` directory, might supplement the information in this manual:

<b>On-Line File</b>	<b>Purpose</b>
Documentation notes	Describes features that are not covered in the manual or that have been modified since publication. The file containing the documentation notes for this product is called <b>SQLRDOC_7.2</b> .
Release notes	Describes feature differences from earlier versions of Informix products and how these differences might affect current products. The file containing the release notes for Version 7.2 of Informix database server products is called <b>SERVERS_7.2</b> .
Machine notes	Describes any special actions that are required to configure and use Informix products on your computer. Machine notes are named for the product that is described. For example, the machine notes file for INFORMIX-OnLine Dynamic Server is <b>ONLINE_7.2</b> .

Please examine these files because they contain vital information about application and performance issues.

## **Related Reading**

For additional technical information on database management, consult the following books. The first book is an introductory text for readers who are new to database management, while the second book is a more complex technical work for SQL programmers and database administrators:

- *Database: A Primer* by C. J. Date (Addison-Wesley Publishing, 1983)
- *An Introduction to Database Systems* by C. J. Date (Addison-Wesley Publishing, 1994)

To learn more about the SQL language, consider the following books:

- *A Guide to the SQL Standard* by C. J. Date with H. Darwen (Addison-Wesley Publishing, 1993)

- *Understanding the New SQL: A Complete Guide* by J. Melton and A. Simon (Morgan Kaufmann Publishers, 1993)
- *Using SQL* by J. Groff and P. Weinberg (Osborne McGraw-Hill, 1990)

The *Informix Guide to SQL: Reference* assumes that you are familiar with your computer operating system. If you have limited UNIX system experience, consult your operating-system manual or a good introductory text before you read this manual. The following texts provide a good introduction to UNIX systems:

- *Introducing the UNIX System* by H. McGilton and R. Morgan (McGraw-Hill Book Company, 1983)
- *Learning the UNIX Operating System* by G. Todino, J. Strang, and J. Peek (O'Reilly & Associates, 1993)
- *A Practical Guide to the UNIX System* by M. Sobell (Benjamin/Cummings Publishing, 1989)
- *UNIX for People* by P. Birns, P. Brown, and J. Muster (Prentice-Hall, 1985)
- *UNIX System V: A Practical Guide* by M. Sobell (Benjamin/Cummings Publishing, 1995)

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## Compliance with Industry Standards

The American National Standards Institute (ANSI) has established a set of industry standards for SQL. Informix SQL-based products are fully compliant with SQL-92 Entry Level (published as ANSI X3.135-1992), which is identical to ISO 9075:1992 on INFORMIX-OnLine Dynamic Server. In addition, many features of OnLine comply with the SQL-92 intermediate and Full Level and X/Open C CAE (common applications environment) standards.

Informix SQL-based products are compliant with ANSI SQL-92 Entry Level (published as ANSI X3.135-1992) on INFORMIX-SE with the following exceptions:

- Effective checking of constraints
- Serializable transactions

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# B

efore you create a database using an Informix product, you must make several decisions that affect which features will be available to applications that use the database. The major decisions are as follows:

- Which database server will house the database: INFORMIX-OnLine Dynamic Server or INFORMIX-SE?
- Does the database need to be ANSI compliant?
- Will the database use characters from a language other than English in its tables?

This chapter describes the implications of each choice and summarizes how these choices affect your databases. For many of the features and behaviors described in this chapter, the specifics of implementation are discussed elsewhere in this manual, in the [Informix Guide to SQL: Syntax](#), and in the [Informix Guide to SQL: Tutorial](#).

---

## Choosing a Database Server

If you have access to both an INFORMIX-OnLine Dynamic Server and an INFORMIX-SE database server, you must choose one to serve your database. If you create a database with one database server, you can transfer it later to the other database server. Informix recommends, however, that you consider which database server is more appropriate for your needs before you create and populate the database.

Various factors might influence your choice of database server, for example, the size of your databases, speed, the need for distributed access, and ease of installation and maintenance. You should also be aware of differences in the SQL features that are available on INFORMIX-OnLine Dynamic Server and INFORMIX-SE.

Your choice of database server decides the following issues for a database:

- Which data types are available
- Whether data-definition statements can be rolled back
- Whether buffered logging is supported
- Whether tables can be fragmented
- Which locking options are available
- Which isolation levels are available
- What information is stored in the system catalog tables
- Which SQL statements are available

This section summarizes how your choice of database server affects each of these issues. References are also provided to indicate where you can find more extended discussions of these issues.

## Data Types

INFORMIX-OnLine Dynamic Server supports all the data types available to INFORMIX-SE as well as the following additional data types:

- BYTE
- CHARACTER VARYING
- TEXT
- VARCHAR
- NVARCHAR

INFORMIX-SE and INFORMIX-OnLine Dynamic Server also have different values for the maximum length of CHAR(*n*) and NCHAR(*n*) data types.

For more information on individual data types, see [“Database Data Types” on page 3-3](#).

## Rolling Back Statements in a Transaction

For both database servers, if you have not yet issued a COMMIT WORK statement for a transaction, the ROLLBACK WORK statement allows you to undo any changes that occurred since the beginning of that transaction. In INFORMIX-OnLine Dynamic Server, you can roll back any statement.

If you are using INFORMIX-SE, you cannot undo certain operations with ROLLBACK WORK. These operations comprise all the data definition statements as well as the GRANT and REVOKE statements. (For a list of the data definition statements, refer to [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.)

For a discussion of transactions, refer to [Chapter 4](#) of the *Informix Guide to SQL: Tutorial*. See also the description of the ROLLBACK WORK statement in [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.

## Transaction Logging

INFORMIX-OnLine Dynamic Server supports buffered logging and allows you to change logging from buffered to unbuffered or unbuffered to buffered with the SET LOG statement. You can also choose to log or not to log.

INFORMIX-SE does not support buffered logging.

For more information on the SET LOG statement, refer to [Chapter 1](#) of the *Informix Guide to SQL: Syntax*. For more information about buffered and unbuffered logging, see the *INFORMIX-OnLine Dynamic Server Administrator's Guide*.

## Table and Index Fragmentation

INFORMIX-OnLine Dynamic Server supports the fragmentation of tables and indexes. The feature allows you to group rows within a table according to a distribution scheme. The rows are stored in separate dbspaces that you specify in a fragmentation strategy.

For more information about fragmentation and the SQL statements you use to create fragmented tables and indexes, see [Chapter 1](#) of the *Informix Guide to SQL: Syntax*. For more information about how fragmentation can enhance performance, see the *INFORMIX-OnLine Dynamic Server Performance Guide*.

## Locking Issues

When you write applications for INFORMIX-OnLine Dynamic Server and INFORMIX-SE, you should be aware of how each handles the following locking issues:

- Which choices of lock scope are available
- Which choices of lock mode are available
- How shared locks are used
- Whether a process can wait for a lock

The following four sections briefly describe how the different database servers handle these locking issues.

### *Lock Scope*

When you create a table, INFORMIX-OnLine Dynamic Server sets the lock scope to page level by default. If you want, you can set the lock scope to row level instead.

INFORMIX-SE supports only row-level locking.

For more information on lock scope, refer to [Chapter 7](#) of the *Informix Guide to SQL: Tutorial*. For how to specify a lock scope, see the descriptions of CREATE TABLE or ALTER TABLE in [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.

### *Lock Mode*

INFORMIX-OnLine Dynamic Server supports three locking modes: shared, exclusive, and promotable. The OnLine database server implicitly places promotable locks on the rows that are selected for an update operation. Just before the actual update, the OnLine promotes the lock to exclusive.

The INFORMIX-SE database server supports only shared and exclusive locking, which results in different locking strategies for table updates. The INFORMIX-SE database server does not have promotable locking, so it places exclusive locks on rows that are selected for update.

For more information on lock modes, refer to [Chapter 7](#) of the *Informix Guide to SQL: Tutorial*. See also the description of the UPDATE statement in [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.

### ***Use of Shared Locks***

INFORMIX-OnLine Dynamic Server supports shared locks on tables. Multiple users can place shared locks on a table.

INFORMIX-SE also supports shared locks on tables. However, the INFORMIX-SE database server allows only one user at a time to have a shared lock on a table.

For more information, see the description of LOCK TABLE in [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.

### ***Waiting for Locks***

The SET LOCK MODE statement is always available with INFORMIX-OnLine Dynamic Server. This statement specifies whether a process that tries to access a locked row or table must wait until OnLine releases the lock.

Only those INFORMIX-SE database servers that use kernel locking have the SET LOCK MODE statement available.

For more information, refer to [Chapter 7](#) of the *Informix Guide to SQL: Tutorial*. See also the description of SET LOCK MODE in [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.

## **Isolation Level**

INFORMIX-OnLine Dynamic Server supports the SET TRANSACTION statement for databases that use transaction logging. Using this option, you can set the isolation level to Read Uncommitted, Read Committed, Repeatable Read, and Serializable. The default isolation level is Read Committed, unless the database is ANSI-compliant, in which case the default is Serializable.

INFORMIX-SE supports the SET TRANSACTION statement for access modes only. All databases running on INFORMIX-SE use the Read Uncommitted isolation level.

For more information, refer to the description of the SET TRANSACTION statement in [Chapter 1](#) of the *Informix Guide to SQL: Syntax*. See also [Chapter 7](#) of the *Informix Guide to SQL: Tutorial*.

## System Catalog Tables

The following system catalog tables in an INFORMIX-SE database are defined or used differently than their corresponding system catalog tables in an INFORMIX-OnLine Dynamic Server database:

- **syscolumns**
- **sysindexes**
- **syssyntables**
- **systables**
- **sysreferences**

The following system catalog tables exist only on INFORMIX-OnLine Dynamic Server database servers:

- **sysfragments**
- **sysopclstr**
- **sysblobs**

For more information on the system catalog tables, see [Chapter 2](#), “System Catalog.”

## SQL Statements Supported by Specific Database Servers

This section lists which SQL statements INFORMIX-OnLine Dynamic Server supports and which statements INFORMIX-SE supports. This information also appears in [Chapter 1](#) of the *Informix Guide to SQL: Syntax*, where syntax specific to OnLine and SE is indicated by the appropriate icon.



### ***SQL Statements Supported Only by OnLine***

The following statements are supported only by OnLine:

- ALTER FRAGMENT
- SET CONSTRAINTS
- SET ISOLATION
- SET LOG

### ***SQL Statements That Contain Branches Specific to OnLine***

The following statements contain at least one option or branch that is supported only by OnLine:

- ALTER TABLE
- CREATE DATABASE
- CREATE TABLE
- REVOKE
- SET LOCK MODE
- SET TRANSACTION

### ***SQL Segments That Contain Branches Specific to OnLine***

*Segments* are elements of syntax that are extracted from the syntax of the SQL statements. Segments are described in [Chapter 1](#) of the *Informix Guide to SQL: Syntax*. The following segments contain at least one option or branch that is supported only by OnLine:

- Condition
- Constraint
- Database Name
- Expression
- Index Name
- Procedure Name
- Synonym Name
- Table Name
- View Name



**Important:** If one of the segments in the preceding list contains a branch that is specific to OnLine, the entire SQL statement is supported only by OnLine. For example, if a *SELECT* statement contains an expression with a branch that is supported only by OnLine, the entire *SELECT* statement is supported only by an OnLine database server.

### ***SQL Statements Supported Only by SE***

The following statements are supported only by the SE database server:

- CHECK TABLE
- CREATE AUDIT
- DROP AUDIT
- RECOVER TABLE
- REPAIR TABLE
- ROLLFORWARD DATABASE
- START DATABASE

### ***SQL Statements and Segments That Contain Branches Specific to SE***

The following statements contain at least one option or branch that is supported only by SE:

- CONNECT
- CREATE DATABASE
- CREATE TABLE

Segments are elements of syntax that are extracted from the syntax of the SQL statements. Segments are described in [Chapter 1](#) of the *Informix Guide to SQL: Syntax*. The Database Name segment is the only segment that contains an option or branch that is supported only by SE.

---

## Using ANSI-Compliant Databases

An ANSI-compliant database is created using the MODE ANSI keywords. The differences between ANSI-compliant databases and those that are not ANSI-compliant are described on [page 1-12](#).

You might want to create an ANSI-compliant database for the following reasons:

- Privileges and access to objects  
ANSI rules govern privileges and access to objects such as tables and synonyms. However, creating an ANSI-compliant database does not ensure that this database remains compliant with the ANSI/ISO SQL-92 standards. (If you take a non-ANSI action, such as CREATE INDEX, on an ANSI database, you receive a warning, but the application program does not forbid the action.)
- Name isolation  
The ANSI table-naming scheme allows different users to create tables in a database without having to worry about name conflicts.
- Transaction isolation
- Data recovery  
ANSI-compliant databases enforce unbuffered logging and automatic transactions for INFORMIX-OnLine Dynamic Server database servers.

## Designating a Database as ANSI Compliant

You designate a database as ANSI compliant by using the MODE ANSI keywords when you create it. Once you create a database using the MODE ANSI keywords, the database is considered ANSI compliant. In an ANSI-compliant database, you cannot change the logging mode to buffered logging, and you cannot turn logging off.

## Determining If an Existing Database Is ANSI Compliant

The following list describes several methods to determine if a database is ANSI compliant:

- If the default database server is INFORMIX-OnLine Dynamic Server, you can use the ON-Monitor utility to list all the databases that reside on that default database server. The Databases option of the Status menu displays this list. In the Log Status column on the list, an ANSI-compliant database has the notation U\*.
- If you are using an SQL API such as INFORMIX-ESQL/C, you can test the SQL Communications Area (SQLCA). Specifically, the third element in the SQLCAWARN structure contains a W immediately after you open an ANSI-compliant database using the DATABASE or CONNECT statement. For information on SQLCA, see [Chapter 5](#) of the *Informix Guide to SQL: Tutorial* or your SQL API manual.
- If you are running on an INFORMIX-SE database server, you can query the **systables** system catalog table. If a database was created with the MODE ANSI keywords, **systables** lists a row with a **tabname** of ANSI and a **tabid** of 100. For example, if the following query on **systables** returns a row, the database is ANSI compliant:

```
SELECT * FROM 'informix'.systables WHERE tabname = 'ANSI'
```

## Differences Between ANSI-Compliant and Non-ANSI-Compliant Databases

Databases that you designate as ANSI compliant (by using the MODE ANSI keywords when you create them) and databases that are not ANSI compliant behave differently in the following areas:

- Transactions
- Transaction logging
- Owner naming
- Privileges on objects
- Default isolation level
- Character data types
- Decimal data type

- Escape characters
- Cursor behavior
- SQLCODE of the SQLCA
- Allowed SQL statements
- Synonym behavior

### ***Transactions***

All the SQL statements that you issue in an ANSI-compliant database are automatically contained in transactions. With a database that is not ANSI compliant, you can choose whether to use transaction processing.

In a database that is not ANSI compliant, a transaction is enclosed by a BEGIN WORK statement and a COMMIT WORK or a ROLLBACK WORK statement. However, in an ANSI-compliant database, the BEGIN WORK statement is redundant and unnecessary because all statements are automatically contained in a transaction. You need to indicate only the end of a transaction with a COMMIT WORK or ROLLBACK WORK statement.

For more information on transactions, see [Chapter 4](#) of the *Informix Guide to SQL: Tutorial*.

### ***Transaction Logging***

All ANSI-compliant databases on an INFORMIX-OnLine Dynamic Server database server run with unbuffered transaction logging. Databases that are not ANSI compliant can run with either buffered logging or unbuffered logging. Unbuffered logging provides more comprehensive data recovery, but buffered logging provides better performance.

For more information, see the description of CREATE DATABASE in [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.

### ***Owner Naming***

In an ANSI-compliant database, owner naming is enforced. When you supply an object name in an SQL statement, ANSI standards require that the name include the prefix *owner.*, unless you are the owner of the object. The combination of *owner* and *name* must be unique in the database. If you are the owner of the object, the database server supplies your user name as the default.

Databases that are not ANSI compliant do not enforce owner naming.

For more information, see “Table Name” in [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.

### ***Privileges on Objects***

ANSI-compliant databases and databases that are not ANSI compliant differ as to which users are granted table-level privileges by default when a table in a database is created. ANSI standards specify that the database server grants only the table owner (as well as the DBA if they are not the same user) any table-level privileges. In a database that is not ANSI compliant, however, privileges are granted to PUBLIC. In addition, Informix provides two table-level privileges, Alter and Index, that are not included in the ANSI standards.

For more information on granting table-level privileges, see [Chapter 11](#) of the *Informix Guide to SQL: Tutorial* and the description of the GRANT statement in [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.

To run a stored procedure, you must have the Execute privilege for that procedure. When you create an owner-privileged procedure for an ANSI-compliant database, only the owner of the stored procedure has the Execute privilege. When you create an owner-privileged procedure in a database that is not ANSI compliant, the database server grants the Execute privilege to public by default.

For more information on stored procedure privileges, see [Chapter 12](#) of the *Informix Guide to SQL: Tutorial*.

### ***Default Isolation Level***

The database isolation level specifies the degree to which your program is isolated from the concurrent actions of other programs. The default isolation level for all ANSI-compliant databases is Serializable. The default isolation level for databases that are not ANSI compliant but do use logging is ANSI Read Committed on an OnLine database server and Informix Dirty Read on an INFORMIX-SE database server. The default isolation level in a database that is not ANSI compliant and without logging is Read Uncommitted.

For more information, see [Chapter 7](#) of the *Informix Guide to SQL: Tutorial* and the description of the SET TRANSACTION and SET ISOLATION statements in [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.

### ***Character Data Types***

In an ANSI-compliant database, you get an error if any character field (CHAR, CHARACTER, VARCHAR, NCHAR, NVARCHAR, CHARACTER VARYING) is filled with a string that is longer than the specified width of the field.

### ***Decimal Data Type***

In an ANSI-compliant database, no scale is used for the DECIMAL data type. You can think of this as scale=0.

### ***Escape Characters***

In an ANSI-compliant database, escape characters can only escape the following characters: percent (%) and underscore(\_). An escape character can also be used to escape itself. See the Condition segment in the *Informix Guide to SQL: Syntax* for additional information.

### ***Cursor Behavior***

If a database is not ANSI compliant, you need to use the FOR UPDATE keywords when you declare an update cursor for a SELECT statement. The SELECT statement must also meet the following conditions:

- It selects from a single table.
- It does not include any aggregate functions.
- It does not include the DISTINCT, GROUP BY, INTO TEMP, ORDER BY, UNION, or UNIQUE clauses and keywords.

With an ANSI-compliant database, you do not have to explicitly use the FOR UPDATE keywords when you declare a cursor. In ANSI-compliant databases, *all* cursors that meet the restrictions described in the preceding list are potentially UPDATE cursors. You can specify that a cursor is read-only with the FOR READ ONLY keywords on the DECLARE statement.

For more information, see the description of the DECLARE statement in [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.

### ***The SQLCODE Field of the SQL Communications Area***

If no rows satisfy the search criteria of a DELETE, an INSERT INTO *tablename* SELECT, a SELECT...INTO TEMP, or an UPDATE statement, the database server sets SQLCODE to 100 if the database is ANSI compliant and set SQLCODE to 0 if the database is not ANSI compliant.

For more information, see the descriptions of SQLCODE in [Chapter 5](#) of the *Informix Guide to SQL: Tutorial*.

### ***SQL Statements Allowed with ANSI-Compliant Databases***

No restrictions exist on SQL statements that are allowed in applications used with an ANSI-compliant database. You can use the Informix extensions with either an ANSI-compliant database or a database that is not ANSI compliant.

### ***Synonym Behavior***

Synonyms are always private in an ANSI-compliant database. If you attempt to create a public synonym, or use the PRIVATE keyword to designate a private synonym in an ANSI-compliant database, you receive an error.



GLS



## Using a Customized Language Environment for Your Database

With Global Language Support (GLS), Informix Version 7.2 products permit the use of different locales. A GLS locale is an environment that has defined conventions for a particular language or culture.

*Tip: With this release, GLS replaces Native Language Support (NLS) and Asian Language Support (ALS).*

By default, Informix products use the U.S.-English ASCII code set and perform in the U.S.-English environment with ASCII collation order. Set your environment to accommodate a nondefault locale if you plan to use any of the following functionalities:

- Non-English characters in the data
- User-specified object names
- Conformity with the sorting and collation order of a non-ASCII code set
- Culture-specific collation and sorting orders, such as those used in dictionaries or phone books

For descriptions of GLS environment variables and for detailed information on implementing non-U.S. English environments, see the [Guide to GLS Functionality](#). ♦



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# System Catalog

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**T**he system catalog consists of tables that describe the structure of the database. Each system catalog table contains specific information about an element in the database.

This chapter covers the following topics:

- How to access tables in the system catalog
- How to update statistics in the system catalog
- The structure, including the name and data type of each column, of the tables that make up the system catalog
- Information Schema views that are created from system catalog information

---

## Objects Tracked by the System Catalog Tables

The system catalog tables track the following objects:

- Tables and constraints
- Views
- Triggers
- Authorized users and privileges that are associated with every table that you create
- Stored procedures

The system catalog tables are generated automatically when you create a database, and you can query them as you would query any other table in the database. If you use INFORMIX-OnLine Dynamic Server, the data for a newly created database and the 29 system catalog tables for that database reside in a common area of the disk called a dbspace. If you use INFORMIX-SE, the 27 system catalog tables for a newly created database reside in the **dbname.dbs** directory. All tables in the system catalog have the prefix **sys** (for example, the systables system catalog table).

---

## Using the System Catalog

The database server accesses the system catalog constantly. Each time an SQL statement is processed, the database server accesses the system catalog to determine system privileges, add or verify table names or column names, and so on. For example, the following CREATE SCHEMA block adds the **customer** table, with its respective indexes and privileges, to the **stores7** database. This block also adds a view, **california**, that restricts the *view* in the **customer** table to only the first and last names of the customer, the company name, and the phone number of all customers who reside in California.

```
CREATE SCHEMA AUTHORIZATION mary1
CREATE TABLE customer
    (customer_num SERIAL(101), fname CHAR(15), lname CHAR(15), company CHAR(20),
    address1 CHAR(20), address2 CHAR(20), city CHAR(15), state CHAR(2),
    zipcode CHAR(5), phone CHAR(18))
GRANT ALTER, ALL ON customer TO cath1 WITH GRANT OPTION AS mary1
GRANT SELECT ON CUSTOMER TO public
GRANT UPDATE (fname, lname, phone) ON customer TO howe
CREATE VIEW california AS
    SELECT fname, lname, company, phone FROM customer WHERE state = 'CA'
CREATE UNIQUE INDEX c_num_ix ON customer (customer_num)
CREATE INDEX state_ix ON customer (state);
```

To process this CREATE SCHEMA block, the database server first accesses the system catalog to verify the following information:

- The new table and view names do not already exist in the database. (If the database is ANSI compliant, the database server verifies that the table and view names do not already exist for the specified owners.)
- The user has permission to create the tables and grant user privileges.
- The column names in the CREATE VIEW and CREATE INDEX statements exist in the **customer** table.

In addition to verifying this information and creating two new tables, the database server adds new rows to the following system catalog tables:

- **systables**
- **syscolumns**
- **sysviews**
- **systabauth**
- **syscolauth**
- **sysindexes**

The following two new rows of information are added to the **systables** system catalog table after the CREATE SCHEMA block shown on [page 2-4](#) is run.

```
tabname          customer
owner            maryl
partnum          16778361
tabid            101
rowsize          134
ncols            10
nindexes         2
nrows            0
created          04/26/1994
version          1
tabtype          T
locklevel        P
npused           0
fextsize         16
nextsize         16
flags            0
site
dbname

tabname          california
owner            maryl
partnum          0
tabid            102
rowsize          134
ncols            4
nindexes         0
nrows            0
created          04/26/1994
version          0
tabtype          V
locklevel        B
npused           0
fextsize         0
nextsize         0
flags            0
site
dbname
```

Each table recorded in the **systables** system catalog table is assigned a **tabid**, a system-assigned sequential ID number that uniquely identifies each table in the database. The system catalog tables receive **tabid** numbers 1 through 24, and the user-created tables receive **tabid** numbers beginning with 100.



The CREATE SCHEMA block adds 14 rows to the **syscolumns** system catalog table. These rows correspond to the columns in the table **customer** and the view **california**, as shown in the following example.

colname	tabid	colno	coltype	collength	colmin	colmax
customer_num	101	1	262	4		
fname	101	2	0	15		
lname	101	3	0	15		
company	101	4	0	20		
address1	101	5	0	20		
address2	101	6	0	20		
city	101	7	0	15		
state	101	8	0	2		
zipcode	101	9	0	5		
phone	101	10	0	18		
fname	102	1	0	15		
lname	102	2	0	15		
company	102	3	0	20		
phone	102	4	0	18		

In the **syscolumns** system catalog table, each column within a table is assigned a sequential column number, **colno**, that uniquely identifies the column within its table. In the **colno** column, the **fname** column of the **customer** table is assigned the value 2 and the **fname** column of the view **california** is assigned the value 1. The **colmin** and **colmax** columns contain no entries. These two columns contain values when a column is the first key in a composite index or is the only key in the index, has no null or duplicate values, and the UPDATE STATISTICS statement has been run.

The rows shown in the following example are added to the **sysviews** system catalog table. These rows correspond to the CREATE VIEW portion of the CREATE SCHEMA block:

tabidseqviewtext
102 0 create view 'mary1'.california (customer_num, fname, lname, company
102 1 ,address1, address2, city, state, zipcode, phone) as select x0.custom
102 2 er_num, x0.fname, x0.lname, x0.company, x0.address1, x0.address2
102 3 ,x0.city, x0.state, x0.zipcode, x0.phone from 'mary1'.customer
102 4 x0 where (x0.state = 'CA');

The **sysviews** system catalog table contains the CREATE VIEW statement that creates the view. Each line of the CREATE VIEW statement in the current schema is stored in this table. In the **viewtext** column, the **x0** that precedes the column names in the statement (for example, **x0.fname**) operates as an alias name that distinguishes among the same columns that are used in a self-join.

The CREATE SCHEMA block also adds rows to the **sysstabauth** system catalog table. These rows correspond to the user privileges granted on **customer** and **california** tables, as shown in the following example.

grantor	grantee	tabid	tabauth
maryl	public	101	su-idx--
maryl	cathl	101	SU-IDXAR
maryl	nhowe	101	--*-----
	maryl	102	SU-ID---

The **tabauth** column of this table specifies the table-level privileges granted to users on the **customer** and **california** tables. This column uses an 8-byte pattern—s (select), u (update), \* (column-level privilege), i (insert), d (delete), x (index), a (alter), r (references)—to identify the type of privilege. In this example, the user **nhowe** has column-level privileges on the **customer** table.

If the **tabauth** privilege code is uppercase (for example, S for select), the user who is granted this privilege can also grant it to others. If the **tabauth** privilege code is lowercase (for example, s for select), the user who has this privilege cannot grant it to others.

In addition, three rows are added to the **syscolauth** system catalog table. These rows correspond to the user privileges that are granted on specific columns in the **customer** table, as shown in the following example.

grantor	grantee	tabid	colno	colauth
maryl	nhowe	101	2	-u-
maryl	nhowe	101	3	-u-
maryl	nhowe	101	10	-u-

The **colauth** column specifies the column-level privileges that are granted on the **customer** table. This column uses a 3-byte pattern—s (select), u (update), r (references)—to identify the type of privilege. For example, the user **nhowe** has update privileges on the second column (because the **colno** value is 2) of the **customer** table (indicated by **tabid** value of 101).

The CREATE SCHEMA block adds two rows to the **sysindexes** system catalog table. These rows correspond to the indexes created on the **customer** table, as shown in the following example.

idxname	c_num_ix	state_ix
owner	maryl	maryl
tabid	101	101
idxtype	U	D
clustered		
part1	1	8
part2	0	0
part3	0	0
part4	0	0
part5	0	0
part6	0	0
part7	0	0
part8	0	0
part9	0	0
part10	0	0
part11	0	0
part12	0	0
part13	0	0
part14	0	0
part15	0	0
part16	0	0
levels		
leaves		
nunique		
clust		

In this table, the **idxtype** column identifies whether the created index is unique or a duplicate. For example, the index **c\_num\_ix** that is placed on the **customer\_num** column of the **customer** table is unique.

## Accessing the System Catalog

Normal user access to the system catalog is read only. Users with the Connect or Resource privileges cannot alter the system catalog. They can, however, access data in the system catalog tables on a read-only basis using standard SELECT statements. For example, the following SELECT statement displays all the table names and corresponding table ID numbers of user-created tables in the database:

```
SELECT tabname, tabid FROM systables WHERE tabid > 99
```



**Warning:** Although user **informix** and DBAs can modify most system catalog tables (only user **informix** can modify **systables**), Informix strongly recommends that you do not update, delete, or insert any rows in them. Modifying the system catalog tables can destroy the integrity of the database. Informix supports using the ALTER TABLE statement to modify the size of the next extent of system catalog tables.

## Updating System Catalog Data

The fact that the optimizer in Informix database servers determines the most efficient strategy for executing SQL queries allows you to query the database without having to fully consider which tables to search first in a join or which indexes to use. The optimizer uses information from the system catalog to determine the best query strategy.

By using the UPDATE STATISTICS statement to update the system catalog, you can ensure that the information provided to the optimizer is current. When you delete or modify a table, the database server does not automatically update the related statistical data in the system catalog. For example, if you delete rows in a table using the DELETE statement, the **nrows** column in the **systables** system catalog table, which holds the number of rows for that table, is not updated. The UPDATE STATISTICS statement causes the database server to recalculate data in the **systables**, **sysdistrib**, **syscolumns**, and **sysindexes** system catalog tables. After you run UPDATE STATISTICS, the **systables** system catalog table holds the correct value in the **nrows** column. If you use the medium or high mode with the UPDATE STATISTICS statement, the **sysdistrib** system catalog table holds the updated data-distribution data after you run UPDATE STATISTICS.

Whenever you modify a table extensively, use the UPDATE STATISTICS statement to update data in the system catalog. For more information on the UPDATE STATISTICS statement, see [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.

---

## Structure of the System Catalog

The following system catalog tables describe the structure of the Informix database:

- **sysblobs**
- **syschecks**
- **syscolauth**
- **syscoldepend**
- **syscolumns**
- **sysconstraints**
- **sysdefaults**
- **sysdepend**
- **sysdistrib**
- **sysfragauth**
- **sysfragments**
- **sysindexes**
- **sysobjstate**
- **sysopclstr**
- **sysprocauth**
- **sysprocbody**
- **sysprocedures**
- **sysprocplan**
- **sysreferences**
- **sysroleauth**
- **syssynonyms**
- **syssytable**

- **systabauth**
- **systables**
- **systrigbody**
- **systriggers**
- **sysusers**
- **sysviews**
- **sysviolations**

Do not confuse the system catalog tables of a database with the tables in the **sysmaster** database of OnLine database servers. The **sysmaster** tables also start with the **sys** prefix, but they contain information about an entire OnLine database server, which might manage many databases. The information in the **sysmaster** tables is primarily useful for OnLine DBAs. For more information about the **sysmaster** tables, see the [INFORMIX-OnLine Dynamic Server Administrator's Guide](#).

**GLS**

In a database whose collation order is locale dependent, all character information in the system catalog tables is stored in NCHAR rather than CHAR columns. However, for those databases where the collation order is code-set dependent, all character information in the system catalog tables is stored in CHAR columns. For more information on collation orders, see [Chapter 1](#) of the [Guide to GLS Functionality](#). For information about NCHAR and CHAR data types, see [Chapter 3](#) of the [Guide to GLS Functionality](#) and [Chapter 3](#) of this guide. ♦

## SYSBLOBS

The **sysblobs** system catalog table specifies the storage location of a blob column. It contains one row for each blob column in a table. Available only in OnLine, the **sysblobs** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
spacename	NCHAR(18)	Blobspace, dbspace, or family name
type	NCHAR(1)	Media type: M = Magnetic O = Optical
tabid	INTEGER	Table identifier
colno	SMALLINT	Column number

A composite index for the **tabid** and **colno** columns allows only unique values.

## SYSCHECKS

The **syschecks** system catalog table describes each check constraint defined in the database. Because the **syschecks** system catalog table stores both the ASCII text and a binary encoded form of the check constraint, it contains multiple rows for each check constraint. The **syschecks** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
constrid	INTEGER	Constraint identifier
type	NCHAR(1)	Form in which the check constraint is stored: B = Binary encoded T = ASCII text
seqno	SMALLINT	Line number of the check constraint
checktext	NCHAR(32)	Text of the check constraint

A composite index for the **constrid**, **type**, and **seqno** columns allows only unique values.

The text in the **checktext** column associated with B type in the **type** column is in computer-readable format. To view the text associated with a particular check constraint, use the following query with the appropriate constraint ID:

```
SELECT * FROM syschecks WHERE constring=10 AND type='T'
```

Each check constraint described in the **syschecks** system catalog table also has its own row in the **sysconstraints** system catalog table.

## SYSCOLAUTH

The **syscolauth** system catalog table describes each set of privileges granted on a column. It contains one row for each set of column privileges granted in the database. The **syscolauth** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
grantor	NCHAR(8)	Grantor of privilege
grantee	NCHAR(8)	Grantee (receiver) of privilege
tabid	INTEGER	Table identifier
colno	SMALLINT	Column number
colauth	NCHAR(3)	3-byte pattern that specifies column privileges: s = Select u = Update r = References

If the **colauth** privilege code is uppercase (for example, S for select), a user who has this privilege can also grant it to others. If the **colauth** privilege code is lowercase (for example, s for select), the user who has this privilege cannot grant it to others.

A composite index for the **tabid**, **grantor**, **grantee**, and **colno** columns allows only unique values. A composite index for the **tabid** and **grantee** columns allows duplicate values.



## SYSCOLDEPEND

The **syscoldepend** system catalog table tracks the table columns specified in check and not null constraints. Because a check constraint can involve more than one column in a table, the **syscoldepend** table can contain multiple rows for each check constraint. One row is created in the **syscoldepend** table for each column involved in the constraint. The **syscoldepend** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
constrid	INTEGER	Constraint identifier
tabid	INTEGER	Table identifier
colno	SMALLINT	Column number

A composite index for the **constrid**, **tabid**, and **colno** columns allows only unique values. A composite index for the **tabid** and **colno** columns allows duplicate values.

## SYSCOLUMNS

The **syscolumns** system catalog table describes each column in the database. One row exists for each column that is defined in a table or view. If you use OnLine, the **syscolumns** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
colname	NCHAR(18)	Column name
tabid	INTEGER	Table identifier
colno	SMALLINT	Column number sequentially assigned by the system (from left to right within each table)

(1 of 2)

Column Name	Type	Explanation																
coltype	SMALLINT	Code for column data type: <table style="margin-left: 40px; border: none;"> <tr> <td>0 = NCHAR</td> <td>8 = MONEY</td> </tr> <tr> <td>1 = SMALLINT</td> <td>10 = DATETIME</td> </tr> <tr> <td>2 = INTEGER</td> <td>11 = BYTE</td> </tr> <tr> <td>3 = FLOAT</td> <td>12 = TEXT</td> </tr> <tr> <td>4 = SMALLFLOAT</td> <td>13 = NVARCHAR</td> </tr> <tr> <td>5 = DECIMAL</td> <td>14 = INTERVAL</td> </tr> <tr> <td>6 = SERIAL</td> <td>15 = NCHAR</td> </tr> <tr> <td>7 = DATE</td> <td>16 = NVARCHAR</td> </tr> </table>	0 = NCHAR	8 = MONEY	1 = SMALLINT	10 = DATETIME	2 = INTEGER	11 = BYTE	3 = FLOAT	12 = TEXT	4 = SMALLFLOAT	13 = NVARCHAR	5 = DECIMAL	14 = INTERVAL	6 = SERIAL	15 = NCHAR	7 = DATE	16 = NVARCHAR
0 = NCHAR	8 = MONEY																	
1 = SMALLINT	10 = DATETIME																	
2 = INTEGER	11 = BYTE																	
3 = FLOAT	12 = TEXT																	
4 = SMALLFLOAT	13 = NVARCHAR																	
5 = DECIMAL	14 = INTERVAL																	
6 = SERIAL	15 = NCHAR																	
7 = DATE	16 = NVARCHAR																	
collength	SMALLINT	Column length (in bytes)																
colmin	INTEGER	Second minimum value																
colmax	INTEGER	Second maximum value																

(2 of 2)

A composite index for the **tabid** and **colno** columns allows only unique values.

If the **coltype** column contains a value greater than 256, it does not allow null values. To determine the data type for a **coltype** column that contains a value greater than 256, subtract 256 from the value and evaluate the remainder, based on the possible **coltype** values. For example, if a column has a **coltype** value of 262, subtracting 256 from 262 leaves a remainder of 6, which indicates that this column uses a SERIAL data type.

The value that the **collength** column holds depends on the data type of the column. If the data type of the column is BYTE or TEXT, **collength** holds the length of the descriptor. A **collength** value for a MONEY or DECIMAL column is determined using the following formula:

$$(\textit{precision} * 256) + \textit{scale}$$

For columns of type NVARCHAR, the *max\_size* and *min\_space* values are encoded in the **collength** column using one of the following formulas:

- If the **collength** value is positive:

$$\text{collength} = (\text{min\_space} * 256) + \text{max\_size}$$

- If the **collength** value is negative:

$$\text{collength} + 65536 = (\text{min\_space} * 256) + \text{max\_size}$$

For columns of type DATETIME or INTERVAL, **collength** is determined using the following formula:

$$(\text{length} * 256) + (\text{largest\_qualifier\_value} * 16) + \text{smallest\_qualifier\_value}$$

The *length* is the physical length of the DATETIME or INTERVAL field, and *largest\_qualifier* and *smallest\_qualifier* have the values shown in the following table.

Field Qualifier	Value
YEAR	0
MONTH	2
DAY	4
HOUR	6
MINUTE	8
SECOND	10
FRACTION(1)	11
FRACTION(2)	12
FRACTION(3)	13
FRACTION(4)	14
FRACTION(5)	15

For example, if a DATETIME YEAR TO MINUTE column has a length of 12 (such as YYYY:DD:MM:HH:MM), a *largest\_qualifier* value of 0 (for YEAR), and a *smallest\_qualifier* value of 8 (for MINUTE), the **collength** value is 3080, or  $(256 * 12) + (0 * 16) + 8$ .

For information about using the HEX function to display the **collength** and **coltype** values, see the Column Expression discussion in the Expression segment in [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.

The **colmin** and **colmax** column values hold the second-smallest and second-largest data values in the column, respectively. For example, if the values in an indexed column are 1, 2, 3, 4, and 5, the **colmin** value is 2 and the **colmax** value is 4. Storing the second-smallest and second-largest data values lets the database server make assumptions about the range of values in a given column and, in turn, further optimize searching strategies. The **colmin** and **colmax** columns contain values only if the column is indexed and you have run the UPDATE STATISTICS statement. If you store BYTE or TEXT data in the **tblspace**, the **colmin** value is -1. The values for all other noninteger column types are the initial 4 bytes of the maximum or minimum value, which are treated as an integer.

If you are using INFORMIX-SE, the **syscolumns** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation												
colname	NCHAR(18)	Column name												
tabid	INTEGER	Table identifier												
colno	SMALLINT	Column number sequentially assigned by the system (ordinally from left to right within each table)												
coltype	SMALLINT	Code for column data type: <table style="margin-left: 2em; border: none;"> <tr> <td>0 = NCHAR</td> <td>6 = SERIAL</td> </tr> <tr> <td>1 = SMALLINT</td> <td>7 = DATE</td> </tr> <tr> <td>2 = INTEGER</td> <td>8 = MONEY</td> </tr> <tr> <td>3 = FLOAT</td> <td>10 = DATETIME</td> </tr> <tr> <td>4 = SMALLFLOAT</td> <td>14 = INTERVAL</td> </tr> <tr> <td>5 = DECIMAL</td> <td>15 = NCHAR</td> </tr> </table>	0 = NCHAR	6 = SERIAL	1 = SMALLINT	7 = DATE	2 = INTEGER	8 = MONEY	3 = FLOAT	10 = DATETIME	4 = SMALLFLOAT	14 = INTERVAL	5 = DECIMAL	15 = NCHAR
0 = NCHAR	6 = SERIAL													
1 = SMALLINT	7 = DATE													
2 = INTEGER	8 = MONEY													
3 = FLOAT	10 = DATETIME													
4 = SMALLFLOAT	14 = INTERVAL													
5 = DECIMAL	15 = NCHAR													
collength	SMALLINT	Column length (in bytes)												

A composite index for the **tabid** and **colno** columns allows only unique values.

## SYSCONSTRAINTS

The **sysconstraints** system catalog table lists the constraints placed on the columns in each database table. An entry is also placed in the **sysindexes** system catalog table for each unique primary key or referential constraint that you create, if the constraint does not already have a corresponding entry in the **sysindexes** system catalog table. Because indexes can be shared, more than one constraint can be associated with an index. The **sysconstraints** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
constrid	SERIAL	System-assigned sequential identifier
constrname	NCHAR(18)	Constraint name
owner	NCHAR(8)	User name of owner
tabid	INTEGER	Table identifier
constrtype	NCHAR(1)	Constraint type: C = Check constraint P = Primary key R = Referential U = Unique N = Not null
idxname	NCHAR(18)	Index name

A composite index for the **constrname** and **owner** columns allows only unique values. The index for the **tabid** column allows duplicate values, and the index for the **constrid** column allows only unique values.

For check constraints (where **consttype** = C), the **idxname** is always null. Additional information about each check constraint is contained in the **syschecks** system catalog table.

## SYSDEFAULTS

The **sysdefaults** system catalog table lists the user-defined defaults that are placed on each column in the database. One row exists for each user-defined default value. If a default is not explicitly specified in the CREATE TABLE statement, no entry exists in this table. The **sysdefaults** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
tabid	INTEGER	Table identifier
colno	SMALLINT	Column identifier
type	NCHAR(1)	Default type: L = Literal default U = User C = Current N = Null T = Today S = Dbservername
default	NCHAR(256)	If default type = L, the literal default value

If a literal is specified for the default value, it is stored in the **default** column as ASCII text. If the literal value is not of type NCHAR, the **default** column consists of two parts. The first part is the 6-bit representation of the binary value of the default value structure. The second part is the default value in English text. The two parts are separated by a space.

If the data type of the column is not NCHAR or NVARCHAR, a binary representation is encoded in the **default** column.

A composite index for both the **tabid** and **colno** columns allows only unique values.

## SYSDEPEND

The **sysdepend** system catalog table describes how each view or table depends on other views or tables. One row exists in this table for each dependency, so a view based on three tables has three rows. The **sysdepend** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
btoid	INTEGER	Table identifier of base table or view
btype	NCHAR(1)	Base object type: T = Table V = View
dtoid	INTEGER	Table identifier of dependent table
dtype	NCHAR(1)	Dependent object type (V = View); currently, only view is implemented

The **btoid** and **dtoid** columns are indexed and allow duplicate values.

## SYSDISTRIB

The **sysdistrib** system catalog table stores data-distribution information for use by the database server. Data distributions provide detailed table column information to the optimizer to improve the choice of execution paths of SQL SELECT statements. Information is stored in the **sysdistrib** table when an UPDATE STATISTICS statement with mode MEDIUM or HIGH is run for a table. The **sysdistrib** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
tabid	INTEGER	Table identifier of the table where data was gathered
colno	SMALLINT	Column number in the source table
seqno	INTEGER	Sequence number for multiple entries
constructed	DATE	Date when the data distribution was created
mode	NCHAR(1)	Optimization level: L = Low M = Medium H = High
resolution	FLOAT	Specified in the UPDATE STATISTICS statement
confidence	FLOAT	Specified in the UPDATE STATISTICS statement
encdat	NCHAR(256)	ASCII-encoded histogram in fixed-length character field; accessible only to user <b>informix</b> .

You can select any column from **sysdistrib** except **encdat**. User **informix** can select the **encdat** column.



## SYSFRAGAUTH

The **sysfragauth** system catalog table stores information about the privileges that are granted on table fragments. The **sysfragauth** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
grantor	NCHAR(8)	Grantor of privilege
grantee	NCHAR(8)	Grantee (receiver) of privilege
tabid	INTEGER	Table identifier of the table that contains the fragment named in the <b>fragment</b> column.
fragment	NCHAR(18)	Name of dbspace where fragment is stored. Identifies the fragment on which privileges are granted.
fragauth	NCHAR(6)	A 6-byte pattern that specifies fragment-level privileges (including 3 bytes reserved for future use). This pattern contains one or more of the following codes:  u = Update  i = Insert  d = Delete

If a code in the **fragauth** column is lowercase, the grantee cannot grant the privilege to other users. If a code in the **fragauth** column is uppercase, the grantee can grant the privilege to other users.

A composite index for the **tabid**, **grantor**, **grantee**, and **fragment** columns allows only unique values. A composite index on the **tabid** and **grantee** columns allows duplicate values.

The following example displays the fragment-level privileges for one base table, as they appear in the **sysfragauth** system catalog table. The grantee **ted** can grant the UPDATE, DELETE, and INSERT privileges to other users.

grantor	grantee	tabid	fragment	fragauth
dba	dick	101	dbbsp1	-ui---
dba	jane	101	dbbsp3	--i---
dba	mary	101	dbbsp4	--id--
dba	ted	101	dbbsp2	-UID--

## SYSFRAGMENTS

Available only for OnLine, the **sysfragments** table stores fragmentation information for tables and indexes. One row exists for each table or index fragment.

The **sysfragments** table has the following columns:

Column Name	Type	Explanation
fragtype	NCHAR(1)	Fragment type: I = Index T = Table
tabid	INTEGER	Table identifier
indexname	NCHAR(18)	Index identifier
colno	SMALLINT	Blob column identifier
partn	INTEGER	Physical location identifier
strategy	NCHAR(1)	Distribution scheme type: R = Round robin E = Expression

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Column Name	Type	Explanation
		T = Table-based
location	NCHAR(1)	Reserved for future use; shows L for local
servername	NCHAR(18)	Reserved for future use
evalpos	INTEGER	Position of fragment in the fragmentation list
exprtext	TEXT	Expression that was entered
exprbin	BYTE	Binary version of expression
exprarr	BYTE	Range partitioning data used to optimize expression in range-expression fragmentation strategy
flags	INTEGER	Internally used
dbspace	NCHAR(18)	Dbspacename for fragment
levels	SMALLINT	Number of B+ tree index levels
npused	INTEGER	For table fragmentation strategy this is the number of data pages; for index fragmentation strategy this is the number of leaf pages
nrows	INTEGER	For tables this is the number of rows in the fragment; for indexes this is the number of unique keys
clust	INTEGER	Degree of index clustering; smaller numbers correspond to greater clustering

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The strategy type T is used for attached indexes (where index fragmentation is the same as the table fragmentation).

## SYSINDEXES

The **sysindexes** system catalog table describes the indexes in the database. It contains one row for each index that is defined in the database. The **sysindexes** system catalog table for the OnLine database server has the columns shown in the following table.

Column Name	Type	Explanation
idxname	NCHAR(18)	Index name
owner	NCHAR(8)	Owner of index (user <b>informix</b> for system catalog tables and user name for database tables)
tabid	INTEGER	Table identifier
idxtype	NCHAR(1)	Index type: U = Unique D = Duplicates
clustered	NCHAR(1)	Clustered or nonclustered index (C = Clustered)
part1	SMALLINT	Column number ( <b>colno</b> ) of a single index or the 1st component of a composite index
part2	SMALLINT	2nd component of a composite index
part3	SMALLINT	3rd component of a composite index
part4	SMALLINT	4th component of a composite index
part5	SMALLINT	5th component of a composite index
part6	SMALLINT	6th component of a composite index
part7	SMALLINT	7th component of a composite index
part8	SMALLINT	8th component of a composite index
part9	SMALLINT	9th component of a composite index
part10	SMALLINT	10th component of a composite index
part11	SMALLINT	11th component of a composite index

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Column Name	Type	Explanation
part12	SMALLINT	12th component of a composite index
part13	SMALLINT	13th component of a composite index
part14	SMALLINT	14th component of a composite index
part15	SMALLINT	15th component of a composite index
part16	SMALLINT	16th component of a composite index
levels	SMALLINT	Number of B+ tree levels
leaves	INTEGER	Number of leaves
nunique	INTEGER	Number of unique keys in the first column
clust	INTEGER	Degree of clustering: smaller numbers correspond to greater clustering

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Changes that affect existing indexes are reflected in this table only after you run the UPDATE STATISTICS statement.

Each **part $n$**  column component of a composite index (the **part1** through **part16** columns in this table) holds the column number (**colno**) of each part of the 16 possible parts of a composite index. If the component is ordered in descending order, the **colno** is entered as a negative value.

The **clust** column is blank until the UPDATE STATISTICS statement is run on the table. The maximum value is the number of rows in the table, and the minimum value is the number of data pages in the table.

The **tabid** column is indexed and allows duplicate values. A composite index for the **idxname**, **owner**, and **tabid** columns allows only unique values.

If you use SE, the **sysindexes** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
idxname	NCHAR(18)	Index name
owner	NCHAR(8)	Owner of index (user <b>informix</b> for system tables and user name for database tables)
tabid	INTEGER	Table identifier
idxtype	NCHAR(1)	Index type: U = Unique D = Duplicates
clustered	NCHAR(1)	Clustered or nonclustered index (C = Clustered)
part1	SMALLINT	Column number ( <b>colno</b> ) of a single index or the 1st component of a composite index
part2	SMALLINT	2nd component of a composite index
part3	SMALLINT	3rd component of a composite index
part4	SMALLINT	4th component of a composite index
part5	SMALLINT	5th component of a composite index
part6	SMALLINT	6th component of a composite index
part7	SMALLINT	7th component of a composite index
part8	SMALLINT	8th component of a composite index

Each **part $n$ th** column component of a composite index (the **part1** through **part8** columns in this table) holds the column number (**colno**) of each part of the eight possible parts of an index.

The **tabid** column is indexed and allows duplicate values. A composite index for the **idxname** and **tabid** columns allows only unique values.

## SYSOBJSTATE

The **sysobjstate** system catalog table stores information about the state (object mode) of database objects. The types of database objects listed in this table are indexes, triggers, and constraints.

Every index, trigger, and constraint in the database has a corresponding row in the **sysobjstate** table if a user created the object. Indexes that the database server created on the system catalog tables are not listed in the **sysobjstate** table because their object mode cannot be changed.

The **sysobjstate** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
objtype	NCHAR(1)	The type of database object. This column has one of the following codes:  C = Constraint  I = Index  T = Trigger
owner	NCHAR(8)	The owner of the database object
name	NCHAR(18)	The name of the database object
tabid	INTEGER	Table identifier of the table on which the database object is defined
state	NCHAR(1)	The current state (object mode) of the database object. This column has one of the following codes:  D = Disabled  E = Enabled  F = Filtering, with no integrity-violation errors  G = Filtering, with integrity-violation errors

A composite index for the **objtype**, **name**, **owner**, and **tabid** columns allows only unique values.

## SYSOPCLSTR

The **sysopclstr** system catalog table defines each optical cluster in the database. Available for OnLine only, it contains one row for each optical cluster. The **sysopclstr** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
owner	NCHAR(8)	Owner of the cluster
clstrname	NCHAR(18)	Name of the cluster
clstrsize	INTEGER	Size of the cluster
tabid	INTEGER	Table identifier
blobcol1	SMALLINT	Blob column number 1
blobcol2	SMALLINT	Blob column number 2
blobcol3	SMALLINT	Blob column number 3
blobcol4	SMALLINT	Blob column number 4
blobcol5	SMALLINT	Blob column number 5
blobcol6	SMALLINT	Blob column number 6
blobcol7	SMALLINT	Blob column number 7
blobcol8	SMALLINT	Blob column number 8
blobcol9	SMALLINT	Blob column number 9
blobcol10	SMALLINT	Blob column number 10
blobcol11	SMALLINT	Blob column number 11
blobcol12	SMALLINT	Blob column number 12
blobcol13	SMALLINT	Blob column number 13
blobcol14	SMALLINT	Blob column number 14
blobcol15	SMALLINT	Blob column number 15

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Column Name	Type	Explanation
blobcol16	SMALLINT	Blob column number 16
clstrkey1	SMALLINT	Cluster key number 1
clstrkey2	SMALLINT	Cluster key number 2
clstrkey3	SMALLINT	Cluster key number 3
clstrkey4	SMALLINT	Cluster key number 4
clstrkey5	SMALLINT	Cluster key number 5
clstrkey6	SMALLINT	Cluster key number 6
clstrkey7	SMALLINT	Cluster key number 7
clstrkey8	SMALLINT	Cluster key number 8
clstrkey9	SMALLINT	Cluster key number 9
clstrkey10	SMALLINT	Cluster key number 10
clstrkey11	SMALLINT	Cluster key number 11
clstrkey12	SMALLINT	Cluster key number 12
clstrkey13	SMALLINT	Cluster key number 13
clstrkey14	SMALLINT	Cluster key number 14
clstrkey15	SMALLINT	Cluster key number 15
clstrkey16	SMALLINT	Cluster key number 16

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A composite index for both the **clstrname** and **owner** columns allows only unique values. The **tabid** column allows duplicate values.

## SYSPROCAUTH

The **sysprocauth** table describes the privileges granted on a procedure. It contains one row for each set of privileges that are granted. The **sysprocauth** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
grantor	NCHAR(8)	Grantor of procedure
grantee	NCHAR(8)	Grantee (receiver) of procedure
procid	INTEGER	Procedure identifier
procauth	NCHAR(1)	Type of procedure permission granted: e = Execute permission on procedure E = Execute permission and the ability to grant it to others

A composite index for the **procid**, **grantor**, and **grantee** columns allows only unique values. The composite index for the **procid** and **grantee** columns allows duplicate values.

## SYSPROCBODY

The **sysprocbody** system catalog table describes the compiled version of each stored procedure in the database. Because the **sysprocbody** system catalog table stores the text of the procedure, each procedure can have multiple rows. The **sysprocbody** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
procid	INTEGER	Procedure identifier
datakey	NCHAR(1)	Data-descriptor type: D = User document text T = Actual procedure source R = Return value type list S = Procedure symbol table L = Constant procedure data string (that is, literal numbers or quoted strings) P = Interpreter instruction code
seqno	INTEGER	Line number of the procedure
data	NCHAR(256)	Actual text of the procedure

Although the **datakey** column indicates the type of data that is stored, the **data** column contains the actual data, which can be one of the following types: the encoded return values list, the encoded symbol table, constant data, compiled code for the procedure, or the text of the procedure and its documentation.

A composite index for the **procid**, **datakey**, and **seqno** columns allows only unique values.

## SYSPROCEDURES

The **sysprocedures** system catalog table lists the characteristics for each stored procedure in the database. It contains one row for each procedure. The **sysprocedures** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
procname	NCHAR(18)	Procedure name
owner	NCHAR(8)	Owner name
procid	SERIAL	Procedure identifier
mode	NCHAR(1)	Mode type: D = DBA O = Owner P = Protected
retsize	INTEGER	Compiled size (in bytes) of values
symsize	INTEGER	Compiled size (in bytes) of symbol table
datasize	INTEGER	Compiled size (in bytes) constant data
codesize	INTEGER	Compiled size (in bytes) of procedure instruction code
numargs	INTEGER	Number of procedure arguments

A composite index for the **procname** and **owner** columns allows only unique values.

A database server can create special-purpose protected stored procedures for internal use. The **sysprocedures** table identifies these protected procedures with the letter **P** in the mode column. You cannot modify or drop protected stored procedures or display them through **dbschema**.

## SYSPROCPLAN

The **sysprocplan** system catalog table describes the query-execution plans and dependency lists for data-manipulation statements within each stored procedure. Because different parts of a procedure plan can be created on different dates, the table can contain multiple rows for each procedure. The **sysprocplan** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
procid	INTEGER	Procedure identifier
planid	INTEGER	Plan identifier
datakey	NCHAR(1)	Identifier procedure plan part: D = Dependency list Q = Execution plan
seqno	INTEGER	Line number of plan
created	DATE	Date plan created
datasize	INTEGER	Size (in bytes) of the list or plan
data	NCHAR(256)	Encoded (compiled) list or plan

A composite index for the **procid**, **planid**, **datakey**, and **seqno** columns allows only unique values.

## SYSREFERENCES

The **sysreferences** system catalog table lists the referential constraints that are placed on columns in the database. It contains a row for each referential constraint in the database. The **sysreferences** table has the columns shown in the following table.

Column Name	Type	Explanation
constrid	INTEGER	Constraint identifier
primary	INTEGER	Constraint identifier of the corresponding primary key
ptabid	INTEGER	Table identifier of the primary key
updrule	NCHAR(1)	Reserved for future use; displays an R
delrule	NCHAR(1)	Displays cascading delete or restrict rule: C = Cascading delete R = Restrict (default)
matchtype	NCHAR(1)	Reserved for future use; displays an N
pendant	NCHAR(1)	Reserved for future use; displays an N

The **constrid** column is indexed and allows only unique values. The **primary** column is indexed and allows duplicate values. If you use SE, the contents of the **delrule** column are reserved.

## SYSROLEAUTH

The **sysroleauth** system catalog table describes the roles that are granted to users. It contains one row for each role that is granted to a user in the database. The **sysroleauth** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
rolename	NCHAR(user-size)	Name of the role
grantee	NCHAR(user-size)	Grantee (receiver) of role
is_grantable	NCHAR(1)	Specifies whether the role is grantable: Y = Grantable N = Not grantable

The **rolename** and **grantee** columns are indexed and allow only unique values. The **is\_grantable** column indicates whether the role was granted with the WITH GRANT OPTION on the GRANT statement.

## SYSSYNONYMS

The **syssynonyms** system catalog table lists the synonyms for each table or view. It contains a row for every synonym defined in the database. The **syssynonyms** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
owner	NCHAR(8)	User name of owner
synname	NCHAR(18)	Synonym identifier
created	DATE	Date synonym created
tabid	INTEGER	Table identifier



A composite index for the **owner** and **synonym** columns allows only unique values. The **tabid** column is indexed and allows duplicate values.

***Important:** Informix Version 4.0 or later products no longer use this table; however, any **syssynonyms** entries made before Version 4.0 remain in this table.*

## SYSSYNTABLE

The **syssyntable** system catalog table outlines the mapping between each synonym and the object it represents. It contains one row for each entry in the **systables** table that has a **tabtype** of **S**. The **syssyntable** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
tabid	INTEGER	Table identifier
servername	NCHAR(18)	Server name
dbname	NCHAR(18)	Database name
owner	NCHAR(8)	User name of owner
tablename	NCHAR(18)	Name of table
btabid	INTEGER	Table identifier of base table or view

If you define a synonym for a table that is in your current database, only the **tabid** and **btabid** columns are used. If you define a synonym for a table that is external to your current database, the **btabid** column is not used; but the **tabid**, **servername**, **dbname**, **owner**, and **tablename** columns are used.

The **tabid** column maps to the **tabid** column in **systables**. With the **tabid** information, you can determine additional facts about the synonym from **systables**.

An index for the **tabid** column allows only unique values. The **btabid** column is indexed to allow duplicate values.

If you are using SE, only the **tabid** and **btabid** columns are used.



## SYSTABAUTH

The **systabauth** system catalog table describes each set of privileges that are granted in a table. It contains one row for each set of table privileges that are granted in the database. The **systabauth** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
grantor	NCHAR(8)	Grantor of privilege
grantee	NCHAR(8)	Grantee (receiver) of privilege
tabid	INTEGER	Table identifier
tabauth	NCHAR(8)	8-byte pattern that specifies table privileges: s = Select u = Update * = Column-level authority i = Insert d = Delete x = Index a = Alter r = References

If the **tabauth** privilege code is uppercase (for example, S for select), a user who has this privilege also can grant it to others. If the **tabauth** privilege code is lowercase (for example, s for select), the user who has this privilege cannot grant it to others.

A composite index for the **tabid**, **grantor**, and **grantee** columns allows only unique values. The composite index for the **tabid** and **grantee** columns allows duplicate values.

## SYSTABLES

The **systables** system catalog table describes each table in the database. It contains one row for each table, view, or synonym that is defined in the database. This includes all database tables and the system catalog tables. If you use OnLine, the **systables** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
tablename	NCHAR(18)	Name of table, view, or synonym
owner	NCHAR(8)	Owner of table (user <b>informix</b> for system catalog tables and user name for database tables)
partnum	INTEGER	Tblspace identifier (similar to <b>tabid</b> )
tabid	SERIAL	System-assigned sequential ID number (system tables: 1-24, user tables: 100-nnn)
rowsize	SMALLINT	Row size
ncols	SMALLINT	Number of columns
nindexes	SMALLINT	Number of indexes
nrows	INTEGER	Number of rows
created	DATE	Date created
version	INTEGER	Number that changes when table is altered
tabtype	NCHAR(1)	Table type: T = Table V = View P = Private synonym P = Synonym (in an ANSI-compliant database) S = Synonym

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Column Name	Type	Explanation
locklevel	NCHAR(1)	Lock mode for a table: B = Page P = Page R = Row
npused	INTEGER	Number of data pages in use
fextsize	INTEGER	Size of initial extent (in kilobytes)
nextsize	INTEGER	Size of all subsequent extents (in kilobytes)
flags	SMALLINT	Reserved for future use
site	NCHAR(18)	Reserved for future use in OnLine (used to store database collation and Ctype information)
dbname	NCHAR(18)	Reserved for future use

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The **tabid** column is indexed and must contain unique values. A composite index for the **tabname** and **owner** columns allows only unique values. The **version** column contains an encoded number that is put into the **systables** system catalog table when the table is created. Portions of the encoded value are incremented when data-definition statements, such as ALTER INDEX, ALTER TABLE, DROP INDEX, and CREATE INDEX, are performed. When a prepared statement is executed, the **version** number is checked to make sure that nothing has changed since the statement was prepared. If the **version** number has changed, your statement does not execute and you must prepare your statement again.

The **npused** column does not reflect blob data used.

If you use SE, the **systables** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
tablename	NCHAR(18)	Name of table
owner	NCHAR(8)	Owner of table (user <b>informix</b> for system tables and user name for database tables)
dirpath	NCHAR(64)	Directory path for the table file
tabid	SERIAL	System assigned sequential ID number (system tables: 1-21, user tables: 100-nnn)
rowsize	SMALLINT	Row size
ncols	SMALLINT	Number of columns
nindexes	SMALLINT	Number of indexes
nrows	INTEGER	Number of rows
created	DATE	Date created
version	INTEGER	Number that changes when table is altered
tabtype	NCHAR(1)	Table type: T = Table V = View S = Synonym L = Log P = Synonym (in an ANSI-compliant database)
audpath	NCHAR(64)	Audit filename (full pathname)

The **dirpath** column contains the directory path for the table or log file. The **tabid** column is indexed and must contain unique values. A composite index for the **tablename** and **owner** columns allows only unique values.

The **systables** system catalog table has two additional rows to store the database locale: **GL\_COLLATE** with a **tabid** of 90, and **GL\_CTYPE** with a **tabid** of 91. Enter the following **SELECT** statement to view these rows:

```
SELECT tabname, tabid FROM systables
```

## SYSTRIGBODY

The **systrigbody** system catalog table contains the English text of the trigger definition and the linearized code for the trigger. Linearized code is binary data and code that is represented in ASCII format.

***Warning:** The database server uses the linearized code that is stored in **systrigbody**. You must not alter the content of rows that contain linearized code.*

The **systrigbody** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
trigid	INT	Trigger identifier
datakey	NCHAR	Type of data: D = English text for the header, trigger definition A = English text for the body, triggered actions H = Linearized code for the header S = Linearized code for the symbol table B = Linearized code for the body
seqno	INT	Sequence number
data	NCHAR(256)	English text or linearized code

A composite index for the **trigid**, **datakey**, and **seqno** columns allows only unique values.



## SYSTRIGGERS

The **systriggers** system catalog table contains miscellaneous information about the SQL triggers in the database. This information includes the trigger event and the correlated reference specification for the trigger. The **systriggers** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
trigid	SERIAL	Trigger identifier
trigname	NCHAR(18)	Trigger name
owner	NCHAR(8)	Owner of trigger
tabid	INT	ID of triggering table
event	NCHAR	Triggering event: I = Insert trigger U = Update trigger D = Delete trigger
old	NCHAR(18)	Name of value before update
new	NCHAR(18)	Name of value after update
mode	NCHAR	Reserved for future use

A composite index for the **trigname** and **owner** columns allows only unique values. The **trigid** column is indexed and must contain unique values. An index for the **tabid** column allows duplicate values.

## SYSUSERS

The **sysusers** system catalog table describes each set of privileges that are granted in the database. It contains one row for each user who has privileges in the database. The **sysusers** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
username	NCHAR(8)	Name of the database user or role
usertype	NCHAR(1)	Specifies database-level privileges: D = DBA (all privileges) R = Resource (create permanent tables and indexes) G = Role C = Connect (work within existing tables)
priority	SMALLINT	Reserved for future use
password	CHAR(8)	Reserved for future use

The **username** column is indexed and allows only unique values. The **username** can be the name of a role.

## SYSVIEWS

The **sysviews** system catalog table describes each view that is defined in the database. Because the **sysviews** system catalog table stores the SELECT statement that you use to create the view, it can contain multiple rows for each view into the database. The **sysviews** system catalog table has the columns shown in the following table.

Column Name	Type	Explanation
tabid	INTEGER	Table identifier
seqno	SMALLINT	Line number of the SELECT statement
viewtext	NCHAR(64)	Actual SELECT statement used to create the view

A composite index for the **tabid** and **seqno** columns allows only unique values.

## SYSVIOLATIONS

The **sysviolations** system catalog table stores information about the violations and diagnostics tables for base tables. Every table in the database that has a violations and diagnostics table associated with it has a corresponding row in the **sysviolations** table. The **sysviolations** database table has the columns shown in the following table.

Column Name	Type	Explanation
targettid	INTEGER	Table identifier of the target table. The target table is the base table on which the violations and diagnostics tables are defined.
viotid	INTEGER	Table identifier of the violations table
diatid	INTEGER	Table identifier of the diagnostics table

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Column Name	Type	Explanation
maxrows	INTEGER	<p>Maximum number of rows that can be inserted into the diagnostics table during a single insert, update, or delete operation on a target table that has a filtering mode object defined on it.</p> <p>Also signifies the maximum number of rows that can be inserted into the diagnostics table during a single operation that enables a disabled object or sets a disabled object to filtering mode (provided that a diagnostics table exists for the target table).</p> <p>If no maximum has been specified for the diagnostics table, this column contains a null value.</p>

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The primary key of the **sysviolations** table is the **targettid** column. Unique indexes are also defined on the **viotid** and **diatid** columns.

---

## System Catalog Map

Figure 2-1 displays the column names of the tables in an OnLine system catalog. The lines connecting a column in one table to a column in another table indicate columns that contain the same information. The columns in parentheses apply to SE only.

**Figure 2-1**  
System Catalog Map

**systables**

tabid tabname owner (dirpath) rowsize ncols nindexes nrows created version tabtype  
(audpath) partnum locklevel npused fextsize nextsize flags site dbname

**sysstable**

tabid tabname servername dbname owner btabid

**sys synonyms**

tabid owner synname created

**sysdepend**

btabid btype dtabid dtype

**syscolumns**

tabid colno colname coltype collength colmin colmax

**syscolauth**

tabid colno grantor grantee colauth

**sysusers**

username usertype priority password

**sysindexes**

tabid idxname owner idxtype clustered part1-part16 levels leaves nunique clust

**sysconstraints**

tabid idxname constrid constrname owner constrtype

**sysfragments**

tabid fragtype indexname colno partn strategy location servername evalpos  
exprtext exprbin exprarr flags dbspace levels npused nrows clust

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**sysopclstr**

tabid owner clstrname clstrsize blobcol1-blobcol16 clstrkey1-clstrkey16

**systriggers**

tabid trigid trigname owner event old new mode

**sysstrigbody**

trigid datakey seqno data

**sysdistrib**

tabid colno seqno constructed mode resolution confidence encdat

**sysstabauth**

tabid grantor grantee tabauth

**sysviews**

tabid seqno viewtext

**sysblobs**

tabid spacename type colno

**sysfragauth**

tabid grantor grantee fragment fragauth

**sysobjstate**

tabid objtype owner name state

**sysprocplan**

procid planid datakey seqno created  
datasize data

**sysprocbody**

procid datakey seqno data

**sysprocedures**

procid procname owner mode retsize  
symsize datasize codesize numargs

**sysprocauth**

procid procauth grantor grantee

**sysroleauth**

rolename is\_grantable grantee

**sysdefaults**

tabid colno type default

**syscoldepend**

tabid colno constrid

**syschecks**

constrid type seqno checktext

**sysreferences**

constrid primary ptabid updrule delrule matchtype pendant

**sysviolations**

targettid viotid diatid maxrows

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---

## Information Schema

The Information Schema consists of read-only views that provide information about all the tables, views, and columns on the current database server to which you have access. In addition, Information Schema views provide information about SQL dialects (such as Informix, Oracle, or Sybase) and SQL standards.

This version of the Information Schema views are X/Open CAE standards. Informix provides them so that applications developed on other database systems can obtain Informix system catalog information without having to use the Informix system catalogs directly.

**Important:** *Because the X/Open CAE standards Information Schema views differ from ANSI-compliant Information Schema views, Informix recommends that you do not install the X/Open CAE Information Schema views on ANSI-compliant databases.*



The following Information Schema views are available:

- **tables**
- **columns**
- **sql\_languages**
- **server\_info**

The following sections contain information about generating and accessing Information Schema views as well as information about their structure.

## Generating the Information Schema Views

The Information Schema views are generated automatically when you, as DBA, run the following DB-Access command:

```
dbaccess database-name $INFORMIXDIR/etc/xpg4_is.sql
```

The views are populated by data in the Informix system catalog tables. If tables, views, or stored procedures exist with any of the same names as the Information Schema views, you need to either rename the database objects or rename the views in the script before you can install the views. You can drop the views by using the DROP VIEW statement on each view. Re-create the views by running the script again.



**Important:** In addition to the columns specified for each Information Schema view, individual vendors might include additional columns or change the order of the columns. Informix recommends that applications **not** use the forms `SELECT *` or `SELECT table-name*` to access an Information Schema view.

## Accessing the Information Schema Views

All Information Schema views have the Select privilege granted to PUBLIC WITH GRANT OPTION so that all users can query the views. Because no other privileges are granted on the Information Schema views, they cannot be updated.

You can query the Information Schema views as you would query any other table or view in the database.

## Structure of the Information Schema Views

The following views are described in this section:

- **tables**
- **columns**
- **sql\_languages**
- **server\_info**

Most of the columns in the views are defined as VARCHAR data types with large maximums to accept large names and in anticipation of long identifier names in future standards.

### ***TABLES***

The **tables** Information Schema view contains one row for each table to which you have access. It contains the columns shown in the following table.

Column Name	Data Type	Explanation
table_schema	VARCHAR(128)	Owner of table
table_name	VARCHAR(128)	Name of table or view
table_type	VARCHAR(128)	BASE TABLE for table or VIEW for view
remarks	VARCHAR(255)	Reserved

The visible rows in the **tables** view depend on your privileges. For example, if you have one or more privileges on a table (such as Insert, Delete, Select, References, Alter, Index, or Update on one or more columns), or if these privileges have been granted to PUBLIC, you see one row describing that table.

**COLUMNS**

The **columns** Information Schema view contains one row for each accessible column. It contains the columns shown in the following table.

Column Name	Data Type	Explanation
table_schema	VARCHAR(128)	Owner of table
table_name	VARCHAR(128)	Name of table or view
column_name	VARCHAR(128)	Name of the column of the table or view
ordinal_position	INTEGER	Ordinal position of the column. The ordinal_position of a column in a table is a sequential number starting at 1 for the first column. This column is an Informix extension to XPG4.
data_type	VARCHAR(254)	Data type of the column, such as CHARACTER or DECIMAL
char_max_length	INTEGER	Maximum length for character data types; null otherwise
numeric_precision	INTEGER	Total number of digits allowed for exact numeric data types (DECIMAL, INTEGER, MONEY, and SMALLINT), and the number of digits of mantissa precision for approximate data types (FLOAT and SMALLFLOAT), and null for all other data types. The value is machine dependent for FLOAT and SMALLFLOAT.
numeric_prec_radix	INTEGER	Uses one of the following values: Two approximate data types (FLOAT and SMALLFLOAT) 10 exact numeric data types (DECIMAL, INTEGER, MONEY, and SMALLINT) Null for all other data types

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Column Name	Data Type	Explanation
numeric_scale	INTEGER	Number of significant digits to the right of the decimal point for DECIMAL and MONEY data types: 0 for INTEGER and SMALLINT data types Null for all other data types
datetime_precision	INTEGER	Number of digits in the fractional part of the seconds for DATE and DATETIME columns; null otherwise. This column is an Informix extension to XPG4.
is_nullable	VARCHAR(3)	Indicates whether a column allows nulls; either YES or NO
remarks	VARCHAR(254)	Reserved

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### SQL\_LANGUAGES

The **sql\_languages** Information Schema view contains a row for each instance of conformance to standards that the current database server supports. If the database server is INFORMIX-SE, the table shows no rows. The **sql\_languages** Information Schema view contains the columns shown in the following table.

Column Name	Data Type	Explanation
source	VARCHAR(254)	Organization that defines this SQL version
source_year	VARCHAR(254)	Year the source document was approved
conformance	VARCHAR(254)	Which conformance is supported
integrity	VARCHAR(254)	Indicates whether this is an integrity enhancement feature; either YES or NO

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Column Name	Data Type	Explanation
implementation	VARCHAR(254)	Identifies the vendor's SQL product
binding_style	VARCHAR(254)	Direct, module, or other bind style
programming_lang	VARCHAR(254)	Host language for which the binding style is adopted

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The **sql\_languages** Information Schema view is completely visible to all users.

### **SERVER\_INFO**

The **server\_info** Information Schema view describes the database server to which the application is currently connected. It contains the columns shown in the following table.

Column Name	Data Type	Explanation
server_attribute	VARCHAR(254)	An attribute of the database server
attribute_value	VARCHAR(254)	Value of the server_attribute as it applies to the current database server

Each row in this view provides information about one attribute. X/Open-compliant databases must provide applications with certain required information about the database server. The **server\_info** view includes the information shown in the following table.

server_attribute	Description
identifier_length	Maximum number of characters for a user-defined name
row_length	Maximum length of a row

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<b>server_attribute</b>	<b>Description</b>
<b>userid_length</b>	Maximum number of characters of a user name (or “authorization identifier”)
<b>txn_isolation</b>	Initial transaction isolation level that the database server assumes: Read Committed Default isolation level for databases created without logging Read Uncommitted Default isolation level for databases created with logging, but not ANSI compliant Serializable Default isolation level for ANSI-compliant databases
<b>collation_seq</b>	Assumed ordering of the character set for the database server. The following values are possible: ISO 8859-1 EBCDIC The Informix representation shows ISO 8859-1

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The **server\_info** Information Schema view is completely visible to all users.

# Data Types

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**E**very column in a table is assigned a *data type*. The data type precisely defines the type of values that you can store in that column.

This chapter covers the following topics:

- Data types supported by Informix products
- Data type conversions
- DATE, DATETIME, and INTERVAL values in arithmetic and relational expressions

---

## Database Data Types

You assign data types with the CREATE TABLE statement and change them with the ALTER TABLE statement. When you change an existing data type, all data is converted to the new data type, if possible. For more information on the ALTER TABLE and CREATE TABLE statements and data type syntax conventions, refer to [Chapter 1](#) of the *Informix Guide to SQL: Syntax*. For a general introduction to data types, see the *Informix Guide to SQL: Tutorial*.

## Summary of Data Types

Informix products recognize the data types listed in Figure 3-1. The remainder of this chapter describes each of these data types.

**Figure 3-1**  
Data Types Recognized by Informix Products

Data Type	Explanation
BYTE	Stores any kind of binary data
CHAR( <i>n</i> )	Stores single-byte or multibyte sequences of characters, including letters, numbers, and symbols; collation is code-set dependent
CHARACTER( <i>n</i> )	Is a synonym for CHAR
CHARACTER VARYING( <i>m,r</i> )	Stores single-byte and multibyte sequences of characters, including letters, numbers, and symbols of varying length (ANSI compliant); collation is code-set dependent
DATE	Stores calendar date
DATETIME	Stores calendar date combined with time of day
DEC	Is a synonym for DECIMAL
DECIMAL	Stores numbers with definable scale and precision
DOUBLE PRECISION	Behaves the same way as FLOAT
FLOAT( <i>n</i> )	Stores double-precision floating-point numbers corresponding to the <b>double</b> data type in C
INT	Is a synonym for INTEGER
INTEGER	Stores whole numbers from $-2,147,483,647$ to $+2,147,483,647$
INTERVAL	Stores span of time
MONEY( <i>p,s</i> )	Stores currency amount
NCHAR( <i>n</i> )	Stores single-byte and multibyte sequences of characters, including letters, numbers, and symbols; collation is locale dependent
NUMERIC( <i>p,s</i> )	Is a synonym for DECIMAL
NVARCHAR( <i>m,r</i> )	Stores single-byte and multibyte sequences of characters, including letters, numbers, and symbols of varying length; collation is locale dependent

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Data Type	Explanation
REAL	Is a synonym for SMALLFLOAT
SERIAL	Stores sequential integers
SMALLFLOAT	Stores single-precision floating-point numbers corresponding to the <b>float</b> data type in C
SMALLINT	Stores whole numbers from $-32,767$ to $+32,767$
TEXT	Stores any kind of text data
VARCHAR( <i>m,r</i> )	Stores multibyte strings of letters, numbers, and symbols of varying length; collation is code-set dependent

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## BYTE

The BYTE data type stores any kind of binary data in an undifferentiated byte stream. Binary data typically consists of saved spreadsheets, program load modules, digitized voice patterns, and so on.

**Important:** *The INFORMIX-SE database server does not support this data type.*

The BYTE data type has no maximum size. A BYTE column has a theoretical limit of  $2^{31}$  bytes and a practical limit determined by your disk capacity.

You can store, retrieve, update, or delete the contents of a BYTE column. However, you cannot use BYTE data items in arithmetic or string operations, or assign literals to BYTE items with the SET clause of the UPDATE statement. You also cannot use BYTE items in any of the following ways:

- With aggregate functions
- With the IN clause
- With the MATCHES or LIKE clauses
- With the GROUP BY clause
- With the ORDER BY clause

You can use BYTE objects in a Boolean expression only if you are testing for null values.



You can insert data into BYTE columns in the following ways:

- With the **dbload** or **onload** utilities
- With the LOAD statement (DB-Access)
- From BYTE host variables (INFORMIX-ESQL/C)
- By declaring a FILE (INFORMIX-ESQL/COBOL)

You cannot use a quoted text string, number, or any other actual value to insert or update BYTE columns.

When you select a BYTE column, you can choose to receive all or part of it. To see it all, use the regular syntax for selecting a column. You can also select any part of a BYTE column by using subscripts as shown in the following example:

```
SELECT cat_picture [1,75] FROM catalog WHERE catalog_num = 10001
```

This statement reads the first 75 bytes of the **cat\_picture** column associated with the catalog number 10001.

*Tip:* If you select a BYTE column using the DB-Access Interactive Schema Editor, only the phrase “BYTE value” is returned; no actual value is displayed.



## CHAR(*n*)

The CHAR data type stores any sequence of letters, numbers, and symbols. It can store single-byte and multibyte characters, based on what the chosen locale supports. For more information on multibyte CHARs, see [“Multibyte Characters with CHAR” on page 3-7](#).

A character column has a maximum length *n* bytes, where  $1 \leq n \leq 32,767$ . (If you are using SE, the maximum length is 32,511.) If you do not specify *n*, CHAR(1) is assumed. Character columns typically store names, addresses, phone numbers, and so on.

Because the length of this column is fixed, when a character value is retrieved or stored, exactly *n* bytes of data are transferred. If the character string is shorter than *n* bytes, the string is extended with spaces to make up the length. If the string value is longer than *n* bytes, the string is truncated.



GLS

### ***Collating CHAR Data***

The collation order of the CHAR data type depends on the code set. That is, this data is sorted by the order of characters as they appear in the code set. For more information, see [Chapter 1](#) of the *Guide to GLS Functionality*. ♦

GLS

### ***Multibyte Characters with CHAR***

Multibyte characters used in a database must be supported by the database locale. If you are storing multibyte characters, make sure to calculate the number of bytes needed. For more information on multibyte characters and locales, see [Chapter 1](#) of the *Guide to GLS Functionality*. ♦

### ***Treating CHAR Values as Numeric Values***

If you plan to perform calculations on numbers stored in a column, you should assign a number data type to that column. Although you can store numbers in CHAR columns, you might not be able to use them in some arithmetic operations. For example, if you are inserting the sum of values into a character column, you might experience overflow problems if the character column is too small to hold the value. In this case, the insert fails. However, numbers that have leading zeros (such as some zip codes) have the zeros stripped if they are stored as number types INTEGER or SMALLINT. Instead, store these numbers in CHAR columns.

CHAR values are compared to other CHAR values by taking the shorter value and padding it on the right with spaces until the values have equal length. Then the two values are compared for the full length. Comparisons use the code-set collation order.

### ***Nonprintable Characters with CHAR***

A CHAR value can include tabs, spaces, and other nonprintable characters. However, you must use an application to insert the nonprintable characters into host variables and to insert the host variables into your database. After passing nonprintable characters to the database server, you can store or retrieve the characters. When you select nonprintable characters, fetch them into host variables and display them using your own display mechanism.

## CHARACTER(*n*)

The only nonprintable character that you can enter and display with DB-Access is a tab. If you try to display other nonprintable characters using DB-Access, your screen returns inconsistent results.

## CHARACTER(*n*)

The CHARACTER data type is a synonym for CHAR.

## CHARACTER VARYING(*m,r*)

The CHARACTER VARYING data type stores any multibyte string of letters, numbers, and symbols of varying length, where *m* is the maximum size of the column and *r* is the minimum amount of space reserved for that column. The CHARACTER VARYING data type complies with ANSI standards; the Informix VARCHAR data type supports the same functionality. See the description of the VARCHAR data type on [page 3-25](#).



**Important:** The INFORMIX-SE database server does not support this data type.

## DATE

The DATE data type stores the calendar date. DATE data types require 4 bytes. A calendar date is stored internally as an integer value equal to the number of days since December 31, 1899.

Because DATE values are stored as integers, you can use them in arithmetic expressions. For example, you can subtract a DATE value from another DATE value. The result, a positive or negative INTEGER value, indicates the number of days that elapsed between the two dates.

The default display format of a DATE column is shown in the following example:

*mm/ dd/ yyyy*

In this example, *mm* is the month (1-12), *dd* is the day of the month (1-31), and *yyyy* is the year (0001-9999). For the month, Informix products accept a number value 1 or 01 for January, and so on. For the day, Informix products accept a value 1 or 01 that corresponds to the first day of the month, and so on.

If you enter only a two-digit value for year, how Informix products fill in the century digits depends on how you set the **DBCENTURY** environment variable. For example, if you enter the year value as 95, whether that year value is stored as 1995 or 2095 depends on the setting of your **DBCENTURY** variable. If you do not set the **DBCENTURY** environment variable, then your Informix products consider the present century as the default. For information on how to set the **DBCENTURY** environment variable, refer to [page 4-18](#).

If you specify a locale other than the default locale, you can display culture-specific formats for dates. The locales and the **GL\_DATE** and **DB\_DATE** environment variables affect the display formatting of DATE values. They do not affect the internal format used in a DATE column of a database. You can change the default DATE format by setting the **DBDATE** or **GL\_DATE** environment variable. GLS functionality permits the display of international DATE formats. For more information, see [Chapter 2](#) of the *Guide to GLS Functionality*. ♦

## DATETIME

The DATETIME data type stores an instant in time expressed as a calendar date and time of day. You choose how precisely a DATETIME value is stored; its precision can range from a year to a fraction of a second.

The DATETIME data type is composed of a contiguous sequence of fields that represents each component of time you want to record and uses the following syntax:

```
DATETIME largest_qualifier TO smallest_qualifier
```

The *largest\_qualifier* and *smallest\_qualifier* can be any one of the fields listed in [Figure 3-2](#).

**Figure 3-2**  
DATETIME Field Qualifiers

Qualifier Field	Valid Entries
YEAR	A year numbered from 1 to 9,999 (A.D.)
MONTH	A month numbered from 1 to 12
DAY	A day numbered from 1 to 31, as appropriate to the month
HOUR	An hour numbered from 0 (midnight) to 23
MINUTE	A minute numbered from 0 to 59
SECOND	A second numbered from 0 to 59
FRACTION	A decimal fraction of a second with up to 5 digits of precision. The default precision is 3 digits (a thousandth of a second). Other precisions are indicated explicitly by writing FRACTION( <i>n</i> ), where <i>n</i> is the desired number of digits from 1 to 5.

A DATETIME column does not need to include all fields from YEAR to FRACTION; it can include a subset of fields or even a single field. For example, you can enter a value of MONTH TO HOUR into a column that is defined as YEAR TO MINUTE, as long as each entered value contains information for a contiguous sequence of fields. You cannot, however, define a column for just MONTH and HOUR; this entry must also include a value for DAY.

For a detailed description of the DATETIME syntax, see the DATETIME field qualifier segment in the *Informix Guide to SQL: Syntax*. If you are using the DB-Access TABLE menu and you do not specify the DATETIME qualifiers, the default DATETIME qualifier, YEAR TO YEAR, is assigned.

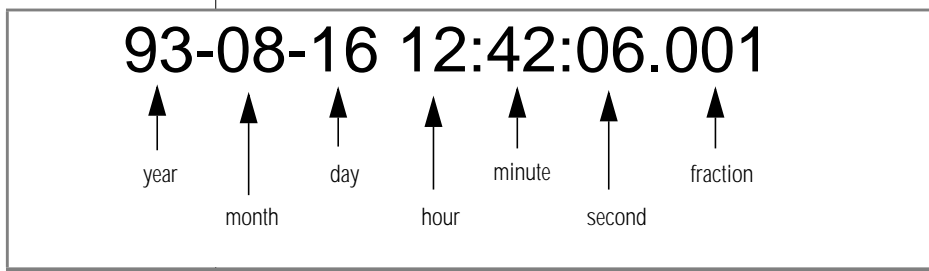
A valid DATETIME literal must include the DATETIME keyword, the values to be entered, and the field qualifiers. (See the discussion of literal DATETIME in [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.) You must include these qualifiers because, as noted earlier, the value you enter can contain fewer fields than defined for that column. Acceptable qualifiers for the first and last fields are identical to the list of valid DATETIME fields listed in Figure 3-2.

Values for the field qualifiers are written as integers and separated by delimiters. Figure 3-3 lists the delimiters that are used with DATETIME values in the U.S. ASCII English locale.

**Figure 3-3**  
*Delimiters Used with DATETIME*

Delimiter	Placement in DATETIME Expression
hyphen	Between the YEAR, MONTH, and DAY portions of the value
space	Between the DAY and HOUR portions of the value
colon	Between the HOUR and MINUTE and the MINUTE and SECOND portions of the value
decimal point	Between the SECOND and FRACTION portions of the value

Figure 3-4 shows a DATETIME YEAR TO FRACTION(3) value with delimiters.



**Figure 3-4**  
*Example DATETIME Value with Delimiters*

When you enter a value with fewer fields than the defined column, the value you enter is expanded automatically to fill all the defined fields. If you leave out any more-significant fields, that is, fields of larger magnitude than any value you supply, those fields are filled automatically with the current date. If you leave out any less-significant fields, those fields are filled with zeros (or a 1 for MONTH and DAY) in your entry.

You also can enter DATETIME values as character strings. However, the character string must include information for each field defined in the DATETIME column. The INSERT statement in the following example shows a DATETIME value entered as a character string:

```
INSERT into cust_calls (customer_num, call_dtime, user_id,
    call_code, call_descr)
VALUES (101, '1993-08-14 08:45', 'maryj', 'D',
    'Order late - placed 6/1/92')
```

In this example, the **call\_dtime** column is defined as DATETIME YEAR TO MINUTE. This character string must include values for the year, month, day, hour, and minute fields. If the character string does not contain information for all defined fields (or adds additional fields), the database server returns an error. For more information on entering DATETIME values as character strings, see [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.

All fields of a DATETIME column are two-digit numbers except for the year and fraction fields. The year field is stored as four digits. When you enter a two-digit value in the year field, how the century digits are filled in and interpreted depends on the value you assign to the **DBCENTURY** environment variable. For example, if you enter 95 as the year value, whether the year is interpreted as 1995 or 2095 depends on the setting of the **DBCENTURY** variable. If you do not set the **DBCENTURY** environment variable, then your Informix products consider the present century to be the default. For information on setting and using the **DBCENTURY** environment variable, see [page 4-18](#).

The fraction field requires  $n$  digits where  $1 \leq n \leq 5$ , rounded up to an even number. You can use the following formula (rounded up to a whole number of bytes) to calculate the number of bytes required for a DATETIME value:

$$\text{total number of digits for all fields} / 2 + 1$$

For example, a YEAR TO DAY qualifier requires a total of eight digits (four for year, two for month, and two for day). This data value requires 5, or  $(8/2) + 1$ , bytes of storage.

For information on using DATETIME data in arithmetic and relational expressions, see [“Range of Operations Using DATE, DATETIME, and INTERVAL” on page 3-30](#). For information on using DATETIME as a constant expression, see [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.

If you specify a locale other than U.S. ASCII English, the locale defines the culture-specific display formats for DATETIME values. For more information, see the [Guide to GLS Functionality](#). You can change the default display format by changing the setting of the `GL_DATETIME` environment variable. With an SQL API, the `DBTIME` environment variable also affects DATETIME formatting. For more information, see [page 4-36](#). Locales and the `GL_DATE` and `DB_DATE` environment variables affect the display of datetime data. They do not affect the internal format used in a DATETIME column. ♦

## DEC

The DEC data type is a synonym for DECIMAL.

## DECIMAL

The DECIMAL data type can take two forms: `DECIMAL(p)` floating point, and `DECIMAL(p,s)` fixed point.

### *DECIMAL Floating Point*

The DECIMAL data type stores decimal floating-point numbers up to a maximum of 32 significant digits, where  $p$  is the total number of significant digits (the *precision*). Specifying precision is optional. If you do not specify the precision ( $p$ ), DECIMAL is treated as `DECIMAL(16)`, a floating decimal with a precision of 16 places. `DECIMAL(p)` has an absolute value range between  $10^{-130}$  and  $10^{124}$ .

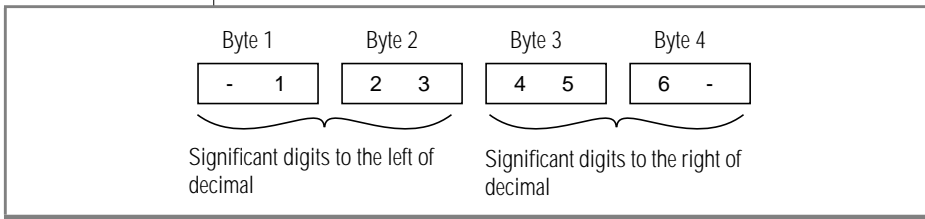
If you are using an ANSI-compliant database and specify `DECIMAL(p)`, the value defaults to `DECIMAL(p, 0)`. See the following discussion for more information about fixed-point decimal values.

### DECIMAL Fixed Point

In fixed-point numbers,  $\text{DECIMAL}(p,s)$ , the decimal point is fixed at a specific place, regardless of the value of the number. When you specify a column of this type, you write its precision ( $p$ ) as the total number of digits it can store, from 1 to 32. You write its *scale* ( $s$ ) as the total number of digits that fall to the right of the decimal point. All numbers with an absolute value less than  $0.5 * 10^{-s}$  have the value zero. The largest absolute value of a variable of this type that you can store without an error is  $10^{p-s} - 10^{-s}$ . A DECIMAL data type column typically stores numbers with fractional parts that must be stored and displayed exactly (for example, rates or percentages).

### DECIMAL Storage

The database server uses 1 byte of disk storage to store two digits of a decimal number. The database server uses an additional byte to store the exponent and sign. The significant digits to left of the decimal and the significant digits to the right of the decimal are stored on separate groups of bytes. This is best illustrated with an example. If you specify  $\text{DECIMAL}(6,3)$ , the data type consists of three significant digits to the left of the decimal and three significant digits to the right of the decimal (for instance, 123.456). The three digits to the left of the decimal are stored on 2 bytes (where one of the bytes only holds a single digit) and the three digits to the right of the decimal are stored on another 2 bytes as illustrated in Figure 3-5. (The exponent byte is not shown.) With the additional byte required for the exponent and sign, this data type requires a total of 5 bytes of storage.



**Figure 3-5**  
Schematic  
Illustrating the  
Storage of Digits in  
a Decimal Value

You can use the following formulas (rounded *down* to a whole number of bytes) to calculate the byte storage ( $N$ ) for a decimal data type ( $N$  includes the byte required to store the exponent and sign):

$$\text{If the scale is odd: } N = (\text{precision} + 4) / 2$$

$$\text{If the scale is even: } N = (\text{precision} + 3) / 2$$



For example, the data type DECIMAL(5,3) requires 4 bytes of storage ( $9/2$  rounded down equals 4).

There is one caveat to these formulas. The maximum number of bytes the database server uses to store a decimal value is 17. One byte is used to store the exponent and sign leaving 16 bytes to store up to 32 digits of precision. If you specify a precision of 32 and an *odd* scale, however, you lose 1 digit of precision. Consider, for example, the data type DECIMAL(32,31). This decimal is defined as 1 digit to the left of the decimal and 31 digits to the right. The 1 digit to the left of the decimal requires 1 byte of storage. This leaves only 15 bytes of storage for the digits to the right of the decimal. The 15 bytes can accommodate only 30 digits, so 1 digit of precision is lost.

## DOUBLE PRECISION

Columns defined as DOUBLE PRECISION behave the same as those defined as FLOAT.

## FLOAT(*n*)

The FLOAT data type stores double-precision floating-point numbers with up to 16 significant digits. FLOAT corresponds to the **double** data type in C. The range of values for the FLOAT data type is the same as the range of values for the C **double** data type on your computer.

You can use *n* to specify the precision of a FLOAT data type, but SQL ignores the precision. The value *n* must be a whole number between 1 and 14.

A column with the FLOAT data type typically stores scientific numbers that can be calculated only approximately. Because floating-point numbers retain only their most significant digits, the number you enter in this type of column and the number the database server displays can differ slightly. This depends on how your computer stores floating-point numbers internally. For example, you might enter a value of 1.1000001 into a FLOAT field and, after processing the SQL statement, the database server might display this value as 1.1. This occurs when a value has more digits than the floating-point number can store. In this case, the value is stored in its approximate form with the least significant digits treated as zeros.

FLOAT data types usually require 8 bytes per value.

## INT

The INT data type is a synonym for INTEGER.

## INTEGER

The INTEGER data type stores whole numbers that range from  $-2,147,483,647$  to  $2,147,483,647$ . The maximum negative number,  $-2,147,483,648$ , is a reserved value and cannot be used. The INTEGER data type is stored as a signed binary integer and is typically used to store counts, quantities, and so on.

Arithmetic operations and sort comparisons are performed more efficiently on integer data than on float or decimal data. However, INTEGER columns can store only a limited range of values. If the data value exceeds the numeric range, the database server does not store the value.

INTEGER data types require 4 bytes per value.

## INTERVAL

The INTERVAL data type stores a value that represents a span of time. INTERVAL types are divided into two classes: *year-month intervals* and *day-time intervals*. A year-month interval can represent a span of years and months, and a day-time interval can represent a span of days, hours, minutes, seconds, and fractions of a second.

An INTERVAL value always is composed of one value, or a contiguous sequence of values, that represents a component of time. An INTERVAL data type is defined using the following example:

```
INTERVAL largest_qualifier(n) TO smallest_qualifier(n)
```

In this example, the *largest\_qualifier* and *smallest\_qualifier* fields are taken from one of the two INTERVAL classes shown in Figure 3-6, and *n* optionally specifies the precision of the largest field (and smallest field if it is a FRACTION).

**Figure 3-6**  
Interval Classes

Interval Class	Qualifier Field	Valid Entry
YEAR-MONTH INTERVAL	YEAR	A number of years
	MONTH	A number of months
DAY-TIME INTERVAL	DAY	A number of days
	HOUR	A number of hours
	MINUTE	A number of minutes
	SECOND	A number of seconds
	FRACTION	A decimal fraction of a second, with up to 5 digits of precision. The default precision is 3 digits (thousandth of a second). Other precisions are indicated explicitly by writing FRACTION( <i>n</i> ), where <i>n</i> is the desired number of digits from 1 to 5.

As with a DATETIME column, you can define an INTERVAL column to include a subset of the fields you need; however, because the INTERVAL data type represents a span of time that is independent of an actual date, you cannot combine the two INTERVAL classes. For example, because the number of days in a month depends on which month it is, a single INTERVAL data value cannot combine months and days.

A value entered into an INTERVAL column need not include all fields contained in the column. For example, you can enter a value of HOUR TO SECOND into a column defined as DAY TO SECOND. However, a value must always consist of a contiguous sequence of fields. In the previous example, you cannot enter just HOUR and SECOND values; you must also include MINUTE values.

A valid INTERVAL literal contains the INTERVAL keyword, the values to be entered, and the field qualifiers. (See the discussion of the Literal Interval segment in [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.) When a value contains only one field, the largest and smallest fields are the same.

When you enter a value in an INTERVAL column, you must specify the largest and smallest fields in the value, just as you do for DATETIME values. In addition, you can use *n* optionally to specify the precision of the first field (and the last field if it is a FRACTION). If the largest and smallest field qualifiers are both FRACTIONS, you can specify only the precision in the last field. Acceptable qualifiers for the largest and smallest fields are identical to the list of INTERVAL fields displayed in Figure 3-6.

If you are using the DB-Access TABLE menu and you do not specify the INTERVAL field qualifiers, the default INTERVAL qualifier, YEAR TO YEAR, is assigned.

The *largest qualifier* in an INTERVAL value can be up to nine digits (except for FRACTION, which cannot be more than five digits), but if the value you want to enter is greater than the default number of digits allowed for that field, you must explicitly identify the number of significant digits in the value you are entering. For example, to define an INTERVAL of DAY TO HOUR that can store up to 999 days, you could specify it as shown in the following example:

```
INTERVAL DAY(3) TO HOUR
```

INTERVAL values use the same delimiters as DATETIME values. The delimiters are shown in Figure 3-7.

**Figure 3-7**  
*INTERVAL Delimiters*

Delimiter	Placement in DATETIME Expression
hyphen	Between the YEAR and MONTH portions of the value
space	Between the DAY and HOUR portions of the value
colon	Between the HOUR and MINUTE and the MINUTE and SECOND portions of the value
decimal point	Between the SECOND and FRACTION portions of the value

You also can enter INTERVAL values as character strings. However, the character string must include information for the identical sequence of fields defined for that column. The INSERT statement in the following example shows an INTERVAL value entered as a character string:

```
INSERT INTO manufact (manu_code, manu_name, lead_time)
VALUES ('BRO', 'Ball-Racquet Originals', '160')
```

Because the **lead\_time** column is defined as INTERVAL DAY(3) TO DAY, this INTERVAL value requires only one field, the span of days required for lead time. If the character string does not contain information for all fields (or adds additional fields), the database server returns an error. For more information on entering INTERVAL values as character strings, see [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.

By default, all fields of an INTERVAL column are two-digit numbers except for the year and fraction fields. The year field is stored as four digits. The fraction field requires *n* digits where  $1 \leq n \leq 5$ , rounded up to an even number. You can use the following formula (rounded up to a whole number of bytes) to calculate the number of bytes required for an INTERVAL value:

$$\text{total number of digits for all fields} / 2 + 1$$

For example, a YEAR TO MONTH qualifier requires a total of six digits (four for year and two for month). This data value requires 4, or  $(6/2) + 1$ , bytes of storage.

For information on using INTERVAL data in arithmetic and relational operations, see “[Range of Operations Using DATE, DATETIME, and INTERVAL](#)” on page 3-30. For information on using INTERVAL as a constant expression, see the description of the INTERVAL Field Qualifier segment in [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.

## MONEY(*p,s*)

The MONEY data type stores currency amounts. As with the DECIMAL data type, the MONEY data type stores fixed-point numbers up to a maximum of 32 significant digits, where *p* is the total number of significant digits (the precision) and *s* is the number of digits to the right of the decimal point (the scale).

Unlike the DECIMAL data type, the MONEY data type always is treated as a fixed-point decimal number. The database server defines the data type MONEY(*p*) as DECIMAL(*p*,2). If the precision and scale are not specified, the database server defines a MONEY column as DECIMAL(16,2).

You can use the following formula (rounded up to a whole number of bytes) to calculate the byte storage for a MONEY data type:

If the *scale* is odd:  $N = (\textit{precision} + 4) / 2$   
 If the *scale* is even:  $N = (\textit{precision} + 3) / 2$

For example, a MONEY data type with a precision of 16 and a scale of 2 (MONEY(16,2)) requires 10, or  $(16 + 3)/2$ , bytes of storage.

### GLS

The default value that the database server uses for scale is locale-dependent. The default locale specifies a default scale of two. For nondefault locales, if the scale is omitted from the declaration, the database server creates MONEY values with a locale-specific scale. For more information, see [Chapter 3](#) of the [Guide to GLS Functionality](#). ♦

Client applications format values in MONEY columns with the following currency notation:

- A currency symbol: a dollar sign (\$) at the front of the value
- A thousands separator: a comma (,) that separates every three digits of the value
- A decimal point: a period (.)

### GLS

The currency notation that client applications use is locale-dependent. If you specify a nondefault locale, the client uses a culture-specific format for MONEY values. For more information, see [Chapter 1](#) of the [Guide to GLS Functionality](#). ♦

You can change the format for MONEY values by changing the DBMONEY environment variable. See [page 4-27](#) for information on how to set the DBMONEY environment variable.

## GLS

**NCHAR(*n*)**

The NCHAR data type stores fixed-length character data. This data can be a sequence of single-byte or multibyte letters, numbers, and symbols. The main difference between CHAR and NCHAR data types is the collation order. While the collation order of the CHAR data type is defined by the code-set order, the collation order of the NCHAR data type depends on the locale-specific localized order. For more information about the NCHAR data type, see [Chapter 3](#) of the *Guide to GLS Functionality*. ♦

**NUMERIC(*p,s*)**

The NUMERIC data type is a synonym for fixed-point DECIMAL.

**NVARCHAR(*m,r*)**

The NVARCHAR data type stores character data of varying lengths. This data can be a sequence of single-byte or multibyte letters, numbers, and symbols. The main difference between VARCHAR and NVARCHAR data types is the collation order. While the collation order of the VARCHAR data type is defined by the code-set order, the collation order of the NVARCHAR data type depends on the locale-specific localized order. For more information about the NVARCHAR data type, see [Chapter 3](#) of the *Guide to GLS Functionality*. ♦

## GLS

**REAL**

The REAL data type is a synonym for SMALLFLOAT.

**SERIAL(*n*)**

The SERIAL data type stores a sequential integer assigned automatically by the database server when a row is inserted. (For more information on inserting values into SERIAL columns, see [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.) You can define only one SERIAL column in a table.

The SERIAL data type is not automatically a unique column. You must apply a unique index to this column to prevent duplicate serial numbers.

If you are using the interactive schema editor in DB-Access to define the table, a unique index is applied automatically to a SERIAL column.

The default serial starting number is 1, but you can assign an initial value, *n*, when you create or alter the table. You can assign any number greater than 0 as your starting number. The highest serial number you can assign is 2,147,483,647. If you assign a number greater than 2,147,483,647, you receive a syntax error.

Once a nonzero number is assigned, it cannot be changed. You can, however, insert a value into a SERIAL column (using the INSERT statement) or reset the serial value *n* (using the ALTER TABLE statement), as long as that value does not duplicate any existing values in the table. When you insert a number into a SERIAL column or reset the next value of a SERIAL column, your database server assigns the next number in sequence to the number entered. However, if you reset the next value of a SERIAL column to a value that is less than the values already in that column, the next value is computed using the following formula:

$$\text{maximum existing value in SERIAL column} + 1$$

For example, if you reset the serial value of the **customer\_num** column in the **customer** table to 50 and the highest-assigned customer number is 128, the next customer number assigned is 129.

A SERIAL data column is commonly used to store unique numeric codes (for example, order, invoice, or customer numbers). SERIAL data values require 4 bytes of storage.

## SMALLFLOAT

The SMALLFLOAT data type stores single-precision floating-point numbers with approximately eight significant digits. SMALLFLOAT corresponds to the **float** data type in C. The range of values for a SMALLFLOAT data type is the same as the range of values for the C **float** data type on your computer.



A SMALLFLOAT data type column typically stores scientific numbers that can be calculated only approximately. Because floating-point numbers retain only their most significant digits, the number you enter in this type of column and the number the database displays might differ slightly depending on how your computer stores floating-point numbers internally. For example, you might enter a value of 1.1000001 into a SMALLFLOAT field and, after processing the SQL statement, the application development tool might display this value as 1.1. This difference occurs when a value has more digits than the floating-point number can store. In this case, the value is stored in its approximate form with the least significant digits treated as zeros.

SMALLFLOAT data types usually require 4 bytes per value.

## SMALLINT

The SMALLINT data type stores small whole numbers that range from  $-32,767$  to  $32,767$ . The maximum negative number,  $-32,768$ , is a reserved value and cannot be used. The SMALLINT value is stored as a signed binary integer.

Integer columns typically store counts, quantities, and so on. Because the SMALLINT data type takes up only 2 bytes per value, arithmetic operations are performed very efficiently. However, this data type stores a limited range of values. If the values exceed the range between the minimum and maximum numbers, the database server does not store the value and provides you with an error message.

## TEXT

The TEXT data type stores any kind of text data. It can contain both single and multi-byte characters. For more information on multibyte characters of TEXT data type, see [“Multibyte Characters with TEXT” on page 3-25](#).

The TEXT data type has no maximum size. A TEXT column has a theoretical limit of  $2^{31}$  bytes and a practical limit determined by your available disk storage.

**Important:** *The INFORMIX-SE database server does not support this data type.*



TEXT columns typically store memos, manual chapters, business documents, program source files, and so on. In the default locale U.S. ASCII English, data object of type TEXT can contain a combination of printable ASCII characters and the following control characters:

- Tabs (CTRL-I)
- New lines (CTRL-J)
- New pages (CTRL-L)

You can store, retrieve, update, or delete the contents of a TEXT column. However, you cannot use TEXT data items in arithmetic or string operations, or assign literals to TEXT items with the SET clause of the UPDATE statement. You also cannot use TEXT items in the following ways:

- With aggregate functions
- With the IN clause
- With the MATCHES or LIKE clauses
- With the GROUP BY clause
- With the ORDER BY clause

You can use TEXT objects in Boolean expressions only if you are testing for null values.

You can insert data into TEXT columns in the following ways:

- With the **dbload** or **onload** utilities
- With the LOAD statement (DB-Access)
- From TEXT host variables (INFORMIX-ESQL/C)
- By declaring a FILE (INFORMIX-ESQL/COBOL)

You cannot use a quoted text string, number, or any other actual value to insert or update TEXT columns.

When you select a TEXT column, you can choose to receive all or part of it. To see all of a column, use the regular syntax for selecting a column into a variable. You also can select any part of a TEXT column by using subscripts, as shown in the following example:

```
SELECT cat_descr [1,75] FROM catalog WHERE catalog_num = 10001
```

This statement reads the first 75 bytes of the `cat_descr` column associated with catalog number 10001.

### ***Nonprintable Characters with TEXT***

Both printable and non-printable characters can be inserted into text columns. Informix products do not do any checking of the data that is inserted into a column with the TEXT data type. For detailed information on entering and displaying nonprintable characters, refer to “[Nonprintable Characters with CHAR](#)” on page 3-7.

### ***Multibyte Characters with TEXT***

Multibyte TEXT characters must be supported by the database locale. For more information, see [Chapter 1](#) of the *Guide to GLS Functionality*. ♦

### ***Collating TEXT Data***

Text data type is collated in code-set order. For more information on collation orders, see [Chapter 1](#) of the *Guide to GLS Functionality*.

## **VARCHAR(*m,r*)**

The VARCHAR data type stores single-byte and multibyte character sequences of varying length, where *m* is the maximum byte size of the column and *r* is the minimum amount of byte space reserved for that column. For more information on multibyte VARCHAR sequences, see “[Multibyte Characters with VARCHAR](#)” on page 3-26.

The VARCHAR data type is the Informix implementation of a character varying data type.

**Important:** *The INFORMIX-SE database server does not support this data type.*

The ANSI standard data type for varying character strings is CHARACTER VARYING, described on [page 3-8](#).

GLS



You must specify the maximum size (*m*) of the VARCHAR column. The size of this parameter can range from 1 to 255 bytes. If you are placing an index on a VARCHAR column, the maximum size is 254 bytes. You can store shorter, but not longer, character strings than the value you specify.

Specifying the minimum reserved space (*r*) parameter is optional. This value can range from 0 to 255 bytes but must be less than the maximum size (*m*) of the VARCHAR column. If you do not specify a minimum space value, it defaults to 0. You should specify this parameter when you initially intend to insert rows with short or null data in this column, but later expect the data to be updated with longer values.

Although the use of VARCHAR economizes on space used in a table, it has no effect on the size of an index. In an index based on a VARCHAR column, each index key has length *m*, the maximum size of the column.

When you store a VARCHAR value in the database, only its defined characters are stored. The database server does not strip a VARCHAR object of any user-entered trailing blanks, nor does the database server pad the VARCHAR to the full length of the column. However, if you specify a minimum reserved space (*r*) and some data values are shorter than that amount, some space reserved for rows goes unused.

VARCHAR values are compared to other VARCHAR values and to character values in the same way that character values are compared. The shorter value is padded on the right with spaces until the values have equal lengths; then they are compared for the full length.

### ***Multibyte Characters with VARCHAR***

Multibyte VARCHAR characters must be supported by the database locale. If you are storing multibyte characters, make sure to calculate the number of bytes needed. For more information, see [Chapter 1](#) of the [Guide to GLS Functionality](#). ♦

## Collating VARCHAR

The main difference between the NVARCHAR and the VARCHAR data types is the difference in collation sequencing. Collation order of NVARCHAR characters depends on the GLS locale chosen, while collation of VARCHAR characters depends on the code set. For more information, see [Chapter 1](#) of the [Guide to GLS Functionality](#). ♦

## Nonprintable Characters with VARCHAR

Nonprintable VARCHAR characters are entered, displayed, and treated in the same way as nonprintable CHAR characters are. For detailed information on entering and displaying nonprintable characters, refer to “[Nonprintable Characters with CHAR](#)” on page 3-7.

## Storing Numeric Values in a VARCHAR Column

When you insert a numeric value into a VARCHAR column, the stored value does not get padded with trailing blanks to the maximum length of the column. The number of digits in a numeric VARCHAR value is the number of characters that you need to store that value. For example, given the following statement, the value that gets stored in table **mytab** is 1.

```
create table mytab (coll varchar(10));
insert into mytab values (1);
```

**Tip:** VARCHAR treats C null (binary 0) and string terminators as termination characters for nonprintable characters.



---

## Data Type Conversions

You might want to change the data type of a column when you need to store larger values than the current data type can accommodate. For example, if you create a SMALLINT column and later find that you need to store integers larger than 32,767, you must change the data type of that column to store the larger value. You can use the ALTER TABLE statement to change the data type of that column.

If you change data types, the new data type must be able to store all the old values. For example, if you try to convert a column from the INTEGER data type to the SMALLINT data type and the following values exist in the INTEGER column, the database server does not change the data type because SMALLINT columns cannot accommodate numbers greater than 32,768:

```
100 400 700 50000700
```

The same situation might occur if you attempt to transfer data from FLOAT or SMALLFLOAT columns to INTEGER, SMALLINT, or DECIMAL columns.

## Converting from Number to Number

When you convert columns from one number data type to another, you occasionally find rounding errors. Figure 3-8 indicates which numeric data type conversions are acceptable and what kinds of errors you can encounter when you convert between certain numeric data types.

**Figure 3-8**  
*Numeric Data Type Conversion Chart*

From:	To:				
	SMALLINT	INTEGER	SMALLFLOAT	FLOAT	DECIMAL
SMALLINT	OK	OK	OK	OK	O
INTEGER	X	OK	X	OK	O
SMALLFLOAT	X	X	OK	OK	O
FLOAT	X	X	F	OK	O
DECIMAL	X	X	F	F	O

Legend:

- OK = No error
- O = An error can occur depending on precision of the decimal
- X = An error can occur depending on data
- F = No error, but less significant digits might be lost

For example, if you convert a `FLOAT` column to `DECIMAL(4,2)`, your database server rounds off the floating-point numbers before storing them as decimal numbers. This conversion can result in an error depending on the precision assigned to the `DECIMAL` column.

## Converting Between Number and CHAR

You can convert a `CHAR` (or `NCHAR`) column to a number column and vice versa. However, if the `CHAR` or `NCHAR` column contains any characters that are not valid in a number column (for example, the letter *l* instead of the number *1*), your database server cannot complete the `ALTER TABLE` statement and leaves the column values as characters. You receive an error message and the statement is rolled back (whether you are in a transaction or not).

In `INFORMIX-SE`, the original table is unchanged, but the system catalog tables might be in an inconsistent state.

## Converting Between DATE and DATETIME

You can convert `DATE` columns to `DATETIME` columns. However, if the `DATETIME` column contains more fields than the `DATE` column, the database server either ignores the fields or fills them with zeros. The illustrations in the following list show how these two data types are converted (assuming that the default date format is *mm/dd/yyyy*):

- If you convert `DATE` to `DATETIME YEAR TO DAY`, the database server converts the existing `DATE` values to `DATETIME` values. For example, the value `08/15/1994` becomes `1994-08-15`.
- If you convert `DATETIME YEAR TO DAY` to the `DATE` format, the value `1994-08-15` becomes `08/15/1994`.
- If you convert `DATE` to `DATETIME YEAR TO SECOND`, the database server converts existing `DATE` values to `DATETIME` values and fills in the additional `DATETIME` fields with zeros. For example, `08/15/1994` becomes `1994-08-15 00:00:00`.
- If you convert `DATETIME YEAR TO SECOND` to `DATE`, the database server converts existing `DATETIME` to `DATE` values but drops fields more precise than `DAY`. For example, `1994-08-15 12:15:37` becomes `08/15/1994`.

## Range of Operations Using DATE, DATETIME, and INTERVAL

You can use DATE, DATETIME, and INTERVAL data in a variety of arithmetic and relational expressions. You can manipulate a DATETIME value with another DATETIME value, an INTERVAL value, the current time (identified by the keyword CURRENT), or a specified unit of time (identified by the keyword UNITS). In most situations, you can use a DATE value wherever it is appropriate to use a DATETIME value and vice versa. You also can manipulate an INTERVAL value with the same choices as a DATETIME value. In addition, you can multiply or divide an INTERVAL value by a number.

An INTERVAL column can hold a value that represents the difference between two DATETIME values or the difference between (or sum of) two INTERVAL values. In either case, the result is a span of time, which is an INTERVAL value. On the other hand, if you add or subtract an INTERVAL value from a DATETIME value, another DATETIME value is produced because the result is a specific point in time.

Figure 3-9 indicates the range of expressions that you can use with DATE, DATETIME, and INTERVAL data, along with the data type that results from each expression.

**Figure 3-9**  
*Range of Expressions for DATE, DATETIME, and INTERVAL*

Data Type of Operand 1	Operator	Data Type of Operand 2	Result
DATE	–	DATETIME	INTERVAL
DATETIME	–	DATE	INTERVAL
DATE	+ or –	INTERVAL	DATETIME
DATETIME	–	DATETIME	INTERVAL
DATETIME	+ or –	INTERVAL	DATETIME
INTERVAL	+	DATETIME	DATETIME
INTERVAL	+ or –	INTERVAL	INTERVAL

(1 of 2)



Data Type of Operand 1	Operator	Data Type of Operand 2	Result
DATETIME	–	CURRENT	INTERVAL
CURRENT	–	DATETIME	INTERVAL
INTERVAL	+	CURRENT	DATETIME
CURRENT	+ or –	INTERVAL	DATETIME
DATETIME	+ or –	UNITS	DATETIME
INTERVAL	+ or –	UNITS	INTERVAL
INTERVAL	* or /	NUMBER	INTERVAL

(2 of 2)

No other combinations are allowed. You cannot add two DATETIME values because this operation does not produce either a point in time or a span of time. For example, you cannot add December 25 and January 1, but you can subtract one from the other to find the time span between them.

## Manipulating DATETIME Values

You can subtract most DATETIME values from each other. Dates can be in any order and the result is either a positive or a negative INTERVAL value. The first DATETIME value determines the field precision of the result.

If the second DATETIME value has fewer fields than the first, the shorter value is extended automatically to match the longer one. (See the discussion of the EXTEND function in the “Expression” segment in [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.) In the following example, subtracting the DATETIME YEAR TO HOUR value from the DATETIME YEAR TO MINUTE value results in a positive interval value of 60 days, 1 hour, and 30 minutes. Because minutes were not included in the second value, the database server sets the minutes for the result to 0.

```
DATETIME (1994-9-30 12:30) YEAR TO MINUTE
- DATETIME (1994-8-1 11) YEAR TO HOUR

Result: INTERVAL (60 01:30) DAY TO MINUTE
```

If the second DATETIME value has more fields than the first (regardless of whether the precision of the extra fields is larger or smaller than those in the first value), the additional fields in the second value are ignored in the calculation.

In the following expression (and result), the year is not included for the second value. Therefore, the year is set automatically to the current year, in this case 1994, and the resulting INTERVAL is negative, indicating that the second date is later than the first.

```
DATETIME (1994-9-30) YEAR TO DAY  
- DATETIME (10-1) MONTH TO DAY
```

```
Result: INTERVAL (1) DAY TO DAY [assuming current year  
is 1994]
```

## Manipulating DATETIME with INTERVAL Values

INTERVAL values can be added to or subtracted from DATETIME values. In either case, the result is a DATETIME value. If you are adding an INTERVAL value to a DATETIME value, the order of values is unimportant; however, if you are subtracting, the DATETIME value must come first. Adding or subtracting an INTERVAL value simply moves the DATETIME value forward or backward in time. The expression shown in the following example moves the date ahead three years and five months:

```
DATETIME (1991-8-1) YEAR TO DAY  
+ INTERVAL (3-5) YEAR TO MONTH
```

```
Result: DATETIME (1995-01-01) YEAR TO DAY
```



**Important:** Evaluate the logic of your addition or subtraction. Remember that months can be 28, 29, 30, or 31 days and that years can be 365 or 366 days.

In most situations, the database server automatically adjusts the calculation when the initial values do not have the same precision. However, in certain situations, you must explicitly adjust the precision of one value to perform the calculation. If the INTERVAL value you are adding or subtracting has fields that are not included in the DATETIME value, you must use the EXTEND function to explicitly extend the field qualifier of the DATETIME value. (For more information on the EXTEND function, see the Expression segment in [Chapter 1](#) of the *Informix Guide to SQL: Syntax*.) For example, you cannot subtract a minute INTERVAL value from the DATETIME value in the previous example that has a YEAR TO DAY field qualifier. You can, however, use the EXTEND function to perform this calculation, as shown in the following example:

```
EXTEND (DATETIME (1994-8-1) YEAR TO DAY, YEAR TO MINUTE)
- INTERVAL (720) MINUTE(3) TO MINUTE
```

```
Result: DATETIME (1994-07-31 12:00) YEAR TO MINUTE
```

The EXTEND function allows you to explicitly increase the DATETIME precision from YEAR TO DAY to YEAR TO MINUTE. This allows the database server to perform the calculation, with the resulting extended precision of YEAR TO MINUTE.

## Manipulating DATE with DATETIME and INTERVAL Values

You can use DATE values in arithmetic expressions with DATETIME or INTERVAL values by writing expressions that allow the manipulations shown in Figure 3-10.

**Figure 3-10**  
*Results of Expressions That Manipulate DATE with DATETIME or INTERVAL Values*

Expression	Result
DATE - DATETIME	INTERVAL
DATETIME - DATE	INTERVAL
DATE + or - INTERVAL	DATETIME

In the cases shown in Figure 3-10, DATE values are first converted to their corresponding DATETIME equivalents, and then the expression is computed normally.

Although you can interchange DATE and DATETIME values in many situations, you must indicate whether a value is a DATE or a DATETIME data type. A DATE value can come from the following sources:

- A column or program variable of type DATE
- The TODAY keyword
- The DATE() function
- The MDY function
- A DATE literal

A DATETIME value can come from the following sources:

- A column or program variable of type DATETIME
- The CURRENT keyword
- The EXTEND function
- A DATETIME literal

When you represent DATE and DATETIME values as quoted character strings, the fields in the strings must be in proper order. In other words, when a DATE value is expected, the string must be in DATE format and when a DATETIME value is expected, the string must be in DATETIME format. For example, you can use the string '10/30/1994' as a DATE string but not as a DATETIME string. Instead, you must use '1994-10-30' or '94-10-30' as the DATETIME string.

You also can subtract one DATE value from another DATE value, but the result is a positive or negative INTEGER value rather than an INTERVAL value. If an INTERVAL value is required, you can either convert the INTEGER value into an INTERVAL value or one of the DATE values into a DATETIME value before subtracting.

For example, the following expression uses the DATE() function to convert character string constants to DATE values, calculates their difference, and then uses the UNITS DAY keywords to convert the INTEGER result into an INTERVAL value:

```
(DATE ('5/2/1994') - DATE ('4/6/1955')) UNITS DAY  
Result: INTERVAL (12810) DAY(5) TO DAY
```

If you need YEAR TO MONTH precision, you can use the EXTEND function on the first DATE operand, as shown in the following example:

```
EXTEND (DATE ('5/2/1994'), YEAR TO MONTH) - DATE ('4/6/1955')  
Result: INTERVAL (39-01) YEAR TO MONTH
```

The resulting INTERVAL precision is YEAR TO MONTH because the DATETIME value came first. If the DATE value had come first, the resulting INTERVAL precision would have been DAY(5) TO DAY.

## Manipulating INTERVAL Values

You can add or subtract INTERVAL values as long as both values are from the same class; that is, both are year-month or both are day-time. In the following example, a SECOND TO FRACTION value is subtracted from a MINUTE TO FRACTION value:

```
INTERVAL (100:30.0005) MINUTE(3) TO FRACTION(4)  
- INTERVAL (120.01) SECOND(3) TO FRACTION  
Result: INTERVAL (98:29.9905) MINUTE TO FRACTION(4)
```

Note the use of numeric qualifiers to alert the database server that the MINUTE and FRACTION in the first value and the SECOND in the second value exceed the default number of digits.

When you add or subtract INTERVAL values, the second value cannot have a field with greater precision than the first. The second INTERVAL, however, can have a field of smaller precision than the first. For example, the second INTERVAL can be HOUR TO SECOND when the first is DAY TO HOUR. The additional fields (in this case MINUTE and SECOND) in the second INTERVAL value are ignored in the calculation.

## **Multiplying or Dividing INTERVAL Values**

You can multiply or divide INTERVAL values by a number that can be an integer or a fraction. However, any remainder from the calculation is ignored and the result is truncated. The following expression multiplies an INTERVAL by a fraction:

```
INTERVAL (15:30.0002) MINUTE TO FRACTION(4) * 2.5
```

```
Result: INTERVAL (38:45.0005) MINUTE TO FRACTION(4)
```

In this example,  $15 * 2.5 = 37.5$  minutes,  $30 * 2.5 = 75$  seconds, and  $2 * 2.5 = 5$  fraction(4). The 0.5 minute is converted into 30 seconds and 60 seconds are converted into 1 minute, which produces the final result of 38 minutes, 45 seconds, and 0.0005 of a second. The results of any calculation include the same amount of precision as the original INTERVAL value.

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# V

arious *environment variables* affect the functionality of your Informix products. You can set environment variables that identify your terminal, specify the location of your software, and define other parameters. The environment variables discussed in this chapter are grouped and listed alphabetically beginning on [page 4-12](#). In addition, an index of environment variables is included at the end of this chapter, on [page 4-62](#).

Some environment variables are required, and others are optional. For example, you must set—or accept the default setting for—certain UNIX environment variables.

This chapter describes how to use the environment variables that apply to one or more Informix products and shows how to set them.

---

## Types of Environment Variables

The environment variables discussed in this chapter fall into the following categories:

- **Informix environment variables**  
Set these standard environment variables when you want to work with Informix products. Each product manual specifies the environment variables that you must set to use that product.
- **UNIX environment variables**  
Informix products rely on the correct setting of certain standard UNIX system environment variables. The **PATH** and **TERM** environment variables must always be set. You might also have to set the **TERMCAP** or **TERMINFO** environment variable to use some products effectively.

The GLS environment variables that allow you to work in a nondefault locale are described in [Chapter 2](#) of the *Guide to GLS Functionality*. However, these variables are included in the list of environment variables [on page 4-12](#) and in the index table in [Figure 4-2 on page 4-62](#). ♦

---

## Where to Set Environment Variables

You can set environment variables in the following ways:

- At the system prompt on the command line
- In an environment-configuration file
- In a login file

### Setting Environment Variables at the System Prompt

When you set an environment variable at the system prompt, you must reassign it the next time you log in to the system. For more information about how to do this, see [“Manipulating Environment Variables” on page 4-8](#).

### Setting Environment Variables in an Environment-Configuration File

The environment-configuration file is a common or private file where you can define all the environment variables that are used by Informix products. Using an environment-configuration file reduces the number of environment variables that you must set at the command line or in a shell file.

The common (shared) environment-configuration file resides in the `$INFORMIXDIR/etc/informix.rc` file. The permission for this shared file must be set to `644`. A user can override the system or common environment variables by setting variables in a *private environment-configuration file*. The private environment-configuration file must have the following characteristics:

- The file is stored in the user’s home directory
- The file is named `.informix`

- Permissions are set, by the user, to readable

An environment-configuration file can contain comment lines (preceded by #) and variable lines and their values (separated by blanks and tabs), as shown in the following example:

```
# This is an example of an environment-configuration file
#
DBDATE DMY4-
#
# These are ESQL/COBOL environment variable settings
#
INFORMIXCOB rmcobol
INFORMIXCOBTYPE rm85
INFORMIXCOBDIR /usr/lib/rmcobol
```

You can use the **ENVIGNORE** environment variable to override one or more entries in this file. Use the Informix **chkenv** utility to perform a sanity check on the contents of an environment-configuration file. The **chkenv** utility returns an error message if the file contains a bad environment-variable entry or if the file is too large. The **chkenv** utility is described on [page 4-10](#).

The first time you set an environment variable in a shell file or configuration file, before you work with your Informix product you should *source* the file (if you are using a C shell) or use a period (.) to execute an environment-configuration file (if you are using a Bourne or Korn shell). This procedure tells the shell process to read your entry.

## Setting Environment Variables at Login Time

When you set an environment variable in your **.login**, **.cshrc**, or **.profile** file, it is assigned automatically every time you log in to the system.

Add the commands that set your environment variables to the following login file:

For the C shell	<b>.login</b> or <b>.cshrc</b>
For the Bourne shell or Korn shell	<b>.profile</b>

## Manipulating Environment Variables

The following sections discuss setting, unsetting, viewing, and modifying environment variables. If you are already using an Informix product, some or all of the appropriate environment variables might already be set.

### Setting Environment Variables

Use standard UNIX commands to set environment variables. Depending on the type of shell you use, Figure 4-1 shows how you set the **ABCD** environment variable to *value*. The environment variables are case-sensitive.

**Figure 4-1**  
*Different Shell Settings*

Shell	Command
C	setenv ABCD value
Bourne	ABCD=value export ABCD
Korn	ABCD=value export ABCD
Korn	export ABCD=value

Korn-shell syntax supports a shortcut, as shown in the last line of Figure 4-1.

The following diagram shows how the syntax for setting an environment variable is represented throughout this chapter. These diagrams indicate the setting for the C shell; for the Bourne or Korn shells, use the syntax shown in Figure 4-1.

```
setenv _____ ABCD _____ value _____ |
```

For more information on how to read syntax diagrams, see “Command-Line Conventions” in the Introduction.

## Viewing Your Current Settings

After one or more Informix products have been installed, enter the following command at the system prompt to view your current environment settings:

UNIX Version	Command
BSD UNIX	env
UNIX System V	printenv

## Unsetting Environment Variables

To unset an environment variable, enter the following command:

Shell	Command
C	unsetenv ABCD
Bourne or Korn	unset ABCD

## Modifying the Setting of an Environment Variable

Sometimes you must add information to an environment variable that is already set. For example, the **PATH** environment variable is always set in UNIX environments. When you use an Informix product, you must add to the **PATH** the name of the directory where the executable files for the Informix products are stored.

In the following example, the **INFORMIXDIR** is **/usr/informix**. (That is, during installation, the Informix products were installed in the **/usr/informix** directory.) The executable files are in the **bin** subdirectory, **/usr/informix/bin**. To add this directory to the front of the C shell **PATH** environment variable, use the following command:

```
setenv PATH /usr/informix/bin:$PATH
```

Rather than entering an explicit pathname, you can use the value of the **INFORMIXDIR** environment variable (represented as **\$INFORMIXDIR**), as shown in the following example:

```
setenv INFORMIXDIR /usr/informix
setenv PATH $INFORMIXDIR/bin:$PATH
```

You might prefer to use this version to ensure that your **PATH** entry does not contradict the path that was set in **INFORMIXDIR** and so that you do not have to reset **PATH** whenever you change **INFORMIXDIR**.

If you set the **PATH** environment variable on the C shell command line, you might need to include curly braces with the existing **INFORMIXDIR** and **PATH**, as shown in the following command:

```
setenv PATH ${INFORMIXDIR}/bin:${PATH}
```

For more information about setting and modifying environment variables, refer to the manuals for your operating system.

---

## Checking Environment Variables with the *chkenv* Utility

The *chkenv* utility checks the validity of shared or private environment-configuration files. Use it to provide debugging information when you define, in an environment-configuration file, all the environment variables that are used by your Informix products.

```
chkenv _____ filename _____ |
```

Element	Purpose	Key Considerations
<i>filename</i>	Specifies the name of the environment-configuration file that you want to debug.	None.

The common environment-configuration file is stored in **\$INFORMIXDIR/etc/informix.rc**. A private environment-configuration file is stored in the user's home directory as **.informix**.



Issue the following command to check the contents of the shared environment-configuration file:

```
chkenv informix.rc
```

The **chkenv** utility returns an error message if it finds a bad environment-variable entry in the file or if the file is too large. You can modify the file and rerun the utility to check the modified environment-variable settings.

Informix products ignore all lines in the environment-configuration file, starting at the point of the error, if the **chkenv** utility returns the following message:

```
-33500 filename: Bad environment variable on line number.
```

If you want the product to ignore specified environment-variable settings in the file, you can also set the **ENVIGNORE** environment variable. For a discussion of the use and format of environment-configuration files and the **ENVIGNORE** environment variable, see [page 4-40](#).

---

## Rules of Precedence

When an Informix product accesses an environment variable, normally the following rules of precedence apply:

1. The highest precedence goes to the value that has been defined in the environment (shell) by explicitly setting the value at the shell prompt.
2. The second-highest precedence goes to the value that has been defined in the private environment-configuration file in the user's home directory (**~/.informix**).
3. The next-highest precedence goes to the value that has been defined in the common environment-configuration file (**\$INFORMIXDIR/etc/informix.rc**).
4. The next highest precedence goes to the value that has been defined in your **.login** file.
5. The lowest precedence goes to the default value.

## GLS

For precedence information about GLS environment variables, see [Chapter 2](#) of the [Guide to GLS Functionality](#). ♦

---

## List of Environment Variables

The following table contains an alphabetical list of the environment variables that you can set for an Informix database server and SQL API products. Most of these environment variables are described in this chapter on the pages listed in the last column.

The GLS environment variables are discussed in [Chapter 2](#) of the [Guide to GLS Functionality](#). ♦

Environment Variable	Restrictions	Page
ARC_DEFAULT	OnLine only	<a href="#">4-15</a>
ARC_KEYPAD	OnLine only	<a href="#">4-15</a>
CC8BITLEVEL	ESQL/C only	<a href="#">Guide to GLS Functionality</a>
CLIENT_LOCALE		<a href="#">Guide to GLS Functionality</a>
DBANSIWARN		<a href="#">4-17</a>
DBBLOBBUF	OnLine only	<a href="#">4-18</a>
DBCENTURY	SQL APIs only	<a href="#">4-18</a>
DBDATE		<a href="#">4-21</a> ; <a href="#">Guide to GLS Functionality</a>
DBDELIMITER		<a href="#">4-24</a>
DBEDIT		<a href="#">4-24</a>
DBFLTMASK	DB-Access only	<a href="#">4-25</a>
DBLANG		<a href="#">4-25</a> ; <a href="#">Guide to GLS Functionality</a>

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Environment Variable	Restrictions	Page
DBMONEY		<a href="#">4-27; Guide to GLS Functionality</a>
DBONPLOAD	High-Performance Loader only	<a href="#">4-28</a>
DBPATH		<a href="#">4-29</a>
DBPRINT		<a href="#">4-32</a>
DBREMOTECMD	OnLine only	<a href="#">4-33</a>
DBSPACETEMP	OnLine only	<a href="#">4-34</a>
DBTEMP	SE only	<a href="#">4-35</a>
DBTIME	SQL APIs only	<a href="#">4-36; Guide to GLS Functionality</a>
DBUPSPACE		<a href="#">4-39</a>
DB_LOCALE		<a href="#">Guide to GLS Functionality</a>
DELIMIDENT		<a href="#">4-39</a>
ENVIGNORE		<a href="#">4-40</a>
ESQLMF		<a href="#">Guide to GLS Functionality</a>
FET_BUF_SIZE	SQL APIs and DB-Access only	<a href="#">4-41</a>
GLS8BITSYS		<a href="#">Guide to GLS Functionality</a>
GL_DATE		<a href="#">Guide to GLS Functionality</a>
GL_DATETIME		<a href="#">Guide to GLS Functionality</a>
INFORMIXC	ESQL/C only	<a href="#">4-41</a>
INFORMIXCOB	ESQL/COBOL only	<a href="#">4-42</a>
INFORMIXCOBDIR	ESQL/COBOL only	<a href="#">4-43</a>

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## List of Environment Variables

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INFORMIXCOBTYP	ESQL/COBOL only	4-44
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ONCONFIG	OnLine only	4-52
OPTCOMPIND	OnLine only	4-53
PATH		4-54
PDQPRIORITY	OnLine only	4-54
PLCONFIG	High-Performance Loader	4-55
PSORT_DBTEMP	OnLine only	4-56
PSORT_NPROCS	OnLine only	4-57
SERVER_LOCALE		<i>Guide to GLS Functionality</i>
SQLEXEC		4-58
SQLRM	(obsolete)	4-59

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Environment Variable	Restrictions	Page
SQLRMDIR	(obsolete)	<a href="#">4-59</a>
TERM		<a href="#">4-60</a>
TERMCAP		<a href="#">4-60</a>
TERMINFO		<a href="#">4-61</a>
THREADLIB	ESQL/C only	<a href="#">4-61</a>

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## Environment Variables

The following sections discuss the environment variables used by Informix products.

### ARC\_DEFAULT

When you use the ON-Archive archive and tape-management system for INFORMIX-OnLine Dynamic Server, you can set the **ARC\_DEFAULT** environment variable to indicate where a personal default qualifier file is located.

```
setenv _____ ARC_DEFAULT _____ pathname _____ |
```

*pathname* is the full pathname of the personal default qualifier file.

For example, to set the **ARC\_DEFAULT** environment variable to specify the file `/usr/jane/arcdefault.janeroe`, enter the following command:

```
setenv ARC_DEFAULT /usr/jane/arcdefault.janeroe
```

For more information on archiving, see the [INFORMIX-OnLine Dynamic Server Archive and Backup Guide](#).

## ARC\_KEYPAD

If you use the ON-Archive archive and tape-management system for the INFORMIX-OnLine Dynamic Server, you can set your **ARC\_KEYPAD** environment variable to point to a **ttermcap** file that is different from the default **ttermcap** file. The default is the **\$INFORMIXDIR/etc/ttermcap** file, and it contains instructions on how to modify the **ttermcap** file.

The **ttermcap** file serves the following purposes for the ON-Archive menu interface:

- It defines the terminal control attributes that allow ON-Archive to manipulate the screen and cursor.
- It defines the mappings between commands and key presses.
- It defines the characters used in drawing menus and borders for an API.

```
setenv _____ ARC_KEYPAD _____ pathname _____ |
```

*pathname* is the pathname for a **ttermcap** file.

For example, to set the **ARC\_KEYPAD** environment variable to specify the file **/usr/jane/ttermcap.janeroe**, enter the following command:

```
setenv ARC_KEYPAD /usr/jane/ttermcap.janeroe
```

For more information on archiving, see the [INFORMIX-OnLine Dynamic Server Archive and Backup Guide](#).

## DBANSIWARN

Setting the **DBANSIWARN** environment variable indicates that you want to check for Informix extensions to ANSI standard syntax. Unlike most environment variables, you do not need to set **DBANSIWARN** to a value—setting it to any value or to no value, as shown in the following diagram, is sufficient.

```
setenv _____ DBANSIWARN _____|
```

Setting the **DBANSIWARN** environment variable for DB-Access is functionally equivalent to including the **-ansi** flag when invoking the utility from the command line. If you set **DBANSIWARN** before you run DB-Access, warnings are displayed on the screen within the SQL menu.

Set the **DBANSIWARN** environment variable before you compile an INFORMIX-ESQL/C or INFORMIX-ESQL/COBOL program to check for Informix extensions to ANSI standard syntax. When Informix extensions to ANSI standard syntax are encountered in your program at compile time, warning messages are written to the screen.

At run time, the **DBANSIWARN** environment variable causes the SQL Communication Area (SQLCA) variable **sqlca.sqlwarn.sqlwarn5** to be set to **W** when a statement that is not ANSI-compliant is executed. (For more information on SQLCA, see the [INFORMIX-ESQL/C Programmer's Manual](#) or the [INFORMIX-ESQL/COBOL Programmer's Manual](#).)

Once you set **DBANSIWARN**, Informix extension checking is automatic until you log out or unset **DBANSIWARN**. To turn off Informix extension checking, unset the **DBANSIWARN** environment variable by entering the following command:

```
unsetenv DBANSIWARN
```

## DBBLOBBUF

The **DBBLOBBUF** environment variable controls whether a blob is stored temporarily in memory or in a file while being unloaded with the UNLOAD statement.

```
setenv DBBLOBBUF n
```

*n* represents the maximum size of a blob in kilobytes.

If the blob is smaller than the default of 10 coagulates or the setting of the **DBBLOBBUF** environment variable, it is temporarily stored in memory. If the blob is larger than the default or the setting of the environment variable, it is written to a temporary file. This environment variable applies to the UNLOAD command only.

For instance, to set a buffer size of 15 kilobytes, set the **DBBLOBBUF** environment variable as shown in the following example:

```
setenv DBBLOBBUF 15
```

In the example, any blobs smaller than 15 kilobytes are stored temporarily in memory. Blobs larger than 15 kilobytes are stored temporarily in a file.

## DBCENTURY

The environment variable **DBCENTURY** allows you to choose the appropriate expansion for two-digit year DATE and DATETIME values.

```
setenv DBCENTURY P
                F
                C
                R
```



Previously, if only the decade was provided for a literal DATE or DATETIME value in a table column, the present century was used to expand the year. For example, 12/31/96 would have been expanded to 12/31/1996. With this release, three new algorithms are added to complete the century value of a year: past (P), future (F), and closest (C).

Algorithm	Explanation
P = Past	The past and present centuries are used to expand the year value. These two dates are compared against the current date, and the date that is prior to the current date is chosen. If both dates are prior to the current date, the date that is closest to the current date is chosen.
F = Future	The present and the next centuries are used to expand the year value. These two dates are compared against the current date, and the date that is after the current date is chosen. If both the expansions are after the current date, the date that is closest to the current date is chosen.
C = Closest	The past, present, and next centuries are used to expand the year value, and the date that is closest to the current date is used.
R = Present	The present century is used to expand the year value.

When the **DBCENTURY** environment variable is not set, the current century is used as the system default.

You can override the default by specifying all four digits.

The following examples illustrate how the **DBCENTURY** environment variable expands DATE and DATETIME year formats.

### **Behavior of DBCENTURY = P**

Example data type: DATE  
Current date: 4/6/1996  
User enters: 1-1-1  
**DBCENTURY = P**, Past century algorithm  
Previous century expansion : 1/1/1801  
Present century expansion: 1/1/1901  
Analysis: Both results are prior to the current date, but 1/1/1901 is closer to the current date. 1/1/1901 is chosen.

### **Behavior of DBCENTURY = F**

Example data type: DATETIME year to month  
Current date: 5/7/2005  
User enters: 1/1/1  
**DBCENTURY = F**, Future century algorithm  
Present century expansion: 2001-1  
Next century expansion: 2101-1  
Analysis: Only date 2101-1 is after the current date and it is chosen as the expansion of the year value.

### **Behavior of DBCENTURY = C**

Example data type: DATE  
Current date: 4/6/1996  
User enters: 1-1-1  
**DBCENTURY = C**, Closest century algorithm  
Previous century expansion : 1/1/1801  
Present century expansion: 1/1/1901  
Next century expansion: 1/1/2001  
Analysis: Because the next century expansion is the closest to the current date, 1/1/2001 is chosen.

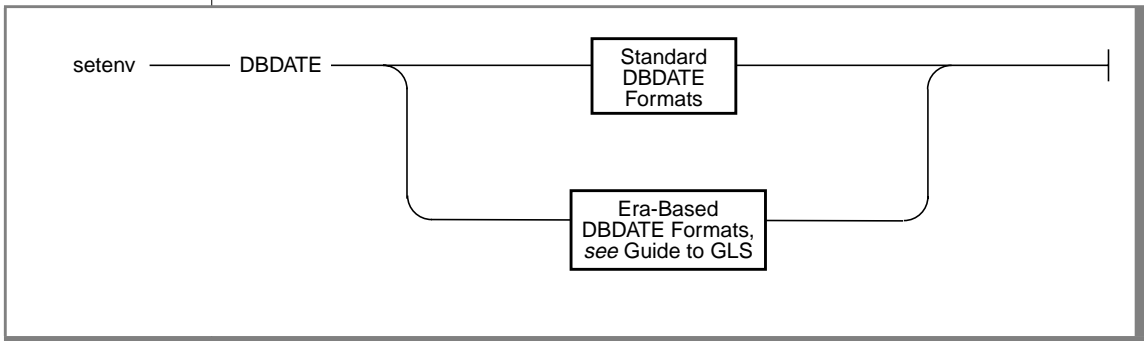
### **Behavior of DBCENTURY = R**

Example data type: DATETIME year to month  
Current date: 4/6/1996  
User enters: 1/1/1  
**DBCENTURY = R**, Present century algorithm  
Present century expansion: 1901-1  
Analysis: The present century expansion is used.

## DBDATE

The **DBDATE** environment variable specifies the end-user formats of DATE values. End-user formats affect the following situations:

- When you input DATE values, Informix products use the **DBDATE** environment variable to interpret the input. For example, if you specify a literal DATE value in an INSERT statement, Informix database servers expect this literal value to be compatible with the format specified by **DBDATE**. Similarly, the database server interprets the date you are specifying as input to the DATE() function in the format specified by the **DBDATE** environment variable.
- When you display DATE values, Informix products use the **DBDATE** environment variable to format the output. For example, if you use the INFORMIX-ESQL/COBOL function ECO-DAT to format an internal date value, Informix SQL API products use the **DBDATE** setting to create the string version of the date.

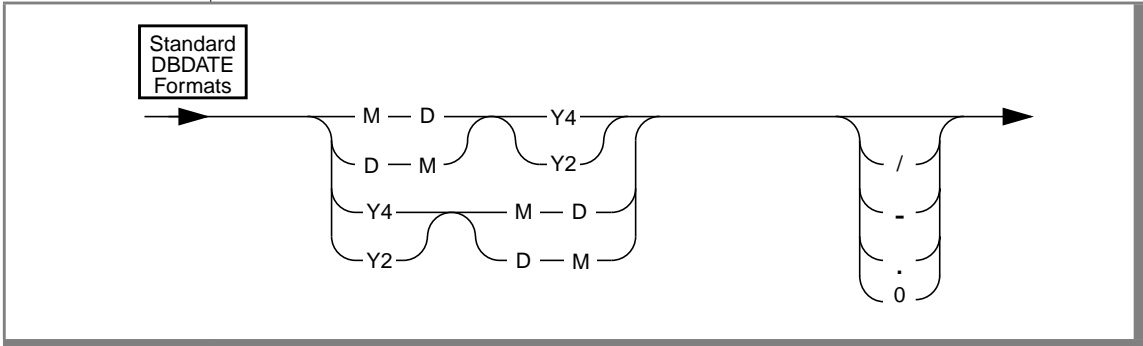


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This section describes standard **DBDATE** formats. For a description of era-based formats, see [Chapter 2](#) of the *Guide to GLS Functionality*. ♦

With standard formats, you can specify the following attributes:

- The order of the month, day, and year in a date
- Whether the year should be printed with two digits (Y2) or four digits (Y4)
- The separator between the month, day, and year



- . / are characters that can be used as separators in a date format.
- 0 indicates that no separator is displayed.
- D, M are characters representing the day and the month.
- Y2, Y4 are characters that represent the year and the number of digits in the year.

For the U.S. ASCII English locale, the default setting for **DBDATE** is `MDY4/`, where `M` represents the month, `D` represents the day, `Y4` represents a four-digit year, and slash (`/`) is a separator (for example, `10/08/1994`).

Other acceptable characters for the separator are a hyphen (`-`), a period (`.`), or a zero (`0`). Use the zero to indicate no separator.

The slash (`/`) appears if you attempt to use a character other than a hyphen, period, or zero as a separator, or if you do not include a separator character in the **DBDATE** definition.

The following table shows a few variations of setting the **DBDATE** environment variable.

Variation	October 8, 1994, appears as:
MDY4/	10/08/1994
DMY2-	08-10-94
MDY4	10/08/1994
Y2DM.	94.08.10
MDY20	100894
Y4MD*	1994/10/08

Notice that the formats Y4MD\* (the asterisk is an unacceptable separator) and MDY4 (no separator is defined) both display the default (slash) as a separator.



**Important:** If you use the Y2 format, understand that the setting of the **DBCENTURY** environment variable affects how the **DATE** values are expanded.

Also, certain routines called by *INFORMIX-ESQL/COBOL* or *INFORMIX-ESQL/C* can use the **DBTIME** variable, rather than **DBDATE**, to set **DATETIME** formats to international specifications. For more information, see the discussion of the **DBTIME** environment variable on [page 4-36](#) and the “*INFORMIX-ESQL/C Programmer’s Manual*” or the “*INFORMIX-ESQL/COBOL Programmer’s Manual*.”

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The setting of the **DBDATE** variable takes precedence over that of the **GL\_DATE** environment variable, as well as over the default **DATE** formats as specified by **CLIENT\_LOCALE**. For information about the **GL\_DATE** and **CLIENT\_LOCALE** environment variables, see the [Guide to GLS Functionality](#). ♦

## DBDELIMITER

The **DBDELIMITER** environment variable specifies the field delimiter used by the **dbexport** utility and with the **LOAD** and **UNLOAD** statements.

```
setenv DBDELIMITER 'delimiter'
```

*delimiter* is the field delimiter for unloaded data files.

The delimiter can be any single character, except the characters in the following list:

- Hexadecimal numbers (0 through 9, a through f, A through F)
- NEWLINE or CTRL-J
- The backslash symbol (\)

The vertical bar (|=ASCII 124) is the default. To change the field delimiter to a plus (+), set the **DBDELIMITER** environment variable, as shown in the following example:

```
setenv DBDELIMITER '+'
```

## DBEDIT

The **DBEDIT** environment variable lets you name the text editor that you want to use to work with SQL statements and command files in DB-Access. If **DBEDIT** is set, the specified editor is called directly. If **DBEDIT** is not set, you are prompted to specify an editor as the default for the rest of the session.

```
setenv DBEDIT editor
```

*editor* is the name of the text editor you want to use.

For most systems, the default editor is **vi**. If you use another editor, be sure that it creates flat ASCII files. Some word processors in *document mode* introduce printer control characters that can interfere with operation of your Informix product.

To specify the EMACS text editor, set the **DBEDIT** environment variable by entering the following command:

```
setenv DBEDIT emacs
```

## DBFLTMASK

By default, Informix client applications (including DB-Access utility or any ESQL program) display the floating-point values of data types **FLOAT**, **SMALLFLOAT**, and **DECIMAL** with 16 digits to the right of the decimal point. However, the actual number of decimal digits displayed depends on the size of the character buffer.

To override the default number of decimal digits in the display, you can set the **DBFLTMASK** environment variable to the number of digits desired.

```
setenv DBFLTMASK n
```

*n* is the number of decimal digits you want the Informix client application to display in the floating-point values.

## DBLANG

The **DBLANG** environment variable specifies the subdirectory of **\$INFORMIXDIR** or the full pathname of the directory that contains the compiled message files used by an Informix product.

```
setenv DBLANG relative_path | full_path
```

*relative\_path* is the subdirectory of **\$INFORMIXDIR**.

*full\_path* is the full pathname of the directory that contains the compiled message files.

By default, Informix products put compiled messages in a locale-specific subdirectory of the `$INFORMIXDIR/msg` directory. These compiled message files have the suffix `.iem`. If you want to use a message directory other than `$INFORMIXDIR/msg`, where, for example, you can store message files that you have created, perform the following steps:

1. Use the `mkdir` command to create the appropriate directory for the message files. You can make this directory under the directory `$INFORMIXDIR` or `$INFORMIXDIR/msg` or you can make it under any other directory.
2. Set the owner and group of the new directory to `informix` and the access permission for this directory to `755`.
3. Set the `DBLANG` environment variable to the new directory. If this directory is a subdirectory of `$INFORMIXDIR` or `$INFORMIXDIR/msg`, you only need to list the relative path to the new directory. Otherwise, you must specify the full pathname of the directory.
4. Copy the `.iem` files or the message files that you created to the new message directory specified by `$DBLANG`. All the files in the message directory should have the owner and group `informix` and access permission `644`.

Informix products that use the default, U.S. ASCII English, search for message files in the following order:

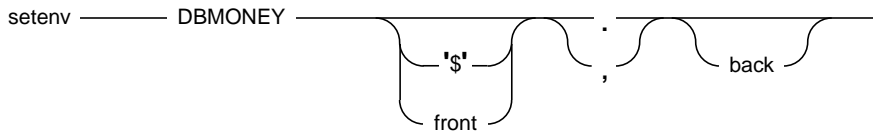
1. In `$DBLANG`, if `DBLANG` is set to a full pathname
2. In `$INFORMIXDIR/msg/$DBLANG`, if `DBLANG` is set to a relative pathname
3. In `$INFORMIXDIR/$DBLANG`, if `DBLANG` is set to a relative pathname
4. In `$INFORMIXDIR/msg/en_us/0333`
5. In `$INFORMIXDIR/msg/en_us.8859-1`
6. In `$INFORMIXDIR/msg`
7. In `$INFORMIXDIR/msg/english`

For more information on access paths for messages, see the description of `DBLANG` in the [Guide to GLS Functionality](#). ♦



## DBMONEY

The **DBMONEY** environment variable specifies the display format of monetary values using **FLOAT**, **DECIMAL**, or **MONEY** data types.



- \$** is the default symbol that precedes the MONEY value.
- ,** is an optional symbol (comma) that separates the integral from the fractional part of the MONEY value.
- .** is the default symbol that separates the integral from the fractional part of the MONEY value.
- back** represents the optional symbol that follows the MONEY value. The **back** symbol can be up to seven characters and can contain any character except an integer, a comma, or a period. If **back** contains a dollar sign (\$), you must enclose the whole string in single quotes (').
- front** is the optional symbol that precedes the MONEY value. The **front** symbol can be up to seven characters and can contain any character except an integer, a comma, or a period. If **front** contains a dollar sign (\$), you must enclose the whole string in single quotes (').

If you use any character except an alphabetic character for **front** or **back**, you must enclose the character in quotes.

When you display MONEY values, Informix products use the **DBMONEY** environment variable to format the output. For example, if you use the **INFORMIX-ESQL/COBOL** function **ECO-FIN** to format an internal monetary value, Informix SQL API products use the **DBMONEY** setting to format the value.

**Tip:** The setting of **DBMONEY** does not affect the internal format of the MONEY column in the database.



If you do not set **DBMONEY**, then **MONEY** values for the default locale, U.S. ASCII English, are formatted with a dollar sign (\$) preceding the **MONEY** value, a period (.) separating the integral from the fractional part of the **MONEY** value, and no *back* symbol. For example, 10050 is formatted as \$100.50.

Suppose you want to represent **MONEY** values in DM (Deutsche Mark), which uses the currency symbol **DM** and a comma. Set the **DBMONEY** environment variable by entering the following command:

```
setenv DBMONEY DM,
```

Here, **DM** is the currency symbol preceding the **MONEY** value, and a comma separates the integral from the fractional part of the **MONEY** value. As a result, the amount 10050 is displayed as **DM100,50**.

For more information about how the **DBMONEY** environment variable handles **MONEY** formats for nondefault locales, see the [Chapter 2](#) of the *Guide to GLS Functionality*. ♦

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## DBONPLOAD

The **DBONPLOAD** environment variable specifies the name of the database that the **onpload** utility of the High-Performance Loader uses. If the **DBONPLOAD** environment variable is set, the specified name is the name of the database. If the **DBONPLOAD** environment variable is not set, the default name of the database is **onpload**.

```
setenv _____DBONPLOAD_____ dbname _____|
```

*dbname* specifies the name of the database to be used by the **onpload** utility.

For example, to specify the name **load\_db** as the name of the database, enter the following command:

```
setenv DBONPLOAD load_db
```

## DBPATH

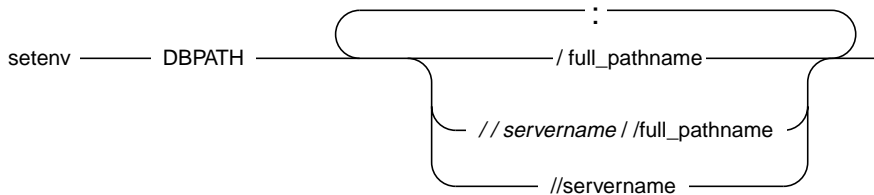
Use **DBPATH** to identify the database servers that contain databases (if you are using the INFORMIX-OnLine Dynamic Server), or the directories and/or database servers that contain databases (if you are using INFORMIX-SE ). The **DBPATH** environment variable also specifies a list of directories (in addition to the current directory) in which DB-Access looks for command scripts (**.sql** files).

The **CONNECT**, **DATABASE**, **START DATABASE**, and **DROP DATABASE** statements use **DBPATH** to locate the database under two conditions:

- If the location of a database is not explicitly stated
- If the database cannot be located in the default server or, for INFORMIX-SE, the default directory

The **CREATE DATABASE** statement does not use **DBPATH**.

To add a new **DBPATH** entry to existing entries, see [“Modifying the Setting of an Environment Variable” on page 4-9](#).



**full\_pathname** is a valid full pathname of a directory in which **.sql** files are stored or in which INFORMIX-SE databases are stored.

**servername** is the name of an INFORMIX-OnLine Dynamic Server or INFORMIX-SE database server on which databases are stored. You cannot reference database files with a **servername**.

**DBPATH** can contain up to 16 entries. Each entry (**full\_pathname**, **servername**, or **servername** and **full\_pathname**) must be less than 128 characters. In addition, the maximum length of **DBPATH** depends on the hardware platform on which you are setting **DBPATH**.

When you access a database using the `CONNECT`, `DATABASE`, `START DATABASE`, or `DROP DATABASE` statement, the search for the database is done first in the directory and/or database server specified in the statement. If no database server is specified, the default database server as set in the `INFORMIXSERVER` environment variable is used. For `INFORMIX-SE`, if no directory is specified in the statement, the default directory is searched for the database. (The default directory is the current working directory if the database server is on the local computer or your login directory if the database server is on a remote computer.) If a directory is specified but is not a full path, the directory is considered to be relative to the default directory.

If the database is not located during the initial search, and if `DBPATH` is set, the database servers and/or directories in `DBPATH` are searched for the indicated database. The entries to `DBPATH` are considered in order.

### *Using DBPATH with DB-Access*

If you are using DB-Access and you use the Choose option of the SQL menu without having already selected a database, you see a list of all the `.sql` files in the directories listed in your `DBPATH`. Once you select a database, the `DBPATH` is not used to find the `.sql` files: For `INFORMIX-OnLine Dynamic Server` databases, only the `.sql` files in the current working directory are displayed; for `INFORMIX-SE` databases, the `.sql` files in the directory containing the selected database are displayed.

### *Searching Local Directories*

Use a pathname without a database server name to have the database server search for databases or `.sql` scripts on your local computer. If you are using DB-Access with `INFORMIX-SE`, you can search for a database and `.sql` scripts; with the `INFORMIX-OnLine Dynamic Server`, you can look only for `.sql` scripts.

In the following example, the `DBPATH` setting causes DB-Access to search for the database files in your current directory and then in Joachim's and Sonja's directories on the local computer:

```
setenv DBPATH /usr/joachim:/usr/sonja
```

As shown in the previous example, if the pathname specifies a directory name but not a database server name, the directory is sought on the computer running the default database server as specified by the **INFORMIXSERVER** environment variable. (See [page 4-47](#).) For instance, with the previous example, if **INFORMIXSERVER** is set to **quality**, the **DBPATH** value is *interpreted* as shown in the following example, where the double slash precedes the database server name:

```
setenv DBPATH //quality/usr/joachim://quality/usr/sonja
```

### ***Searching Networked Computers for Databases***

If you are using more than one database server, you can set **DBPATH** to explicitly contain the database server and/or directory names that you want to search for databases. For example, if **INFORMIXSERVER** is set to **quality** but you also want to search the **marketing** database server for **/usr/joachim**, set **DBPATH** as shown in the following example:

```
setenv DBPATH //marketing/usr/joachim:/usr/sonja
```

### ***Specifying a Servername***

You can set **DBPATH** to contain only database server names. This setting allows you to locate only databases and not locate command files.

The OnLine or SE administrator must include each database server mentioned by **DBPATH** in the **\$INFORMIXDIR/etc/sqlhosts** file. For information on communication-configuration files and dbservernames, see the [INFORMIX-OnLine Dynamic Server Administrator's Guide](#) or the [INFORMIX-SE Administrator's Guide](#).

For example, if **INFORMIXSERVER** is set to **quality**, you can search for an INFORMIX-OnLine Dynamic Server database first on the **quality** database server and then on the **marketing** database server by setting **DBPATH** shown in the following example:

```
setenv DBPATH //marketing
```

If you are using DB-Access in this example, the names of all the databases on the **quality** and **marketing** database servers are displayed with the Select option of the DATABASE menu.

For INFORMIX-SE, you can set **DBPATH** to contain only the database server names (and no directory names) if you want to locate databases and not command scripts:

- If you specify a local SE database server, the current working directory is searched for databases.
- If you specify a remote SE database server, the search for databases is done in the **login** directory of the user on the computer where the database server is running.

## DBPRINT

The **DBPRINT** environment variable specifies the printing program that you want to use.

```
setenv DBPRINT program
```

*program* names any command, shell script, or UNIX utility that handles standard ASCII input.

The default program is found in one of two places:

- For most BSD UNIX systems, the default program is **lpr**.
- For UNIX System V, the default program is usually **lp**.

Set the **DBPRINT** environment variable to specify the **myprint** print program by entering the following command:

```
setenv DBPRINT myprint
```

## DBREMOTECMD

You can set the **DBREMOTECMD** environment variable to override the default remote shell used when you perform remote tape operations with the INFORMIX-OnLine Dynamic Server. Set it using either a simple command or the full pathname. If you use the full pathname, the database server searches your **PATH** for the specified command.

setenv \_\_\_\_\_ DBREMOTECMD \_\_\_\_\_ *command* \_\_\_\_\_  
   *pathname*

*command*            is the command to override the default remote shell.

*pathname*        is the pathname to override the default remote shell.

Informix highly recommends the use of the full pathname syntax on the interactive UNIX platform to avoid problems with similarly named programs in other directories and possible confusion with the *restricted shell* (**/usr/bin/rsh**).

Set the **DBREMOTECMD** environment variable for a simple command name by entering the following command:

```
setenv DBREMOTECMD rcmd
```

Set the **DBREMOTECMD** environment variable to specify the full pathname by entering the following command:

```
setenv DBREMOTECMD /usr/bin/remsh
```

For more information on **DBREMOTECMD**, see the discussion in the [INFORMIX-OnLine Dynamic Server Archive and Backup Guide](#) about using remote tape devices with the INFORMIX-OnLine Dynamic Server for archives, restores, and logical-log backups.

## DBSPACETEMP

If you are using OnLine, you can set your **DBSPACETEMP** environment variable to specify the dbspaces in which temporary tables are to be built. You can specify multiple dbspaces to spread temporary space across any number of disks.

```
setenv _____ DBSPACETEMP _____ temp_dbspace |
```

*punct* can be either colons or commas.  
*temp\_dbspace* is a valid existing temporary dbspace.

The **DBSPACETEMP** environment variable overrides the default dbspaces specified by the **DBSPACETEMP** configuration parameter in the OnLine configuration file.

For example, you might set **DBSPACETEMP** environment variable by entering the following command:

```
setenv DBSPACETEMP sorttmp1:sorttmp2:sorttmp3
```

Separate the dbspace entries with either colons or commas. The number of dbspaces is limited by the maximum size of the environment variable, as defined by the UNIX shell. OnLine does not create a dbspace specified by the environment variable if the dbspace does not exist.

There are two classes of temporary tables: explicit temporary tables that are created by the user and implicit temporary tables that are created by OnLine. You use the **DBSPACETEMP** environment variable to specify the dbspaces for both types of temporary tables.

If you create an explicit temporary table with the **CREATE TEMP TABLE** statement and do not specify a dbspace for the table either in the **IN *dbspace*** clause or in the **FRAGMENT BY** clause, OnLine uses the settings in the **DBSPACETEMP** environment variable to determine where to create the table. If the **DBSPACETEMP** environment variable is not set, OnLine uses the **ONCONFIG** parameter **DBSPACETEMP**. If this parameter is not set, OnLine creates the temporary table in the same dbspace where the database resides.



If you create an explicit temporary table with the `SELECT INTO TEMP` statement, OnLine uses the settings in the **DBSPACETEMP** environment variable to determine where to create the table. If the **DBSPACETEMP** environment variable is not set, OnLine uses the `ONCONFIG` parameter **DBSPACETEMP**. If this parameter is not set, OnLine creates the temporary table in the root dbspace.

OnLine creates implicit temporary tables for its own use while executing join operations, `SELECT` statements with the `GROUP BY` clause, `SELECT` statements with the `ORDER BY` clause, and index builds. When it creates these implicit temporary tables, OnLine uses disk space for writing the temporary data, in the following order:

1. The operating system directory or directories specified by the environment variable **PSORT\_DBTEMP**, if it is set
2. The dbspace or dbspaces specified by the environment variable **DBSPACETEMP**, if it is set
3. The dbspace or dbspaces specified by the `ONCONFIG` parameter **DBSPACETEMP**
4. The operating-system file space in **/tmp**

## DBTEMP

Set the **DBTEMP** environment variable to specify the full pathname of the directory into which you want INFORMIX-SE or INFORMIX-Gateway products to place their temporary files and temporary tables.

```
setenv _____ DBTEMP _____ pathname _____ |
```

*pathname* is the full pathname of the directory for temporary files and temporary tables.

Set the **DBTEMP** environment variable to specify the pathname **usr/magda/mytemp** by entering the following command:

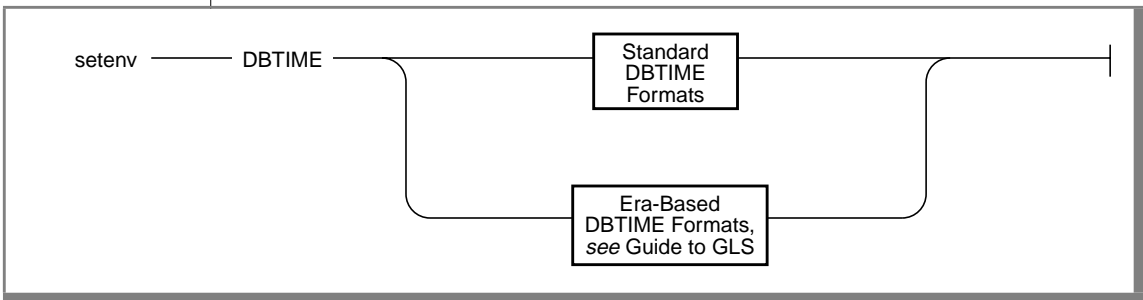
```
setenv DBTEMP usr/magda/mytemp
```

If you do not set **DBTEMP**, temporary files are created in **/tmp**. If **DBTEMP** is not set, temporary tables are created in the directory of the database (that is, the **.dbs** directory).

OnLine uses **DBSPACETEMP** to specify the location of temporary files.

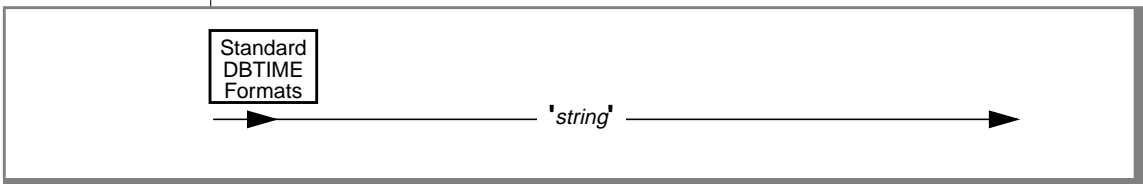
## DBTIME

The **DBTIME** environment variable specifies the end-user formats of DATETIME values for a set of SQL API library functions.



You can set the **DBTIME** environment variable to manipulate DATETIME formats so that the formats conform more closely to various international or local TIME conventions. **DBTIME** takes effect only when you call certain INFORMIX-ESQL/C or INFORMIX-ESQL/COBOL DATETIME routines; otherwise, use the **DBDATE** environment variable. (See the [INFORMIX-ESQL/C Programmer's Manual](#) or the [INFORMIX-ESQL/COBOL Programmer's Manual](#) for details.)

You can set **DBTIME** to specify the exact format of an input/output (I/O) DATETIME string field by using the formatting directives described in the following list. Otherwise, the behavior of the DATETIME formatting routine is undefined.



*string* The formatting directives that you can use are described in the following list:

- %b** is replaced by the abbreviated month name.
- %B** is replaced by the full month name.
- %d** is replaced by the day of the month as a decimal number [01,31].
- %Fn** is replaced by the value of the fraction with precision specified by the integer *n*. The default value of *n* is 2; the range of *n* is  $0 \leq n \leq 5$ .
- %H** is replaced by the hour (24-hour clock).
- %I** is replaced by the hour (12-hour clock).
- %M** is replaced by the minute as a decimal number [00,59].
- %m** is replaced by the month as a decimal number [01,12].
- %p** is replaced by A.M. or P.M. (or the equivalent in the local standards).
- %S** is replaced by the second as a decimal number [00,59].
- %y** is replaced by the year as a four-digit decimal number. If the user enters a two-digit value, the format of this value is affected by the setting of the **DBCENTURY** environment variable. If **DBCENTURY** is not set, then the current century is used for the century digits.
- %Y** is replaced by the year as a four-digit decimal number. User must enter a four-digit value.
- %%** is replaced by % (to allow % in the format string).

For example, consider how to convert a DATETIME YEAR TO SECOND to the following ASCII string format:

```
Mar 21, 1994 at 16 h 30 m 28 s
```

You set **DBTIME** as shown in the following list:

```
setenv DBTIME '%b %d, %Y at %H h %M m %S s'
```

The default **DBTIME** produces the conventional ANSI SQL string format shown in the following line:

```
1994-03-21 16:30:28
```

The default **DBTIME** is set as shown in the following example:

```
setenv DBTIME '%Y-%m-%d %H:%M:%S'
```

An optional field width and precision specification can immediately follow the percent (%) character; it is interpreted as described in the following list:

- `[-|0]w` where *w* is a decimal digit string specifying the minimum field width. By default, the value is right justified with spaces on the left. If `-` is specified, it is left justified with spaces on the right. If `0` is specified, it is right justified and padded with zeros on the left.
- `.p` where *p* is a decimal digit string specifying the number of digits to appear for `d`, `H`, `I`, `m`, `M`, `S`, `y`, and `Y` conversions, and the maximum number of characters to be used for `b` and `B` conversions. A precision specification is significant only when converting a `DATETIME` value to an ASCII string and not vice versa.

When you use field width and precision specifications, the following limitations apply:

- If a conversion specification supplies fewer digits than specified by a precision, it is padded with leading zeros.
- If a conversion specification supplies more characters than specified by a precision, excess characters are truncated on the right.
- If no field width or precision is specified for `d`, `H`, `I`, `m`, `M`, `S`, or `y` conversions, a default of `0.2` is used. A default of `0.4` is used for `Y` conversions.

The `F` conversion does not follow the field width and precision format conversions that are described earlier.

See the discussion of `DBDATE` on [page 4-21](#) for related information.

## DBUPSPACE

The **DBUPSPACE** environment variable lets you specify and constrain the amount of system disk space that the `UPDATE STATISTICS` statement can use when trying to simultaneously construct multiple column distributions.

```
setenv _____ DBUPSPACE _____ value _____
```

*value* represents a disk space amount in kilobytes.

For example, to set **DBUPSPACE** to 2,500 kilobytes, enter the following command:

```
setenv DBUPSPACE 2500
```

Then no more than 2,500 kilobytes of disk space can be used during the execution of an `UPDATE STATISTICS` statement. If a table requires 5 megabytes of disk space for sorting, then `UPDATE STATISTICS` accomplishes the task in two passes; the distributions for one half of the columns are constructed with each pass.

If you try to set **DBUPSPACE** to any value less than 1,024 kilobytes, it is automatically set to 1,024 kilobytes, but no error message is returned. If this value is not large enough to allow more than one distribution to be constructed at a time, at least one distribution is done, even if the amount of disk space required for the one is greater than specified in **DBUPSPACE**.

## DELIMIDENT

The **DELIMIDENT** environment variable specifies that strings set off by double quotes are delimited identifiers.

```
setenv _____ DELIMIDENT _____
```

You can use delimited identifiers to specify identifiers that are identical to reserved keywords, such as `TABLE` or `USAGE`. You can also use them to specify database identifiers that contain nonalpha characters, but you cannot use them to specify storage identifiers that contain non-alpha characters. Note that database identifiers are names for database objects such as tables and columns, and storage identifiers are names for storage objects such as dbspaces and blobspaces.

Delimited identifiers are case sensitive.

To use delimited identifiers, applications in `ESQL /C` and `ESQL /COBOL` must set the `DELIMIDENT` environment variable at compile time and execute time.

## ENVIGNORE

Use the `ENVIGNORE` environment variable to deactivate specified environment variable entries in the common (shared) and private environment-configuration files, `informix.rc` and `.informix` respectively.

```
setenv ENVIGNORE (variable)
```

*variable* is the list of environment variables that you want to deactivate.

For example, to ignore the `DBPATH` and `DBMONEY` entries in the environment-configuration files, enter the following command:

```
setenv ENVIGNORE DBPATH:DBMONEY
```

The common environment-configuration file is stored in `$INFORMIXDIR/etc/informix.rc`. The private environment-configuration file is stored in the user's home directory as `.informix`. For information on creating or modifying an environment-configuration file, see [“Setting Environment Variables in an Environment-Configuration File”](#) on page 4-6.

`ENVIGNORE` cannot be set in an environment-configuration file.

## FET\_BUF\_SIZE

The **FET\_BUF\_SIZE** environment variable lets you override the default setting for the size of the fetch buffer for all data except blobs. When set, **FET\_BUF\_SIZE** is effective for the entire environment.

```
setenv FET_BUF_SIZE n
```

*n* represents the size of the buffer in bytes.

When set to a valid value, the environment variable overrides the previously set value. The default setting for the fetch buffer is dependent on row size.

If the buffer size is set to less than the default size or is out of the range of the small integer value, no error is raised. The new buffer size is ignored.

For example, to set a buffer size to 5,000 bytes, set the **FET\_BUF\_SIZE** environment variable by entering the following command:

```
setenv FET_BUF_SIZE 5000
```

## INFORMIXC

The **INFORMIXC** environment variable specifies the name or pathname of the C compiler to be used to compile files generated by INFORMIX-ESQL/C. If **INFORMIXC** is not set, the default compiler is cc.

```
setenv INFORMIXC compiler
                             pathname
```

*compiler* is the name of the C compiler.

*pathname* is the full pathname of the C compiler.

For example, to specify the GNU C compiler, enter the following command:

```
setenv INFORMIXC gcc
```

The setting is required only during the C compilation stage.

## INFORMIXCOB

The **INFORMIXCOB** environment variable specifies the program name of the COBOL compiler that you use with INFORMIX-ESQL/COBOL. It identifies the command that calls up the compiler environment. You must set this environment variable before you compile your ESQL/COBOL program.

```
setenv _____ INFORMIXCOB _____ program _____
```

*program* is the program name of the COBOL compiler.

The program name depends on the manufacturer of the COBOL compiler, as shown in the following table.

Compiler Manufacturer	Enter the Command:
Micro Focus	setenv INFORMIXCOB cob
Ryan-McFarland (Liant)	setenv INFORMIXCOB rmcobol

Your COBOL compiler might require you to set additional (UNIX) environment variables as listed in the compiler documentation. For compiler-specific information, see the product manuals and the [INFORMIX-ESQL/COBOL Programmer's Manual](#).

For more information about **INFORMIXCOB**, refer to the [INFORMIX-ESQL/COBOL Programmer's Manual](#).



## INFORMIXCOBDIR

The **INFORMIXCOBDIR** environment variable specifies the directory where the COBOL compiler resides. You must set this environment variable before you compile your INFORMIX-ESQL/COBOL program and create the runtime product.

```
setenv _____ INFORMIXCOBDIR _____ dirname _____ |
```

*dirname* is the full directory pathname of the directory where the COBOL compiler, runtime library, and objects reside.

For more information about **INFORMIXCOBDIR**, refer to the [INFORMIX-ESQL/COBOL Programmer's Manual](#).

## INFORMIXCOBSTORE

The **INFORMIXCOBSTORE** environment variable applies only to the Micro Focus (MF) COBOL/2 environment. It specifies the type of storage to use during compilation. You must set **INFORMIXCOBSTORE** before you compile your INFORMIX-ESQL/COBOL program and create the runtime product.

```
setenv _____ INFORMIXCOBSTORE _____ byte _____ |
                                     _____ word _____
```

*byte* specifies byte storage.

*word* specifies word storage.

The number of bytes needed to store **BINARY** or **COMPUTATIONAL** data is based on the size (maximum number of digits) specified in the **PICTURE** clause. The MF COBOL/2 compiler also considers whether *byte* or *word* storage is specified when determining the number of bytes needed to store **BINARY** and **COMPUTATIONAL** data. (MF COBOL/2 uses only byte storage.)

If **INFORMIXCOBSTORE** is not set, the default storage mode is byte, which is more restrictive of available data-type choices. If you are using byte storage, the only legal PIC sizes are 3, 4, 7, 8, and 9. If you are using word storage, PIC sizes can range from 1 through 9.

For a table showing the storage allocation for MF compilers, see the [INFORMIX-ESQL/COBOL Programmer's Manual](#).

## INFORMIXCOBTYPE

The **INFORMIXCOBTYPE** environment variable specifies a code that identifies the manufacturer of your COBOL compiler. You must set **INFORMIXCOBTYPE** before you compile an INFORMIX-ESQL/COBOL program and create the runtime product.

setenv \_\_\_\_\_ INFORMIXCOBTYPE \_\_\_\_\_ type \_\_\_\_\_ |

*type* indicates the manufacturer of the COBOL compiler that you use with ESQL/COBOL, as shown in the following list:

mf2	Micro Focus
rm85	Ryan-McFarland (Liant)

For more information about **INFORMIXCOBTYPE**, refer to the [INFORMIX-ESQL/COBOL Programmer's Manual](#).

## INFORMIXCONRETRY

The **INFORMIXCONRETRY** environment variable specifies the maximum number of additional connection attempts that should be made to each server by the client during the time limit specified by the **INFORMIXCONTIME** environment variable.

setenv \_\_\_\_\_ INFORMIXCONRETRY \_\_\_\_\_ value \_\_\_\_\_ |

*value* represents the number of connection attempts to each server.

For example, set **INFORMIXCONRETRY** to three additional connection attempts (after the initial attempt) by entering the following command:

```
setenv INFORMIXCONRETRY 3
```

The default value for **INFORMIXCONRETRY** is one retry after the initial connection attempt. The **INFORMIXCONTIME** setting, described in the following section, takes precedence over the **INFORMIXCONRETRY** setting.

## INFORMIXCONTIME

The **INFORMIXCONTIME** environment variable lets you specify that an SQL **CONNECT** statement should keep trying for at least the given number of seconds before returning an error.

You might encounter connection difficulties related to system or network load problems. For instance, if the database server is busy establishing new SQL client threads, some clients might fail because the server cannot issue a network function call fast enough. The **INFORMIXCONTIME** and **INFORMIXCONRETRY** environment variables let you configure your client-side connection capability to retry the connection instead of returning an error.

```
setenv _____ INFORMIXCONTIME _____ value _____ |
```

*value* represents the minimum number of seconds spent in attempts to establish a connection to a server.

For example, set **INFORMIXCONTIME** to 60 seconds by entering the following command:

```
setenv INFORMIXCONTIME 60
```

If **INFORMIXCONTIME** is set to 60 and **INFORMIXCONRETRY** is set to 3, as shown in these examples, attempts to connect to the server (after the initial attempt at 0 seconds) will be made at 20, 40, and 60 seconds, if necessary, before aborting. This 20-second interval is the result of **INFORMIXCONTIME** divided by **INFORMIXCONRETRY**.

If execution of the **CONNECT** statement involves searching **DBPATH**, the following rules apply:

- All appropriate servers in the **DBPATH** setting are accessed at least once, even though the **INFORMIXCONTIME** value might be exceeded. Thus, the **CONNECT** statement might take longer than the **INFORMIXCONTIME** time limit to return an error indicating connection failure or that the database was not found.
- The **INFORMIXCONRETRY** value specifies the number of additional connections that should be attempted for each server entry in **DBPATH**.
- The **INFORMIXCONTIME** value is divided among the number of server entries specified in **DBPATH**. Thus, if **DBPATH** contains numerous servers, you should increase the **INFORMIXCONTIME** value accordingly. For example, if **DBPATH** contains three entries, to spend at least 30 seconds attempting each connection, set **INFORMIXCONTIME** to 90.

The default value for **INFORMIXCONTIME** is 15 seconds. The setting for **INFORMIXCONTIME** takes precedence over the **INFORMIXCONRETRY** setting. Retry efforts could end after the **INFORMIXCONTIME** value has been exceeded, but before the **INFORMIXCONRETRY** value has been reached.

## INFORMIXDIR

The **INFORMIXDIR** environment variable specifies the directory that contains the subdirectories in which your product files are installed. You must always set **INFORMIXDIR**. If you have multiple versions of OnLine or SE, set **INFORMIXDIR** to the appropriate directory name for the version that you want to access. For information about when to set the **INFORMIXDIR** environment variable, see the [UNIX Products Installation Guide](#).

```
setenv INFORMIXDIR pathname
```

*pathname* is the directory path where the product files are installed.

Set the **INFORMIXDIR** environment variable to the desired installation directory by entering the following command:

```
setenv INFORMIXDIR /usr/informix
```

## INFORMIXOPCACHE

The **INFORMIXOPCACHE** environment variable lets you specify the size of the memory cache for the staging-area blobspace of the client application.

```
setenv _____ INFORMIXOPCACHE _____ kilobytes
```

*kilobytes* specifies the value you set for the optical memory cache.

You set the **INFORMIXOPCACHE** environment variable by specifying the size of the memory cache in kilobytes. The specified size must be equal to or smaller than the size of the system-wide configuration parameter, **OPCACHEMAX**. If you do not set the **INFORMIXOPCACHE** environment variable, the default cache size is 128 kilobytes or the size specified in the configuration parameter **OPCACHEMAX**. The default for **OPCACHEMAX** is 128 kilobytes. If you set **INFORMIXOPCACHE** to a value of 0, **INFORMIX-OnLine/Optical** does not use the cache.

## INFORMIXSERVER

The **INFORMIXSERVER** environment variable specifies the default database server to which an explicit or implicit connection is made by an SQL API client or the DB-Access utility. The database server can be either **INFORMIX-OnLine Dynamic Server** or **INFORMIX-SE** and can be either local or remote. You must always set **INFORMIXSERVER** before using an Informix product.

```
setenv _____ INFORMIXSERVER _____ dbservername _____ |
```

*dbservername* is the name of the default database server.

The value of **INFORMIXSERVER** must correspond to a valid *dbservername* entry in the **\$INFORMIXDIR/etc/sqlhosts** file on the computer running the application. The *dbservername* must be specified using lowercase characters and cannot exceed 18 characters for **OnLine** or 10 characters for **SE**. For example, specify the **coral** database server as the default for connection by entering the following command:

```
setenv INFORMIXSERVER coral
```



**INFORMIXSERVER** specifies the database server to which an application connects if the **CONNECT DEFAULT** statement is executed. It also defines the database server to which an initial implicit connection is established if the first statement in an application is not a **CONNECT** statement.

***Important:** **INFORMIXSERVER** must be set even if the application or DB-Access does not use implicit or explicit default connections.*

## INFORMIXSHMBASE

The **INFORMIXSHMBASE** environment variable affects only client applications connected to OnLine using the IPC shared-memory (**ipcshm**) communication protocol.



***Important:** Resetting **INFORMIXSHMBASE** requires a thorough understanding of how the application uses memory. Normally you do not reset **INFORMIXSHMBASE**.*

You use **INFORMIXSHMBASE** to specify where shared-memory communication segments are attached to the client process so that client applications can avoid collisions with other memory segments used by the application. If you do not set **INFORMIXSHMBASE**, the memory address of the communication segments defaults to an implementation-specific value such as 0x800000.

setenv \_\_\_\_\_ INFORMIXSHMBASE \_\_\_\_\_ value \_\_\_\_\_ |

*value* is used to calculate the memory address.

The OnLine calculates the memory address where segments are attached by multiplying the value of **INFORMIXSHMBASE** by 1,024. For example, to set the memory address to the value 0x800000, set the **INFORMIXSHMBASE** environment variable by entering the following command:

```
setenv INFORMIXSHMBASE 8192
```

For more information, see the [INFORMIX-OnLine Dynamic Server Administrator's Guide](#).

## INFORMIXSQLHOSTS

The **INFORMIXSQLHOSTS** environment variable specifies the full pathname and filename of a file that contains connectivity information.

The file specified in the **INFORMIXSQLHOSTS** environment variable has the same format as the **\$INFORMIXDIR/etc/sqlhosts** file. For a description of the **\$INFORMIXDIR/etc/sqlhosts** file, see the [INFORMIX-OnLine Dynamic Server Administrator's Guide](#).

```
setenv _____ INFORMIXSQLHOSTS _____ pathname _____|
```

*pathname* specifies the full pathname and filename of the file that contains connectivity information.

For example, to specify that the client or database server will look for connectivity information in the **mysqlhosts** file in the **/work/envt** directory, enter the following command:

```
setenv INFORMIXSQLHOSTS /work/envt/mysqlhosts
```

When the **INFORMIXSQLHOSTS** environment variable is set, the client or database server looks in the specified file for connectivity information. When the **INFORMIXSQLHOSTS** environment variable is not set, the client or database server looks in the **\$INFORMIXDIR/etc/sqlhosts** file.

## INFORMIXSTACKSIZE

**INFORMIXSTACKSIZE** specifies the stack size (in kilobytes) that OnLine uses for a particular client session. Use **INFORMIXSTACKSIZE** to override the value of the **ONCONFIG** parameter **STACKSIZE** for a particular application or user.

```
setenv _____ INFORMIXSTACKSIZE _____ value _____|
```

*value* is the stack size for SQL client threads in kilobytes.

For example, to decrease the **INFORMIXSTACKSIZE** to 20 kilobytes, enter the following command:

```
setenv INFORMIXSTACKSIZE 20
```

If **INFORMIXSTACKSIZE** is not set, the stack size is taken from the OnLine configuration parameter **STACKSIZE**, or it defaults to a platform-specific value. The default stack size value for the primary thread for an SQL client is 32 kilobytes for nonrecursive database activity.



**Warning:** For specific instructions for setting this value, see the “[INFORMIX-OnLine Dynamic Server Administrator’s Guide](#).” If you incorrectly set the value of **INFORMIXSTACKSIZE**, it can cause OnLine to crash.

## INFORMIXTERM

The **INFORMIXTERM** environment variable specifies whether DB-Access should use the information in the **termcap** file or the **terminfo** directory. The **termcap** file and **terminfo** directory determine terminal-dependent keyboard and screen capabilities such as the operation of function keys, color and intensity attributes in screen displays, and the definition of window border and graphics characters.



If **INFORMIXTERM** is not set, the default setting is **termcap**. When DB-Access is installed on your system, a **termcap** file is placed in the **etc** subdirectory of **\$INFORMIXDIR**. This file is a superset of an operating-system **termcap** file.

You can use the **termcap** file supplied by Informix, the system **termcap** file, or a **termcap** file that you create. You must set the **TERMCAP** environment variable if you do not use the default **termcap** file. For information on setting the **TERMCAP** environment variable, see [page 4-60](#).

The **terminfo** directory contains a file for each terminal name that has been defined. The **terminfo** setting for **INFORMIXTERM** is supported only on computers that provide full support for the UNIX System V **terminfo** library. For details, see the Version 7.2 machine notes file for your product.



## INF\_ROLE\_SEP

The `INF_ROLE_SEP` environment variable configures the security feature of role separation when INFORMIX-OnLine Dynamic Server is installed. Role separation enforces separating administrative tasks that are performed by different people who are involved in running and auditing OnLine.

If `INF_ROLE_SEP` is set, role separation is implemented and a separate group is specified to serve each of the following responsibilities: the database system security officer (DBSSO), the audit analysis officer (AAO), and the standard user. If `INF_ROLE_SEP` is not set, user **informix** (the default) can perform all administrative tasks.

```
setenv _____ INF_ROLE_SEP _____ n _____|
```

*n*                    *n* is any positive integer.

See the [INFORMIX-OnLine Dynamic Server Trusted Facility Manual](#) to learn more about the security feature of role separation. See the [UNIX Products Installation Guide](#) to learn how to configure role separation when you install OnLine.

## NODEFDAC

When it is set to `yes`, the `NODEFDAC` environment variable prevents default table privileges (Select, Insert, Update, and Delete) from being granted to `PUBLIC` when a new table is created in a database that is not ANSI compliant. If you do not set the `NODEFDAC` variable, it is, by default, set to `no`.

```
setenv _____ NODEFDAC _____ yes _____|
                                     no
```

- |     |   |
|-----|---|
| yes | prevents default table privileges from being granted to PUBLIC on new tables in a database that is not ANSI compliant. This setting also prevents the Execute privilege for a new stored procedure from being granted to PUBLIC when the stored procedure is created in owner mode. |
| no  | allows default table privileges to be granted to PUBLIC. Also allows the Execute privilege on a new stored procedure to be granted to PUBLIC when the stored procedure is created in owner mode.  |

## ONCONFIG

The **ONCONFIG** environment variable specifies a file that holds configuration parameters for OnLine. This file is read as input during the initialization procedure.

```
setenv _____ ONCONFIG _____ filename _____
```

*filename* is the name of a file in **\$INFORMIXDIR/etc** that contains the OnLine configuration parameters.

Prepare the ONCONFIG file by making a copy of the **onconfig.std** file and modifying the copy. Informix recommends that you name the ONCONFIG file so it can easily be related to a specific OnLine database server. If you have multiple instances of OnLine, each instance *must* have its own uniquely named ONCONFIG file.

If you do not set the **ONCONFIG** environment variable, the default filename is **onconfig**.

For more information, see the [INFORMIX-OnLine Dynamic Server Administrator's Guide](#).

## OPTCOMPIND

You can set the **OPTCOMPIND** environment variable so that the optimizer can select the appropriate join method. The **OPTCOMPIND** environment variable applies only to OnLine.



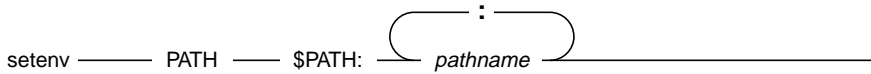
- 0** A nested-loop join is preferred, where possible, over a sort-merge join or a hash join.
- 1** When the transaction isolation mode is *not* Repeatable Read, the optimizer behaves as in setting 2; otherwise, the optimizer behaves as in setting 0.
- 2** Nested-loop joins are not necessarily preferred. The optimizer bases its decision purely on costs, regardless of transaction isolation mode.

When the **OPTCOMPIND** environment variable is not set, OnLine uses the value specified for the ONCONFIG configuration parameter **OPTCOMPIND**. When neither the environment variable nor the configuration parameter is set, the default value is 2.

For more information on the ONCONFIG configuration parameter **OPTCOMPIND**, see the [INFORMIX-OnLine Dynamic Server Administrator's Guide](#). For more information on the different join methods used by the optimizer, see [INFORMIX-OnLine Dynamic Server Performance Guide](#).

## PATH

The UNIX **PATH** environment variable tells the shell which directories to search for executable programs. You must add the directory that contains your Informix product to your **PATH** environment variable before you can use the product.



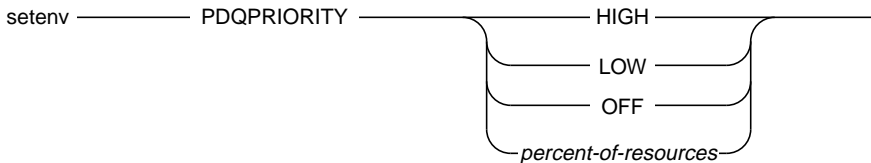
*pathname* specifies the search path for the executables.

You can specify the correct search path in various ways. Be sure to include a colon between the directory names.

For additional information about how to modify your path, see [“Modifying the Setting of an Environment Variable” on page 4-9](#).

## PDQPRIORITY

The **PDQPRIORITY** environment variable determines the degree of parallelism used by OnLine. **PDQPRIORITY** affects how OnLine allocates resources, including memory, processors, and disk reads.



- HIGH** When OnLine allocates resources among all users, it gives as many resources as possible to the query.
- LOW** Data is fetched from fragmented tables in parallel, but no other parallelism is used.
- OFF** PDQ processing is turned off.

*percent-of-resources* An integer between 0 and 100 that indicates a query priority level. The higher the number, the more resources OnLine uses. Two values have special meaning:  
 0 is equivalent to the symbolic value of OFF.  
 1 is equivalent to the symbolic value of LOW.

When the **PDQPRIORITY** environment variable is not set, the default value is OFF.

When the environment variable is set to HIGH, the database server determines an appropriate value to use for **PDQPRIORITY** based on several criteria, including the number of available processors, the fragmentation of tables queried, the complexity of the query, and so on.

Usually the more resources OnLine uses, the better its performance for a given query, but using too many resources can cause contention among the resources and also take away resources from other queries, resulting in degraded performance.

An application can override the setting of the environment variable when it issues the SQL statement SET PDQPRIORITY, which is described in the [Informix Guide to SQL: Syntax](#).

## PLCONFIG

The **PLCONFIG** environment variable specifies the name of the configuration file that the High-Performance Loader uses. This configuration file must reside in the **\$INFORMIXDIR/etc** directory. If the **PLCONFIG** environment variable is not set, the default configuration file is the **\$INFORMIXDIR/etc/plconfig** file.

```
setenv _____ PLCONFIG _____ filename _____ |
```

*filename* specifies the simple filename of the configuration file to be used by the High-Performance Loader.

For example, to specify the `$INFORMIXDIR/etc/custom.cfg` file as the configuration file for the High-Performance Loader, enter the following command:

```
setenv PLCONFIG custom.cfg
```

## PSORT\_DBTEMP

The **PSORT\_DBTEMP** environment variable specifies a directory or directories where the OnLine writes the temporary files it uses when performing a sort.

OnLine uses the directory specified by **PSORT\_DBTEMP** even if the environment variable **PSORT\_NPROCS** is not set.

```
setenv PSORT_DBTEMP : pathname
```

*pathname* is the name of the UNIX directory used for intermediate writes during a sort.

Set the **PSORT\_DBTEMP** environment variable to specify the directory (for example, `/usr/leif/tempsoft`) by entering the following command:

```
setenv PSORT_DBTEMP /usr/leif/tempsoft
```

For maximum performance, specify directories that reside in file systems on different disks.

You also might want to consider setting the environment variable **DBSPACETEMP** to place temporary files used in sorting in dbspaces rather than operating-system files. See the discussion of the **DBSPACETEMP** environment variable on [page 4-34](#).

For additional information about the **PSORT\_DBTEMP** environment variable, see *INFORMIX-OnLine Dynamic Server Administrator's Guide* as well as the *INFORMIX-OnLine Dynamic Server Performance Guide*.

## PSORT\_NPROCS

The **PSORT\_NPROCS** environment variable enables OnLine to improve the performance of the parallel-process sorting package by allocating more threads for sorting. Before the sorting package performs a parallel sort, make sure that OnLine has enough memory for the sort.

```
setenv _____ PSORT_NPROCS _____ threads _____ |
```

*threads* specifies the maximum number of threads to be used to sort a query. The maximum value of *threads* is 10.

Use the following command to set the **PSORT\_NPROCS** environment variable to 4:

```
setenv PSORT_NPROCS 4
```

To maximize the effectiveness of the parallel sort, set **PSORT\_NPROCS** to the number of available processors in the hardware.

You can disable parallel sorting by entering the following command:

```
unsetenv PSORT_NPROCS
```



**Tip:** If the **PDQPRIORITY** environment variable is not set, OnLine allocates the minimum amount of memory to sorts. This minimum memory is insufficient to start even two sort threads. If you have not set the **PDQPRIORITY** environment variable, check the available memory before you perform a large-scale sort (such as an index build) and make sure that you have enough memory.

### Default Values for Ordinary Sorts

If the **PSORT\_NPROCS** environment variable is set, OnLine uses the specified number of sort threads as an upper limit for ordinary sorts.

If **PSORT\_NPROCS** is not set, parallel sorting does not take place. OnLine uses one thread for the sort.

If **PSORT\_NPROCS** is set to 0, OnLine uses three threads for the sort.

### ***Default Values for Attached Indexes***

The default number of threads is different for attached indexes.

If the **PSORT\_NPROCS** environment variable is set, you get the specified number of sort threads for each fragment of the index that is being built.

If the **PSORT\_NPROCS** environment variable is not set, or if it is set to 0, you get two sort threads for each fragment of the index unless you have a single-CPU virtual processor. If you have a single-CPU virtual processor, you get one sort thread for each fragment of the index.

For additional information about the **PSORT\_NPROCS** environment variable, see [INFORMIX-OnLine Dynamic Server Administrator's Guide](#) as well as the [INFORMIX-OnLine Dynamic Server Performance Guide](#).

## **SQLEXEC**



***Important:*** This environment variable functions differently in Version 5.0 and Version 6.0 and later Informix products. For details of Version 5.0 functionality, refer to Chapter 4 of the December 1991 release of this manual.

The **SQLEXEC** environment variable specifies the location of the Version 6.0 or later relay-module executable that allows a Version 5.0 or earlier client to communicate with a local Version 6.0 or later INFORMIX-OnLine Dynamic Server or INFORMIX-SE database server. Therefore, set **SQLEXEC** only if you want to establish communication between a Version 5.0 or earlier client and a Version 6.0 or later database server.

```
setenv _____ SQLEXEC _____ pathname _____
```

*pathname* specifies the pathname for the relay module.

Set **SQLEXEC** to specify the full pathname of the relay module, which is in the **lib** subdirectory of your **SINFORMIXDIR** directory, by entering the following command:

```
setenv SQLEXEC $INFORMIXDIR/lib/sqlrm
```



If you set the **SQLEXEC** environment variable on the C shell command line, you must include curly braces around the existing **INFORMIXDIR**, as shown in the following command:

```
setenv SQLEXEC ${INFORMIXDIR}/lib/sqlrm
```

For information on the relay module, see the [INFORMIX-OnLine Dynamic Server Administrator's Guide](#) or the [INFORMIX-SE Administrator's Guide](#).

## SQLRM



**Important:** This environment variable functions differently in Version 5.0 and Version 6.0 and later Informix products. For details of Version 5.0 functionality, refer to Chapter 4 of the December 1991 release of this manual.

In Version 6.0 and later, if the system administrator is configuring a client/server environment in which a Version 5.0 SQL API client accesses a local Version 6.0 or later database server, the **SQLRM** environment variable must be *unset* before **SQLEXEC** can be used to spawn a Version 6.0 or later relay module.

You can unset **SQLRM** by entering the following command:

```
unsetenv SQLRM
```

For information on the relay module, see the [INFORMIX-OnLine Dynamic Server Administrator's Guide](#) or the [INFORMIX-SE Administrator's Guide](#).

## SQLRMDIR



**Important:** This environment variable functions differently in Version 5.0 and Version 6.0 and later Informix products. For details of Version 5.0 functionality, refer to Chapter 4 of the December 1991 release of this manual.

In Version 6.0 and later, if the DBA is configuring a client/server environment in which a Version 5.0 SQL API client accesses a local Version 6.0 or later database server, the **SQLRMDIR** environment variable must be *unset*.

Unset **SQLRMDIR** by entering the following command:

```
unsetenv SQLRMDIR
```

## TERM

The UNIX **TERM** environment variable is used for terminal handling. It enables DB-Access to recognize and communicate with the terminal you are using.

```
setenv _____ TERM _____ type _____ |
```

*type* specifies the terminal type.

The terminal type specified in the **TERM** setting must correspond to an entry in the **termcap** file or **terminfo** directory. Before you can set the **TERM** environment variable, you must obtain the code for your terminal from the DBA.

For example, to specify the vt100 terminal, set the **TERM** environment variable by entering the following command:

```
setenv TERM vt100
```

## TERMCAP

The **TERMCAP** environment variable is used for terminal handling. It tells DB-Access to communicate with the **termcap** file instead of the **terminfo** directory.

```
setenv _____ TERMCAP _____ pathname _____ |
```

*pathname* specifies the location of the **termcap** file.

The **termcap** file contains a list of various types of terminals and their characteristics. For example, you can provide DB-Access terminal-handling information, which is specified in the **/usr/informix/etc/termcap** file, by entering the following command:

```
setenv TERMCAP /usr/informix/etc/termcap
```

You can use any of the following settings for **TERMCAP**. They are used in the following order:

1. The **termcap** file that you create
2. The **termcap** file supplied by Informix (that is, **\$INFORMIXDIR/etc/termcap**)
3. The operating-system **termcap** file (that is, **/etc/termcap**)

If you set the **TERMCAP** environment variable, be sure that the **INFORMIXTERM** environment variable is set to the default, **termcap**.

If you do not set the **TERMCAP** environment variable, the system file (that is, **/etc/termcap**) is used by default.

## TERMINFO

The **TERMINFO** environment variable is used for terminal handling. It is supported only on platforms that provide full support for the **terminfo** libraries provided by System V and Solaris UNIX systems.

```
setenv _____ TERMINFO _____ /usr/lib/terminfo _____ |
```

**TERMINFO** tells DB-Access to communicate with the **terminfo** directory instead of the **termcap** file. The **terminfo** directory has subdirectories that contain files that pertain to terminals and their characteristics.

Set **TERMINFO** by entering the following command:

```
setenv TERMINFO /usr/lib/terminfo
```

If you set the **TERMINFO** environment variable, you must also set the **INFORMIXTERM** environment variable to **terminfo**.

## THREADLIB

You use the **THREADLIB** environment variable to compile multithreaded ESQ/C applications. A multithreaded ESQ/C application lets you establish as many connections to one or more databases as there are threads. These connections can remain active while the application program executes.

The **THREADLIB** environment variable indicates which thread package to use when you compile an application. Currently only the Distributed Computing Environment (DCE) is supported.

setenv ——— THREADLIB ——— DCE ——— |

The **THREADLIB** environment variable is checked when the **-thread** option is passed to the ESQL/C script when you compile a multithreaded ESQL/C application. When you use the **-thread** option while compiling, the ESQL/C script generates an error if the **THREADLIB** environment variable is not set or if the variable is set to an unsupported thread package.

## Index of Environment Variables

Figure 4-2 provides an overview of the uses for the various Informix and UNIX environment variables supported in Version 7.2. It serves as an index to general topics and lists the related environment variables and the pages where the environment variables are introduced.

**Figure 4-2**  
*Environment Variables Used with Informix Products*

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C compiler	INFORMIXC	<a href="#">4-41</a>
C compiler: processing of multibyte characters	CC8BITLEVEL	<a href="#">Guide to GLS Functionality</a>
Client locale	CLIENT_LOCALE	<a href="#">Guide to GLS Functionality</a>

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# The stores7 Database

# A

The **stores7** database contains a set of tables that describe an imaginary business. The examples in the [Informix Guide to SQL: Syntax](#) and [Informix Guide to SQL: Tutorial](#) are based on this database. The **stores7** database is not ANSI-compliant. Information on creating the **stores7** database appears in the section “Demonstration Database” in the Introduction of this manual.

This appendix contains the following sections:

- The first section describes the structure of the tables in the **stores7** database. It identifies the primary key of each table, lists the name and data type of each column, and indicates whether the column has a default value or check constraint. Indexes on columns are also identified and classified as unique or if they allow duplicate values.
- The second section shows a graphic map of the tables in the **stores7** database and indicates the relationships between columns.
- The third section describes the primary-foreign key relationships between columns in tables.
- The final section shows the data contained in each table of the **stores7** database.

---

## Structure of the Tables

The **stores7** database contains information about a fictitious sporting-goods distributor that services stores in the western United States. This database includes the following tables:

- **customer**
- **orders**
- **items**
- **stock**
- **catalog**
- **cust\_calls**
- **call\_type**
- **manufact**
- **state**


The following sections describe each table. The unique identifier for each table (primary key) is shaded and indicated by a key symbol.

### The customer Table

The **customer** table contains information about the retail stores that place orders from the distributor. The columns of the **customer** table are shown in Figure A-1.

The **zipcode** column in Figure A-1 is indexed and allows duplicate values.


**Figure A-1**  
The customer Table

	Column Name	Data Type	Description
	customer_num	SERIAL(101)	system-generated customer number
	fname	CHAR(15)	first name of store representative
	lname	CHAR(15)	last name of store representative
	company	CHAR(20)	name of store
	address1	CHAR(20)	first line of store address
	address2	CHAR(20)	second line of store address
	city	CHAR(15)	city
	state	CHAR(18)	state (foreign key to <b>state</b> table)
	zipcode	CHAR(2)	zipcode
	phone	CHAR(5)	telephone number

## The orders Table

The **orders** table contains information about orders placed by the customers of the distributor. The columns of the **orders** table are shown in Figure A-2.


**Figure A-2**  
The orders Table

	Column Name	Data Type	Description
	order_num	SERIAL(1001)	system-generated order number
	order_date	DATE	date order entered
	customer_num	INTEGER	customer number (foreign key to <b>customer</b> table)
	ship_instruct	CHAR(40)	special shipping instructions
	backlog	CHAR(1)	indicates order cannot be filled because the item is backlogged: y = yes n = no
	po_num	CHAR(10)	customer purchase order number
	ship_date	DATE	shipping date
	ship_weight	DECIMAL(8,2)	shipping weight
	ship_charge	MONEY(6)	shipping charge
	paid_date	DATE	date order paid

## The items Table

An order can include one or more items. One row exists in the **items** table for each item in an order. The columns of the items table are shown in Figure A-3.

**Figure A-3**  
The items Table

Column Name	Data Type	Description
 item_num	SMALLINT	sequentially assigned item number for an order
order_num	INTEGER	order number (foreign key to <b>orders</b> table)
stock_num	SMALLINT	stock number for item (foreign key to <b>stock</b> table)
manu_code	CHAR(3)	manufacturer code for item ordered (foreign key to <b>manufact</b> table)
quantity	SMALLINT	quantity ordered (value must be > 1)
total_price	MONEY(8)	quantity ordered * unit price = total price of item


## The stock Table

The distributor carries 41 types of sporting goods from various manufacturers. More than one manufacturer can supply an item. For example, the distributor offers racer goggles from two manufacturers and running shoes from six manufacturers.



The stock table is a catalog of the items sold by the distributor. The columns of the **stock** table are shown in Figure A-4.


**Figure A-4**  
The stock Table

Column Name	Data Type	Description
 stock_num	SMALLINT	stock number that identifies type of item
manu_code	CHAR(3)	manufacturer code (foreign key to <b>manufact</b> table)
description	CHAR(15)	description of item
unit_price	MONEY(6,2)	unit price
unit	CHAR(4)	unit by which item is ordered: each pair case box
unit_descr	CHAR(15)	description of unit

## The catalog Table

The **catalog** table describes each item in stock. Retail stores use this table when placing orders with the distributor. The columns of the **catalog** table are shown in Figure A-5.


**Figure A-5**  
The catalog Table

Column Name	Data Type	Description
 catalog_num	SERIAL(10001)	system-generated catalog number
stock_num	SMALLINT	distributor stock number (foreign key to <b>stock</b> table)
manu_code	CHAR(3)	manufacturer code (foreign key to <b>manufact</b> table)
cat_descr	TEXT	description of item
cat_picture	BYTE	picture of item (binary data)
cat_advert	VARCHAR(255, 65)	tag line underneath picture

The **catalog** table appears only if you are using an OnLine database server.

## The cust\_calls Table


All customer calls for information on orders, shipments, or complaints are logged. The **cust\_calls** table contains information about these types of customer calls. The columns of the **cust\_calls** table are shown in Figure A-6.

Column Name	Data Type	Description
 customer_num	INTEGER	customer number (foreign key to <b>customer</b> table)
call_dtime	DATETIME YEAR TO MINUTE	date and time call received
user_id	CHAR(18)	name of person logging call (default is user login name)
call_code	CHAR(1)	type of call (foreign key to <b>call_type</b> table)
call_descr	CHAR(240)	description of call
res_dtime	DATETIME YEAR TO MINUTE	date and time call resolved
res_descr	CHAR(240)	description of how call was resolved

**Figure A-6**  
The cust\_calls Table

## The call\_type Table


The call codes associated with customer calls are stored in the **call\_type** table. The columns of the **call\_type** table are shown in Figure A-7.

Column Name	Data Type	Description
 call_code	CHAR(1)	call code
call_descr	CHAR (30)	description of call type

**Figure A-7**  
The call\_type Table

## The manufact Table


Information about the nine manufacturers whose sporting goods are handled by the distributor is stored in the **manufact** table. The columns of the **manufact** table are shown in Figure A-8.

Column Name	Data Type	Description
 manu_code	CHAR(3)	manufacturer code
manu_name	CHAR(15)	name of manufacturer
lead_time	INTERVAL DAY(3) TO DAY	lead time for shipment of orders

**Figure A-8**  
The manufact Table

## The state Table

The **state** table contains the names and postal abbreviations for the 50 states of the United States. The columns of the **state** table are shown in Figure A-9.

Name	Type	Description
 code	CHAR(2)	state code
sname	CHAR(15)	state name

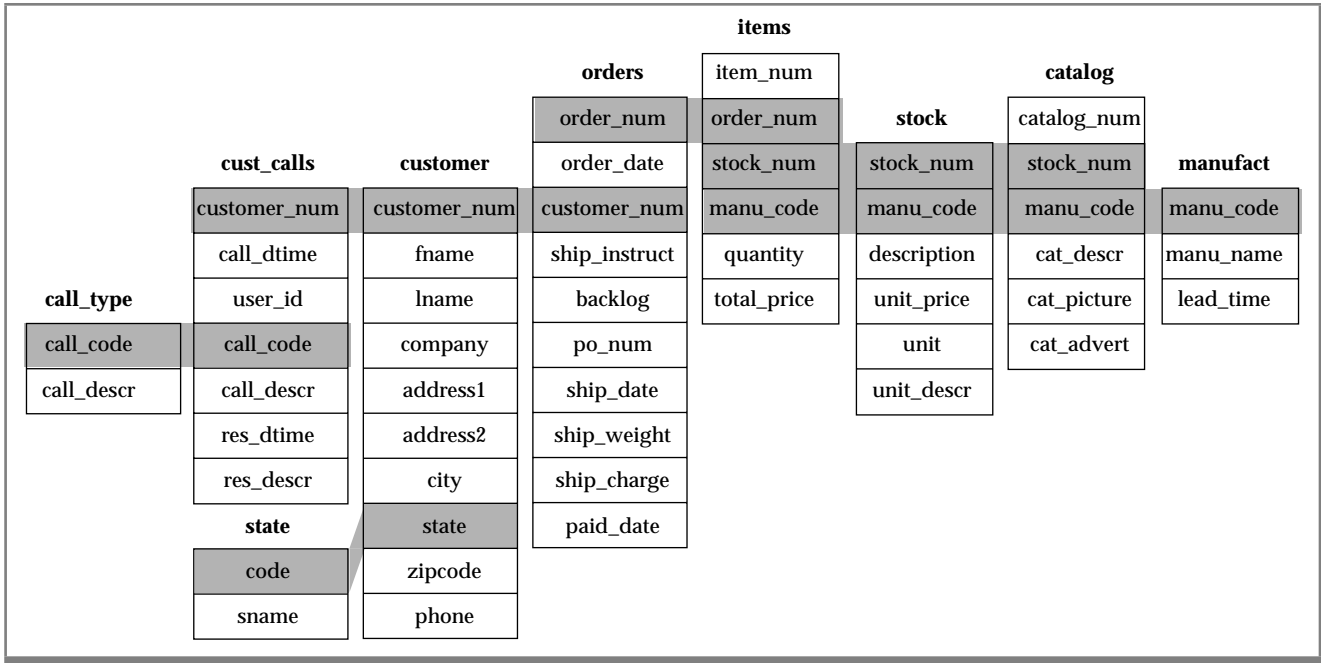
**Figure A-9**  
The state Table

---

## The stores7 Database Map

Figure A-10 displays the joins in the **stores7** database. The lines connecting a column in one table to the same column in another table indicate the relationships, or *joins*, between tables.

**Figure A-10**  
Joins in the stores7 Database



## Primary-Foreign Key Relationships

The tables of the **stores7** database are linked by the primary-foreign key relationships shown in Figure A-10 and identified in this section. This type of relationship is called a *referential constraint* because a foreign key in one table *references* the primary key in another table. Figure A-11 through Figure A-18 show the relationships among tables and how information stored in one table supplements information stored in others.

### The customer and orders Tables

The **customer** table contains a **customer\_num** column that holds a number identifying a customer, along with columns for the customer name, company, address, and telephone number. For example, the row with information about Anthony Higgins contains the number 104 in the **customer\_num** column. The **orders** table also contains a **customer\_num** column that stores the number of the customer who placed a particular order. In the **orders** table, the **customer\_num** column is a foreign key that references the **customer\_num** column in the **customer** table. This relationship is shown in Figure A-11.

**customer** Table (detail)

customer_num	fname	lname
101	Ludwig	Pauli
102	Carole	Sadler
103	Philip	Currie
104	Anthony	Higgins

**orders** Table (detail)

order_num	order_date	customer_num
1001	05/20/1994	104
1002	05/21/1994	101
1003	05/22/1994	104
1004	05/22/1994	106

**Figure A-11**  
Tables Joined by the  
*customer\_num*  
Column

According to Figure A-11, customer 104 (Anthony Higgins) has placed two orders, as his customer number appears in two rows of the **orders** table. Because the customer number is a foreign key in the **orders** table, you can retrieve Anthony Higgins' name, address, and information about his orders at the same time.

## The orders and items Tables

The **orders** and **items** tables are linked by an **order\_num** column that contains an identification number for each order. If an order includes several items, the same order number appears in several rows of the **items** table. In the **items** table, the **order\_num** column is a foreign key that references the **order\_num** column in the **orders** table. Figure A-12 shows this relationship.

orders Table (detail)		
order_num	order_date	customer_num
1001	05/20/1994	104
1002	05/21/1994	101
1003	05/22/1994	104

items Table (detail)			
item_num	order_num	stock_num	manu_code
1	1001	1	HRO
1	1002	4	HSK
2	1002	3	HSK
1	1003	9	ANZ
2	1003	8	ANZ
3	1003	5	ANZ

**Figure A-12**  
Tables Joined by the  
order\_num Column

## The items and stock Tables

The **items** table and the **stock** table are joined by two columns: the **stock\_num** column, which stores a stock number for an item, and the **manu\_code** column, which stores a code that identifies the manufacturer. You need both the stock number and the manufacturer code to uniquely identify an item. For example, the item with the stock number 1 and the manufacturer code HRO is a Hero baseball glove; the item with the stock number 1 and the manufacturer code HSK is a Husky baseball glove. The same stock number and manufacturer code can appear in more than one row of the **items** table, if the same item belongs to separate orders. In the **items** table, the **stock\_num** and **manu\_code** columns are foreign keys that reference the **stock\_num** and **manu\_code** columns in the **stock** table. This is illustrated in Figure A-13.

items Table (detail)			
item_num	order_num	stock_num	manu_code
1	1001	1	HRO
1	1002	4	HSK
2	1002	3	HSK
1	1003	9	ANZ
2	1003	8	ANZ
3	1003	5	ANZ
1	1004	1	HRO

stock Table (detail)		
stock_num	manu_code	description
1	HRO	baseball gloves
1	HSK	baseball gloves
1	SMT	baseball gloves

**Figure A-13**  
Tables Joined by the  
stock\_num and  
manu\_code  
Columns

## The stock and catalog Tables

The **stock** table and **catalog** table are joined by two columns: the **stock\_num** column, which stores a stock number for an item, and the **manu\_code** column, which stores a code that identifies the manufacturer. You need both columns to uniquely identify an item. In the **catalog** table, the **stock\_num** and **manu\_code** columns are foreign keys that reference the **stock\_num** and **manu\_code** columns in the **stock** table. Figure A-14 shows this relationship.

stock Table (detail)		
stock_num	manu_code	description
1	HRO	baseball gloves
1	HSK	baseball gloves
1	SMT	baseball gloves

catalog Table (detail)		
catalog_num	stock_num	manu_code
10001	1	HRO
10002	1	HSK
10003	1	SMT
10004	2	HRO

**Figure A-14**  
Tables Joined by the  
stock\_num and  
manu\_code  
Columns



## The stock and manufact Tables

The **stock** table and the **manufact** table are joined by the **manu\_code** column. The same manufacturer code can appear in more than one row of the **stock** table if the manufacturer produces more than one piece of equipment. In the **stock** table, the **manu\_code** column is a foreign key that references the **manu\_code** column in the **manufact** table. This relationship is illustrated in Figure A-15.

stock Table (detail)		
stock_num	manu_code	description
1	HRO	baseball gloves
1	HSK	baseball gloves
1	SMT	baseball gloves

manufact Table (detail)	
manu_code	manu_name
NRG	Norge
HSK	Husky
HRO	Hero

**Figure A-15**  
Tables Joined by the manu\_code Column

## The cust\_calls and customer Tables

The **cust\_calls** table and the **customer** table are joined by the **customer\_num** column. The same customer number can appear in more than one row of the **cust\_calls** table if the customer calls the distributor more than once with a problem or question. In the **cust\_calls** table, the **customer\_num** column is a foreign key that references the **customer\_num** column in the **customer** table. This relationship is illustrated in Figure A-16.

customer Table (detail)		
customer_num	fname	lname
101	Ludwig	Pauli
102	Carole	Sadler
103	Philip	Currie
104	Anthony	Higgins
105	Raymond	Vector
106	George	Watson

cust_calls Table (detail)		
customer_num	call_dtime	user_id
106	1994-06-12 08:20	maryj
127	1994-07-31 14:30	maryj
116	1993-11-28 13:34	mannyh
116	1993-12-21 11:24	mannyh

**Figure A-16**  
Tables Joined by the  
customer\_num  
Column

## The call\_type and cust\_calls Table

The **call\_type** and **cust\_calls** tables are joined by the **call\_code** column. The same call code can appear in more than one row of the **cust\_calls** table because many customers can have the same *type* of problem. In the **cust\_calls** table, the **call\_code** column is a foreign key that references the **call\_code** column in the **call\_type** table. This relationship is illustrated in Figure A-17.

call_type Table (detail)		
call_code	code_descr	
B	billing error	
D	damaged goods	
I	incorrect merchandise sent	
L	late shipment	
O	other	

cust_calls Table (detail)		
customer_num	call_dtime	call_code
106	1994-06-12 08:20	D
127	1994-07-31 14:30	I
116	1993-11-28 13:34	I
116	1993-12-21 11:24	I

**Figure A-17**  
Tables Joined by the  
call\_code Column

## The state and customer Tables

The **state** table and the **customer** table are joined by a column that contains the state code. This column is called **code** in the **state** table and **state** in the **customer** table. If several customers live in the same state, the same state code appears in several rows of the table. In the **customer** table, the **state** column is a foreign key that references the **code** column in the **state** table. This is shown in Figure A-18.

customer Table (detail)				
customer_num	fname	lname	---	state
101	Ludwig	Pauli	---	CA
102	Carole	Sadler	---	CA
103	Philip	Currie	---	CA

state Table (detail)	
code	sname
AK	Alaska
AL	Alabama
AR	Arkansas
AZ	Arizona
CA	California

**Figure A-18**  
Tables Joined by the  
state/code Column

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## Data in the stores7 Database

The following tables display the data in the **stores7** database.

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*customer Table*

customer_num	fname	lname	company	address1	address2	city	state	zipcode	phone
101	Ludwig	Pauli	All Sports Supplies	213 Erstwild Court		Sunnyvale	CA	94086	408-789-8075
102	Carole	Sadler	Sports Spot	785 Geary St		San Francisco	CA	94117	415-822-1289
103	Philip	Currie	Phil's Sports	654 Poplar	P. O. Box 3498	Palo Alto	CA	94303	415-328-4543
104	Anthony	Higgins	Play Ball!	East Shopping Cntr.	422 Bay Road	Redwood City	CA	94026	415-368-1100
105	Raymond	Vector	Los Altos Sports	1899 La Loma Drive		Los Altos	CA	94022	415-776-3249
106	George	Watson	Watson & Son	1143 Carver Place		Mountain View	CA	94063	415-389-8789
107	Charles	Ream	Athletic Supplies	41 Jordan Avenue		Palo Alto	CA	94304	415-356-9876
108	Donald	Quinn	Quinn's Sports	587 Alvarado		Redwood City	CA	94063	415-544-8729
109	Jane	Miller	Sport Stuff	Mayfair Mart	7345 Ross Blvd.	Sunnyvale	CA	94086	408-723-8789
110	Roy	Jaeger	AA Athletics	520 Topaz Way		Redwood City	CA	94062	415-743-3611
111	Frances	Keyes	Sports Center	3199 Sterling Court		Sunnyvale	CA	94085	408-277-7245
112	Margaret	Lawson	Runners & Others	234 Wyandotte Way		Los Altos	CA	94022	415-887-7235
113	Lana	Beatty	Sportstown	654 Oak Grove		Menlo Park	CA	94025	415-356-9982
114	Frank	Albertson	Sporting Place	947 Waverly Place		Redwood City	CA	94062	415-886-6677
115	Alfred	Grant	Gold Medal Sports	776 Gary Avenue		Menlo Park	CA	94025	415-356-1123

customer_num	fname	lname	company	address1	address2	city	state	zipcode	phone
116	Jean	Parmelee	Olympic City	1104 Spinosa Drive		Mountain View	CA	94040	415-534-8822
117	Arnold	Sipes	Kids Korner	850 Lytton Court		Redwood City	CA	94063	415-245-4578
118	Dick	Baxter	Blue Ribbon Sports	5427 College		Oakland	CA	94609	415-655-0011
119	Bob	Shorter	The Triathletes Club	2405 Kings Highway		Cherry Hill	NJ	08002	609-663-6079
120	Fred	Jewell	Century Pro Shop	6627 N. 17th Way		Phoenix	AZ	85016	602-265-8754
121	Jason	Wallack	City Sports	Lake Biltmore Mall	350 W. 23rd Street	Wilmington	DE	19898	302-366-7511
122	Cathy	O'Brian	The Sporting Life	543 Nassau Street		Princeton	NJ	08540	609-342-0054
123	Marvin	Hanlon	Bay Sports	10100 Bay Meadows Rd	Suite 1020	Jacksonville	FL	32256	904-823-4239
124	Chris	Putnum	Putnum's Putters	4715 S.E. Adams Blvd	Suite 909C	Bartlesville	OK	74006	918-355-2074
125	James	Henry	Total Fitness Sports	1450 Commonwealth Ave.		Brighton	MA	02135	617-232-4159

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customer_num	fname	lname	company	address1	address2	city	state	zipcode	phone
126	Eileen	Neelie	Neelie's Discount Sports	2539 South Utica St		Denver	CO	80219	303-936-7731
127	Kim	Satifer	Big Blue Bike Shop	Blue Island Square	12222 Gregory Street	Blue Island	NY	60406	312-944-5691
128	Frank	Lessor	Phoenix University	Athletic Department	1817 N. Thomas Road	Phoenix	AZ	85008	602-533-1817

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*items Table*

item_num	order_num	stock_num	manu_code	quantity	total_price
1	1001	1	HRO	1	250.00
1	1002	4	HSK	1	960.00
2	1002	3	HSK	1	240.00
1	1003	9	ANZ	1	20.00
2	1003	8	ANZ	1	840.00
3	1003	5	ANZ	5	99.00
1	1004	1	HRO	1	250.00
2	1004	2	HRO	1	126.00
3	1004	3	HSK	1	240.00
4	1004	1	HSK	1	800.00
1	1005	5	NRG	10	280.00
2	1005	5	ANZ	10	198.00
3	1005	6	SMT	1	36.00
4	1005	6	ANZ	1	48.00
1	1006	5	SMT	5	125.00
2	1006	5	NRG	5	140.00
3	1006	5	ANZ	5	99.00
4	1006	6	SMT	1	36.00
5	1006	6	ANZ	1	48.00
1	1007	1	HRO	1	250.00
2	1007	2	HRO	1	126.00
3	1007	3	HSK	1	240.00
4	1007	4	HRO	1	480.00

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item_num	order_num	stock_num	manu_code	quantity	total_price
5	1007	7	HRO	1	600.00
1	1008	8	ANZ	1	840.00
2	1008	9	ANZ	5	100.00
1	1009	1	SMT	1	450.00
1	1010	6	SMT	1	36.00
2	1010	6	ANZ	1	48.00
1	1011	5	ANZ	5	99.00
1	1012	8	ANZ	1	840.00
2	1012	9	ANZ	10	200.00
1	1013	5	ANZ	1	19.80
2	1013	6	SMT	1	36.00
3	1013	6	ANZ	1	48.00
4	1013	9	ANZ	2	40.00
1	1014	4	HSK	1	960.00
2	1014	4	HRO	1	480.00
1	1015	1	SMT	1	450.00
1	1016	101	SHM	2	136.00
2	1016	109	PRC	3	90.00
3	1016	110	HSK	1	308.00
4	1016	114	PRC	1	120.00
1	1017	201	NKL	4	150.00
2	1017	202	KAR	1	230.00
3	1017	301	SHM	2	204.00
1	1018	307	PRC	2	500.00

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*Data in the stores7 Database*

<b>item_num</b>	<b>order_num</b>	<b>stock_num</b>	<b>manu_code</b>	<b>quantity</b>	<b>total_price</b>
2	1018	302	KAR	3	15.00
3	1018	110	PRC	1	236.00
4	1018	5	SMT	4	100.00
5	1018	304	HRO	1	280.00
1	1019	111	SHM	3	1499.97
1	1020	204	KAR	2	90.00
2	1020	301	KAR	4	348.00
1	1021	201	NKL	2	75.00
2	1021	201	ANZ	3	225.00
3	1021	202	KAR	3	690.00
4	1021	205	ANZ	2	624.00
1	1022	309	HRO	1	40.00
2	1022	303	PRC	2	96.00
3	1022	6	ANZ	2	96.00
1	1023	103	PRC	2	40.00
2	1023	104	PRC	2	116.00
3	1023	105	SHM	1	80.00
4	1023	110	SHM	1	228.00
5	1023	304	ANZ	1	170.00
6	1023	306	SHM	1	190.00

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*call\_type Table*

<b>call_code</b>	<b>code_descr</b>
B	billing error
D	damaged goods
I	incorrect merchandise sent
L	late shipment
O	other

*orders Table*

order_num	order_date	customer_num	ship_instruct	backlog	po_num	ship_date	ship_weight	ship_charge	paid_date
1001	05/20/1994	104	express	n	B77836	06/01/1994	20.40	10.00	07/22/1994
1002	05/21/1994	101	PO on box; deliver back door only	n	9270	05/26/1994	50.60	15.30	06/03/1994
1003	05/22/1994	104	express	n	B77890	05/23/1994	35.60	10.80	06/14/1994
1004	05/22/1994	106	ring bell twice	y	8006	05/30/1994	95.80	19.20	
1005	05/24/1994	116	call before delivery	n	2865	06/09/1994	80.80	16.20	06/21/1994
1006	05/30/1994	112	after 10AM	y	Q13557		70.80	14.20	
1007	05/31/1994	117		n	278693	06/05/1994	125.90	25.20	
1008	06/07/1994	110	closed Monday	y	LZ230	07/06/1994	45.60	13.80	07/21/1994
1009	06/14/1994	111	door next to grocery	n	4745	06/21/1994	20.40	10.00	08/21/1994
1010	06/17/1994	115	deliver 776 King St. if no answer	n	429Q	06/29/1994	40.60	12.30	08/22/1994
1011	06/18/1994	104	express	n	B77897	07/03/1994	10.40	5.00	08/29/1994
1012	06/18/1994	117		n	278701	06/29/1994	70.80	14.20	

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order_num	order_date	customer_num	ship_instruct	backlog	po_num	ship_date	ship_weight	ship_charge	paid_date
1013	06/22/1994	104	express	n	B77930	07/10/1994	60.80	12.20	07/31/1994
1014	06/25/1994	106	ring bell, kick door loudly	n	8052	07/03/1994	40.60	12.30	07/10/1994
1015	06/27/1994	110	closed Mondays	n	MA003	07/16/1994	20.60	6.30	08/31/1994
1016	06/29/1994	119	delivery entrance off Camp St.	n	PC6782	07/12/1994	35.00	11.80	
1017	07/09/1994	120	North side of clubhouse	n	DM3543 31	07/13/1994	60.00	18.00	
1018	07/10/1994	121	SW corner of Biltmore Mall	n	S22942	07/13/1994	70.50	20.00	08/06/1994
1019	07/11/1994	122	closed til noon Mondays	n	Z55709	07/16/1994	90.00	23.00	08/06/1994
1020	07/11/1994	123	express	n	W2286	07/16/1994	14.00	8.50	09/20/1994
1021	07/23/1994	124	ask for Elaine	n	C3288	07/25/1994	40.00	12.00	08/22/1994
1022	07/24/1994	126	express	n	W9925	07/30/1994	15.00	13.00	09/02/1994
1023	07/24/1994	127	no deliveries after 3 p.m.	n	KF2961	07/30/1994	60.00	18.00	08/22/1994

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stock Table

stock_num	manu_code	description	unit_price	unit	unit_descr
1	HRO	baseball gloves	250.00	case	10 gloves/case
1	HSK	baseball gloves	800.00	case	10 gloves/case
1	SMT	baseball gloves	450.00	case	10 gloves/case
2	HRO	baseball	126.00	case	24/case
3	HSK	baseball bat	240.00	case	12/case
3	SHM	baseball bat	280.00	case	12/case
4	HSK	football	960.00	case	24/case
4	HRO	football	480.00	case	24/case
5	NRG	tennis racquet	28.00	each	each
5	SMT	tennis racquet	25.00	each	each
5	ANZ	tennis racquet	19.80	each	each
6	SMT	tennis ball	36.00	case	24 cans/case
6	ANZ	tennis ball	48.00	case	24 cans/case
7	HRO	basketball	600.00	case	24/case
8	ANZ	volleyball	840.00	case	24/case
9	ANZ	volleyball net	20.00	each	each
101	PRC	bicycle tires	88.00	box	4/box
101	SHM	bicycle tires	68.00	box	4/box
102	SHM	bicycle brakes	220.00	case	4 sets/case
102	PRC	bicycle brakes	480.00	case	4 sets/case
103	PRC	front derailleur	20.00	each	each
104	PRC	rear derailleur	58.00	each	each
105	PRC	bicycle wheels	53.00	pair	pair

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stock_num	manu_code	description	unit_price	unit	unit_descr
105	SHM	bicycle wheels	80.00	pair	pair
106	PRC	bicycle stem	23.00	each	each
107	PRC	bicycle saddle	70.00	pair	pair
108	SHM	crankset	45.00	each	each
109	PRC	pedal binding	30.00	case	6 pairs/case
109	SHM	pedal binding	200.00	case	4 pairs/case
110	PRC	helmet	236.00	case	4/case
110	ANZ	helmet	244.00	case	4/case
110	SHM	helmet	228.00	case	4/case
110	HRO	helmet	260.00	case	4/case
110	HSK	helmet	308.00	case	4/case
111	SHM	10-spd, assmbld	499.99	each	each
112	SHM	12-spd, assmbld	549.00	each	each
113	SHM	18-spd, assmbld	685.90	each	each
114	PRC	bicycle gloves	120.00	case	10 pairs/case
201	NKL	golf shoes	37.50	each	each
201	ANZ	golf shoes	75.00	each	each
201	KAR	golf shoes	90.00	each	each
202	NKL	metal woods	174.00	case	2 sets/case
202	KAR	std woods	230.00	case	2 sets/case
203	NKL	irons/wedges	670.00	case	2 sets/case
204	KAR	putter	45.00	each	each
205	NKL	3 golf balls	312.00	case	24/case
205	ANZ	3 golf balls	312.00	case	24/case

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Data in the stores7 Database

stock_num	manu_code	description	unit_price	unit	unit_descr
205	HRO	3 golf balls	312.00	case	24/case
301	NKL	running shoes	97.00	each	each
301	HRO	running shoes	42.50	each	each
301	SHM	running shoes	102.00	each	each
301	PRC	running shoes	75.00	each	each
301	KAR	running shoes	87.00	each	each
301	ANZ	running shoes	95.00	each	each
302	HRO	ice pack	4.50	each	each
302	KAR	ice pack	5.00	each	each
303	PRC	socks	48.00	box	24 pairs/box
303	KAR	socks	36.00	box	24 pair/box
304	ANZ	watch	170.00	box	10/box
304	HRO	watch	280.00	box	10/box
305	HRO	first-aid kit	48.00	case	4/case
306	PRC	tandem adapter	160.00	each	each
306	SHM	tandem adapter	190.00	each	each
307	PRC	infant jogger	250.00	each	each
308	PRC	twin jogger	280.00	each	each
309	HRO	ear drops	40.00	case	20/case
309	SHM	ear drops	40.00	case	20/case
310	SHM	kick board	80.00	case	10/case
310	ANZ	kick board	89.00	case	12/case
311	SHM	water gloves	48.00	box	4 pairs/box
312	SHM	racer goggles	96.00	box	12/box

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stock_num	manu_code	description	unit_price	unit	unit_descr
312	HRO	racer goggles	72.00	box	12/box
313	SHM	swim cap	72.00	box	12/box
313	ANZ	swim cap	60.00	box	12/box

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*catalog Table*

catalog_num	stock_num	manu_code	cat_descr	cat_picture	cat_advert
10001	1	HRO	Brown leather. Specify first baseman's or infield/outfield style. Specify right- or left-handed.	<BYTE value>	Your First Season's Baseball Glove
10002	1	HSK	Babe Ruth signature glove. Black leather. Infield/outfield style. Specify right- or left-handed.	<BYTE value>	All-Leather, Hand-Stitched, Deep-Pockets, Sturdy Webbing that Won't Let Go
10003	1	SMT	Catcher's mitt. Brown leather. Specify right- or left-handed.	<BYTE value>	A Sturdy Catcher's Mitt With the Perfect Pocket
10004	2	HRO	Jackie Robinson signature glove. Highest Professional quality, used by National League.	<BYTE value>	Highest Quality Ball Available, from the Hand-Stitching to the Robinson Signature
10005	3	HSK	Pro-style wood. Available in sizes: 31, 32, 33, 34, 35.	<BYTE value>	High-Technology Design Expands the Sweet Spot
10006	3	SHM	Aluminum. Blue with black tape. 31", 20 oz or 22 oz; 32", 21 oz or 23 oz; 33", 22 oz or 24 oz.	<BYTE value>	Durable Aluminum for High School and Collegiate Athletes
10007	4	HSK	Norm Van Brocklin signature style.	<BYTE value>	Quality Pigskin with Norm Van Brocklin Signature
10008	4	HRO	NFL-Style pigskin.	<BYTE value>	Highest Quality Football for High School and Collegiate Competitions

catalog_num	stock_num	manu_code	cat_descr	cat_picture	cat_advert
10009	5	NRG	Graphite frame. Synthetic strings.	<BYTE value>	Wide Body Amplifies Your Natural Abilities by Providing More Power Through Aerodynamic Design
10010	5	SMT	Aluminum frame. Synthetic strings.	<BYTE value>	Mid-Sized Racquet For the Improving Player
10011	5	ANZ	Wood frame, cat-gut strings.	<BYTE value>	Antique Replica of Classic Wooden Racquet Built with Cat-Gut Strings
10012	6	SMT	Soft yellow color for easy visibility in sunlight or artificial light.	<BYTE value>	High-Visibility Tennis, Day or Night
10013	6	ANZ	Pro-core. Available in neon yellow, green, and pink.	<BYTE value>	Durable Construction Coupled with the Brightest Colors Available
10014	7	HRO	Indoor. Classic NBA style. Brown leather.	<BYTE value>	Long-Life Basketballs for Indoor Gymnasiums
10015	8	ANZ	Indoor. Finest leather. Professional quality.	<BYTE value>	Professional Volleyballs for Indoor Competitions
10016	9	ANZ	Steel eyelets. Nylon cording. Double-stitched. Sanctioned by the National Athletic Congress.	<BYTE value>	Sanctioned Volleyball Netting for Indoor Professional and Collegiate Competition
10017	101	PRC	Reinforced, hand-finished tubular. Polyurethane belted. Effective against punctures. Mixed tread for super wear and road grip.	<BYTE value>	Ultimate in Puncture Protection, Tires Designed for In-City Riding

catalog_num	stock_num	manu_code	cat_descr	cat_picture	cat_advert
10018	101	SHM	Durable nylon casing with butyl tube for superior air retention. Center-ribbed tread with herringbone side. Coated sidewalls resist abrasion.	<BYTE value>	The Perfect Tire for Club Rides or Training
10019	102	SHM	Thrust bearing and coated pivot washer/ spring sleeve for smooth action. Slotted levers with soft gum hoods. Two-tone paint treatment. Set includes calipers, levers, and cables.	<BYTE value>	Thrust-Bearing and Spring-Sleeve Brake Set Guarantees Smooth Action
10020	102	PRC	Computer-aided design with low-profile pads. Cold-forged alloy calipers and beefy caliper bushing. Aero levers. Set includes calipers, levers, and cables.	<BYTE value>	Computer Design Delivers Rigid Yet Vibration-Free Brakes
10021	103	PRC	Compact leading-action design enhances shifting. Deep cage for super-small granny gears. Extra strong construction to resist off-road abuse.	<BYTE value>	Climb Any Mountain: ProCycle's Front Derailleur Adds Finesse to Your ATB
10022	104	PRC	Floating trapezoid geometry with extra thick parallelogram arms. 100-tooth capacity. Optimum alignment with any freewheel.	<BYTE value>	Computer-Aided Design Engineers 100-Tooth Capacity Into ProCycle's Rear Derailleur
10023	105	PRC	Front wheels laced with 15g spokes in a 3-cross pattern. Rear wheels laced with 14g spikes in a 3-cross pattern.	<BYTE value>	Durable Training Wheels That Hold True Under Toughest Conditions

catalog_num	stock_num	manu_code	cat_descr	cat_picture	cat_advert
10024	105	SHM	Polished alloy. Sealed-bearing, quick-release hubs. Double-buttet. Front wheels are laced 15g/2-cross. Rear wheels are laced 15g/3-cross.	<BYTE value>	Extra Lightweight Wheels for Training or High-Performance Touring
10025	106	PRC	Hard anodized alloy with pearl finish. 6mm hex bolt hardware. Available in lengths of 90-140mm in 10mm increments.	<BYTE value>	ProCycle Stem with Pearl Finish
10026	107	PRC	Available in three styles: Men's racing; Men's touring; and Women's. Anatomical gel construction with lycra cover. Black or black/hot pink.	<BYTE value>	The Ultimate In Riding Comfort, Lightweight With Anatomical Support
10027	108	SHM	Double or triple crankset with choice of chainrings. For double crankset, chainrings from 38-54 teeth. For triple crankset, chainrings from 24-48 teeth.	<BYTE value>	Customize Your Mountain Bike With Extra-Durable Crankset
10028	109	PRC	Steel toe clips with nylon strap. Extra wide at buckle to reduce pressure.	<BYTE value>	Classic Toeclip Improved To Prevent Soreness At Clip Buckle

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catalog_num	stock_num	manu_code	cat_descr	cat_picture	cat_advert
10029	109	SHM	Ingenious new design combines button on sole of shoe with slot on a pedal plate to give riders new options in riding efficiency. Choose full or partial locking. Four plates mean both top and bottom of pedals are slotted—no fishing around when you want to engage full power. Fast unlocking ensures safety when maneuverability is paramount.	<BYTE value>	Ingenious Pedal/Clip Design Delivers Maximum Power And Fast Unlocking
10030	110	PRC	Super-lightweight. Meets both ANSI and Snell standards for impact protection. 7.5 oz. Quick-release shadow buckle.	<BYTE value>	Feather-Light, Quick-Release, Maximum Protection Helmet
10031	110	ANZ	No buckle so no plastic touches your chin. Meets both ANSI and Snell standards for impact protection. 7.5 oz. Lycra cover.	<BYTE value>	Minimum Chin Contact, Feather-Light, Maximum Protection Helmet
10032	110	SHM	Dense outer layer combines with softer inner layer to eliminate the mesh cover, no snagging on brush. Meets both ANSI and Snell standards for impact protection. 8.0 oz.	<BYTE value>	Mountain Bike Helmet: Smooth Cover Eliminates the Worry of Brush Snags But Delivers Maximum Protection
10033	110	HRO	Newest ultralight helmet uses plastic shell. Largest ventilation channels of any helmet on the market. 8.5 oz.	<BYTE value>	Lightweight Plastic with Vents Assures Cool Comfort Without Sacrificing Protection

catalog_num	stock_num	manu_code	cat_descr	cat_picture	cat_advert
10034	110	HSK	Aerodynamic (teardrop) helmet covered with anti-drag fabric. Credited with shaving 2 seconds/mile from winner's time in Tour de France time-trial. 7.5 oz.	<BYTE value>	Teardrop Design Used by Yellow Jerseys, You Can Time the Difference
10035	111	SHM	Light-action shifting 10 speed. Designed for the city commuter with shock-absorbing front fork and drilled eyelets for carry-all racks or bicycle trailers. Internal wiring for generator lights. 33 lbs.	<BYTE value>	Fully Equipped Bicycle Designed for the Serious Commuter Who Mixes Business With Pleasure
10036	112	SHM	Created for the beginner enthusiast. Ideal for club rides and light touring. Sophisticated triple-butted frame construction. Precise index shifting. 28 lbs.	<BYTE value>	We Selected the Ideal Combination of Touring Bike Equipment, Then Turned It Into This Package Deal: High-Performance on the Roads, Maximum Pleasure Everywhere
10037	113	SHM	Ultra-lightweight. Racing frame geometry built for aerodynamic handlebars. Cantilever brakes. Index shifting. High-performance gearing. Quick-release hubs. Disk wheels. Bladed spokes.	<BYTE value>	Designed for the Serious Competitor, The Complete Racing Machine
10038	114	PRC	Padded leather palm and stretch mesh merged with terry back; Available in tan, black, and cream. Sizes S, M, L, XL.	<BYTE value>	Riding Gloves For Comfort and Protection

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catalog_num	stock_num	manu_code	cat_descr	cat_picture	cat_advert
10039	201	NKL	Designed for comfort and stability. Available in white & blue or white & brown. Specify size.	<BYTE value>	Full-Comfort, Long-Wearing Golf Shoes for Men and Women
10040	201	ANZ	Guaranteed waterproof. Full leather upper. Available in white, bone, brown, green, and blue. Specify size.	<BYTE value>	Waterproof Protection Ensures Maximum Comfort and Durability In All Climates
10041	201	KAR	Leather and leather mesh for maximum ventilation. Waterproof lining to keep feet dry. Available in white & gray or white & ivory. Specify size.	<BYTE value>	Karsten's Top Quality Shoe Combines Leather and Leather Mesh
10042	202	NKL	Complete starter set utilizes gold shafts. Balanced for power.	<BYTE value>	Starter Set of Woods, Ideal for High School and Collegiate Classes
10043	202	KAR	Full set of woods designed for precision control and power performance.	<BYTE value>	High-Quality Woods Appropriate for High School Competitions or Serious Amateurs
10044	203	NKL	Set of eight irons includes 3 through 9 irons and pitching wedge. Originally priced at \$489.00.	<BYTE value>	Set of Irons Available From Factory at Tremendous Savings: Discontinued Line
10045	204	KAR	Ideally balanced for optimum control. Nylon-covered shaft.	<BYTE value>	High-Quality Beginning Set of Irons Appropriate for High School Competitions
10046	205	NKL	Fluorescent yellow.	<BYTE value>	Long Drive Golf Balls: Fluorescent Yellow



catalog_num	stock_num	manu_code	cat_descr	cat_picture	cat_advert
10047	205	ANZ	White only.	<BYTE value>	Long Drive Golf Balls: White
10048	205	HRO	Combination fluorescent yellow and standard white.	<BYTE value>	HiFlier Golf Balls: Case Includes Fluorescent Yellow and Standard White
10049	301	NKL	Super shock-absorbing gel pads disperse vertical energy into a horizontal plane for extraordinary cushioned comfort. Great motion control. Men's only. Specify size.	<BYTE value>	Maximum Protection For High-Mileage Runners
10050	301	HRO	Engineered for serious training with exceptional stability. Fabulous shock absorption. Great durability. Specify men's/women's, size.	<BYTE value>	Pronators and Supinators Take Heart: A Serious Training Shoe For Runners Who Need Motion Control
10051	301	SHM	For runners who log heavy miles and need a durable, supportive, stable platform. Mesh/synthetic upper gives excellent moisture dissipation. Stability system uses rear antipronation platform and forefoot control plate for extended protection during high-intensity training. Specify men's/women's size.	<BYTE value>	The Training Shoe Engineered for Marathoners and Ultra-Distance Runners
10052	301	PRC	Supportive, stable racing flat. Plenty of forefoot cushioning with added motion control. Women's only. D widths available. Specify size.	<BYTE value>	A Woman's Racing Flat That Combines Extra Forefoot Protection With a Slender Heel

catalog_num	stock_num	manu_code	cat_descr	cat_picture	cat_advert
10053	301	KAR	Anatomical last holds your foot firmly in place. Feather-weight cushioning delivers the responsiveness of a racing flat. Specify men's/women's size.	<BYTE value>	Durable Training Flat That Can Carry You Through Marathon Miles
10054	301	ANZ	Cantilever sole provides shock absorption and energy rebound. Positive traction shoe with ample toe box. Ideal for runners who need a wide shoe. Available in men's and women's. Specify size.	<BYTE value>	Motion Control, Protection, and Extra Toebox Room
10055	302	KAR	Reusable ice pack with velcro strap. For general use. Velcro strap allows easy application to arms or legs.	<BYTE value>	Finally, An Ice Pack for Achilles Injuries and Shin Splints that You Can Take to the Office
10056	303	PRC	Neon nylon. Perfect for running or aerobics. Indicate color: Fluorescent pink, yellow, green, and orange.	<BYTE value>	Knock Their Socks Off With YOUR Socks
10057	303	KAR	100% nylon blend for optimal wicking and comfort. We've taken out the cotton to eliminate the risk of blisters and reduce the opportunity for infection. Specify men's or women's.	<BYTE value>	100% Nylon Blend Socks - No Cotton

catalog_num	stock_num	manu_code	cat_descr	cat_picture	cat_advert
10058	304	ANZ	Provides time, date, dual display of lap/cumulative splits, 4-lap memory, 10 hr count-down timer, event timer, alarm, hour chime, waterproof to 50m, velcro band.	<BYTE value>	Athletic Watch w/4-Lap Memory
10059	304	HRO	Split timer, waterproof to 50m. Indicate color: Hot pink, mint green, space black.	<BYTE value>	Waterproof Triathlete Watch In Competition Colors
10060	305	HRO	Contains ace bandage, anti-bacterial cream, alcohol cleansing pads, adhesive bandages of assorted sizes, and instant-cold pack.	<BYTE value>	Comprehensive First-Aid Kit Essential for Team Practices, Team Traveling
10061	306	PRC	Converts a standard tandem bike into an adult/child bike. User-tested assembly instructions	<BYTE value>	Enjoy Bicycling With Your Child On a Tandem; Make Your Family Outing Safer
10062	306	SHM	Converts a standard tandem bike into an adult/child bike. Lightweight model.	<BYTE value>	Consider a Touring Vacation For the Entire Family: A Lightweight, Touring Tandem for Parent and Child
10063	307	PRC	Allows mom or dad to take the baby out too. Fits children up to 21 pounds. Navy blue with black trim.	<BYTE value>	Infant Jogger Keeps A Running Family Together
10064	308	PRC	Allows mom or dad to take both children! Rated for children up to 18 pounds.	<BYTE value>	As Your Family Grows, Infant Jogger Grows With You

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catalog_num	stock_num	manu_code	cat_descr	cat_picture	cat_advert
10065	309	HRO	Prevents swimmer's ear.	<BYTE value>	Swimmers Can Prevent Ear Infection All Season Long
10066	309	SHM	Extra-gentle formula. Can be used every day for prevention or treatment of swimmer's ear.	<BYTE value>	Swimmer's Ear Drops Specially Formulated for Children
10067	310	SHM	Blue heavy-duty foam board with Shimara or team logo.	<BYTE value>	Exceptionally Durable, Compact Kickboard for Team Practice
10068	310	ANZ	White. Standard size.	<BYTE value>	High-Quality Kickboard
10069	311	SHM	Swim gloves. Webbing between fingers promotes strengthening of arms. Cannot be used in competition.	<BYTE value>	Hot Training Tool - Webbed Swim Gloves Build Arm Strength and Endurance
10070	312	SHM	Hydrodynamic egg-shaped lens. Ground-in anti-fog elements; Available in blue or smoke.	<BYTE value>	Anti-Fog Swimmer's Goggles: Quantity Discount
10071	312	HRO	Durable competition-style goggles. Available in blue, grey, or white.	<BYTE value>	Swim Goggles: Traditional Rounded Lens For Greater Comfort

catalog_num	stock_num	manu_code	cat_descr	cat_picture	cat_advert
10072	313	SHM	Silicone swim cap. One size. Available in white, silver, or navy. Team Logo Imprinting Available.	<BYTE value>	Team Logo Silicone Swim Cap
10073	314	ANZ	Silicone swim cap. Squared-off top. One size. White	<BYTE value>	Durable Squared-off Silicone Swim Cap
10074	315	HRO	Re-usable ice pack. Store in the freezer for instant first-aid. Extra capacity to accommodate water and ice.	<BYTE value>	Water Compartment Combines With Ice to Provide Optimal Orthopedic Treatment

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*cust\_calls Table*

customer_num	call_dtime	user_id	call_code	call_descr	res_dtime	res_descr
106	1994-06-12 8:20	maryj	D	Order was received, but two of the cans of ANZ tennis balls within the case were empty.	1994-06-12 8:25	Authorized credit for two cans to customer, issued apology. Called ANZ buyer to report the QA problem.
110	1994-07-07 10:24	richc	L	Order placed one month ago (6/7) not received.	1994-07-07 10:30	Checked with shipping (Ed Smith). Order sent yesterday- we were waiting for goods from ANZ. Next time will call with delay if necessary.
119	1994-07-01 15:00	richc	B	Bill does not reflect credit from previous order.	1994-07-02 8:21	Spoke with Jane Akant in Finance. She found the error and is sending new bill to customer.
121	1994-07-10 14:05	maryj	O	Customer likes our merchandise. Requests that we stock more types of infant joggers. Will call back to place order.	1994-07-10 14:06	Sent note to marketing group of interest in infant joggers.

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customer_num	call_dtime	user_id	call_code	call_descr	res_dtime	res_descr
127	1994-07-31 14:30	maryj	I	Received Hero watches (item # 304) instead of ANZ watches.		Sent memo to shipping to send ANZ item 304 to customer and pickup HRO watches. Should be done tomorrow, 8/1.
116	1993-11-28 13:34	mannyn	I	Received plain white swim caps (313 ANZ) instead of navy with team logo (313 SHM).	1993-11-28 16:47	Shipping found correct case in warehouse and express mailed it in time for swim meet.
116	1993-12-21 11:24	mannyn	I	Second complaint from this customer! Received two cases right-handed outfielder gloves (1 HRO) instead of one case lefties.	1993-12-27 08:19	Memo to shipping (Ava Brown) to send case of left-handed gloves, pick up wrong case; memo to billing requesting 5% discount to placate customer due to second offense and lateness of resolution because of holiday.

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*manufact Table*

<b>manu_code</b>	<b>manu_name</b>	<b>lead_time</b>
ANZ	Anza	5
HSK	Husky	5
HRO	Hero	4
NRG	Norge	7
SMT	Smith	3
SHM	Shimara	30
KAR	Karsten	21
NKL	Nikolus	8
PRC	ProCycle	9

*state Table*

<b>code</b>	<b>sname</b>	<b>code</b>	<b>sname</b>
AK	Alaska	MT	Montana
AL	Alabama	NE	Nebraska
AR	Arkansas	NC	North Carolina
AZ	Arizona	ND	North Dakota
CA	California	NH	New Hampshire
CT	Connecticut	NJ	New Jersey
CO	Colorado	NM	New Mexico
DC	D.C.	NV	Nevada
DE	Delaware	NY	New York
FL	Florida	OH	Ohio

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<b>code</b>	<b>sname</b>	<b>code</b>	<b>sname</b>
GA	Georgia	OK	Oklahoma
HI	Hawaii	OR	Oregon
IA	Iowa	PA	Pennsylvania
ID	Idaho	PR	Puerto Rico
IL	Illinois	RI	Rhode Island
IN	Indiana	SC	South Carolina
KY	Kentucky	TN	Tennessee
LA	Louisiana	TX	Texas
MA	Massachusetts	UT	Utah
MD	Maryland	VA	Virginia
ME	Maine	VT	Vermont
MI	Michigan	WA	Washington
MN	Minnesota	WI	Wisconsin
MO	Missouri	WV	West Virginia
MS	Mississippi	WY	Wyoming

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# Glossary

<b>access method</b>	A procedure that is used to retrieve rows from or insert rows into a storage location. In the SET EXPLAIN statement, access method refers to the type of table access in a query (for example, SEQUENTIAL SCAN as opposed to INDEX PATH).
<b>access privileges</b>	The types of operations that a user has permission to perform in a specific database, table, table fragment, or column. Informix maintains its own set of database, table, table fragment, and column access privileges, which are independent of the operating-system access privileges.
<b>active set</b>	The collection of rows that satisfies a query associated with a cursor.
<b>aggregate functions</b>	The functions that return a single value based on the values of columns in one or more rows of a table (for example, the total number, sum, average, and maximum or minimum of an expression in a query or report). Aggregate functions are sometimes referred to as <i>set functions</i> or <i>math functions</i> .
<b>alias</b>	A temporary alternative name for a table in a query; usually used in complex subqueries and required for self-joins. In a form-specification file or any SQL query, alias refers to a single-word alternative name used in place of a more complex table name (for example, <i>t1</i> as an alias for <i>owner.table_name</i> ).
<b>alpha class</b>	The alpha class of a code set consists of all characters that are classified as alphabetic. For example, the alpha class of the ASCII code set is the letters a-z and A-Z.
<b>ANSI</b>	Acronym for the American National Standards Institute. This group sets standards in many areas, including the computer industry and standards for SQL languages.

<b>ANSI compliant</b>	Refers to a database that conforms to certain ANSI standards. Informix databases can be created either as ANSI compliant or not ANSI compliant. An ANSI-compliant database enforces certain ANSI requirements, such as implicit transactions, required owner naming, and unbuffered logging (unbuffered logging only when using INFORMIX-OnLine Dynamic Server), that are not enforced in databases that are not ANSI compliant.
<b>application development tool</b>	Software, such as INFORMIX-NewEra, that you can use to create and maintain a database. The software allows a user to send instructions and data to and receive information from the database server.
<b>application process</b>	The process that manages an ESQL, NewEra, or other program at runtime. It executes the program logic and initiates SQL requests. Memory that is allocated for program variables, program data, and the fetch buffer is part of this process. See also <i>database server process</i> .
<b>application-productivity tools</b>	Tools, such as forms and reports, used to write applications.
<b>application program</b>	An executable file or logically related set of files that perform one or more database management tasks.
<b>application programming interface (API)</b>	See <i>SQL API</i> .
<b>arbitrary rule</b>	A series of expressions that you define using SQL relational and logical operators. Unlike the range rule, the arbitrary rule allows you to use any relational operator and any logical operator to define the expressions. Typically includes the use of the OR logical operator to group data.
<b>archiving</b>	Copying all the data and indexes of a database onto a new medium, usually a tape or a different physical device from the one that stores the database. Archived material is used for recovering from a failure and is usually performed by a database administrator. See <i>backup</i> .
<b>argument</b>	A value passed to a function, routine, stored procedure, or command.
<b>array</b>	A set of items of the same type. Individual members of the array are referred to as <i>elements</i> and are usually distinguished by an integer argument that gives the position of the element in the array. Informix arrays can have up to three dimensions.

<b>ASCII</b>	Acronym for the American Standards Committee for Information Interchange. Often used to describe an ordered set of printable and non-printable characters used in computers and telecommunication.
<b>ASF</b>	Acronym for Associated Services Facility. The code in the ASF portion of Informix products controls the connections between clients and servers. This term is used by system developers; users of Informix products see this term only in occasional error messages.
<b>attached index</b>	An index that is created without a fragmentation strategy. An attached index can also be an index created on a fragmented table.
<b>audit event</b>	Any OnLine activity or operation that could potentially access and alter data, which should be recorded and monitored by the OnLine secure auditing facility. Examples of audit events include accessing tables, altering indexes, dropping chunks, granting database access, updating the current row, running OnLine utilities, and so forth. (For a complete list of audit events, see <a href="#">Appendix A</a> in the <i>INFORMIX-OnLine Dynamic Server Trusted Facility Manual</i> .)
<b>audit file</b>	A file that contains records of audit events and resides in the specified audit directory. Audit files form an audit trail of information that can be extracted by the OnLine secure auditing facility for analysis by the OnLine administrator.
<b>audit mask</b>	A structure that specifies which events should be audited by (or excluded from auditing by) the OnLine secure auditing facility.
<b>audit trail</b>	A history of all changes to a table in SE database servers.
<b>audit trail log</b>	A file that contains a history of all changes to a table. Starting from an archived database, an audit trail log can reconstruct all subsequent changes to the table in INFORMIX-SE database servers.
<b>auxiliary statements</b>	The SQL statements that you use to obtain auxiliary information about tables and databases. These statements include INFO, OUTPUT, WHENEVER, and GET DIAGNOSTICS.
<b>B+ tree</b>	A method of organizing an index into a tree structure for efficient record retrieval.

<b>backup</b>	A duplicate of a computer file on another device or tape to preserve existing work, in case of a computer failure or other mishap. In INFORMIX-OnLine Dynamic Server, <i>backup</i> refers to duplicating logical log files and <i>archiving</i> refers to duplicating data.
<b>base table</b>	See <i>table</i> .
<b>before-image</b>	The image of a row, page, or other item before any changes are made to it.
<b>blobpage</b>	The unit of disk allocation within a blobspace under INFORMIX-OnLine Dynamic Server. The OnLine administrator determines the size of a blobpage; the size can vary from blobpage to blobpage.
<b>blobs</b>	Acronym for binary large objects. Blobs are data objects that effectively have no maximum size (theoretically as large as $2^{31}$ bytes).
<b>blobspace</b>	A logical collection of chunks that is used to store TEXT and BYTE data in INFORMIX-OnLine Dynamic Server.
<b>Boolean</b>	A variable or an expression that can take on the logical values TRUE (1), FALSE (0), or UNKNOWN (if null values are involved).
<b>buffer</b>	A portion of computer memory where a program temporarily stores data. Data typically is read into or written out from buffers to disk.
<b>buffered logging</b>	A type of logging that holds transactions in a memory buffer until the buffer is full, regardless of when the transaction is committed or rolled back. INFORMIX-OnLine Dynamic Server provides this option to speed up operations by reducing the number of disk writes.
<b>byte</b>	A unit of storage that corresponds approximately to one character. It is the smallest addressable computer memory unit. A byte is also known as an <i>octet</i> . (When BYTE appears in uppercase letters, it refers to the Informix data type.)
<b>callback function</b>	A user-defined function called during execution of an SQL request.
<b>Cartesian product</b>	The set that results when you pair each and every member of one set with each and every member of another set. A Cartesian product results from a multiple-table query when you do not specify the joining conditions among tables. See <i>join</i> .
<b>cascading deletes</b>	When any rows are deleted from the primary key column of a table, cascading deletes, if enabled, eliminate identical information from any foreign key column in a related table.

<b>case-sensitivity</b>	The condition of distinguishing between uppercase and lowercase letters. Be careful running Informix programs because certain commands and their options are case-sensitive; that is, they react differently to the same letters presented in uppercase and lowercase characters.
<b>character</b>	A logical unit of storage for the value code in a code set. It can be represented by one or more bytes and can be numeric, alphabetic, or a non-printable character (control character).
<b>check constraint</b>	A condition that must be met before data can be assigned to a table column during an INSERT or UPDATE statement.  checkpoint  A point in time during an INFORMIX-OnLine Dynamic Server operation when the pages on disk are synchronized with the pages in the shared-memory buffer pool. Checkpoints are marked by a special record written into the logical log.
<b>child table</b>	The referencing table in a referential constraint. See <i>parent table</i> .
<b>chunk</b>	The largest contiguous section of disk space for OnLine. A specified set of chunks defines a dbspace or blobspace. An OnLine administrator allocates a chunk to a dbspace or a blobspace when that dbspace or blobspace approaches full capacity.
<b>client</b>	An application program that requests services from a server program, typically a file server or a database server.
<b>client locale</b>	The environment that defines the behavior of the client application at runtime by specifying a language, code set, and the conventions used for a particular language, including date, time, and monetary formats.
<b>client/server architecture</b>	A hardware and software design that allows the user interface and database server to reside on separate nodes or platforms on a single computer or over a network.
<b>client/server connection statements</b>	The SQL statements that you use to make connections with databases. These statements include CONNECT, DISCONNECT, and SET CONNECTION.
<b>close a cursor</b>	To drop the association between a cursor and active set of rows resulting from a query.
<b>close a database</b>	To deactivate the connection between a client and a database. Only one database can be active at a time.

<b>close a file</b>	To release the association between a file and a program.
<b>cluster an index</b>	To rearrange the physical data of a table according to a specific index.
<b>cluster key</b>	The column in a table that logically relates a group of blobs stored in an optical cluster.
<b>clustersize</b>	The amount of space, specified in kilobytes, that is allocated to an optical cluster on an optical volume.
<b>code set</b>	The representation of a national character set where each code value has a one-to-one mapping with a character graphic.
<b>code-set conversion</b>	The process of converting data from one code set to another when client and server computers use different code sets to represent the same character data.
<b>collating sequence</b>	The sequence of values that specifies some logical order in which the character fields in a database are sorted and indexed. Collation sequences may depend on order of the chosen code set (e.g. the order of characters and numbers in the ASCII code set) or it may depend on the locale chosen (e.g. the language, territory of the database, and further specifics as to whether a dictionary or a phone-book order is selected). Collating sequence is also known as <i>collation order</i> .
<b>column</b>	A data element containing a particular type of information that occurs in every row of the table; also known as a <i>field</i> .
<b>column expression</b>	An expression that includes a column name and optionally uses column subscripts to define a column substring.
<b>column subscript</b>	A subscript in a column expression. See <i>subscript</i> .
<b>column substring</b>	A substring in a column expression. See <i>substring</i> .
<b>command file</b>	A system file that contains one or more statements or commands, such as SQL statements.
<b>comment</b>	The information in a program file that is not processed by the computer but documents the program. You use special characters such as a pound sign ( # ), curly braces ( { } ), slash marks ( / ) and asterisks ( * ), or a double dash ( -- ) to identify comments, depending on the programming environment.
<b>COMMIT WORK</b>	To complete a transaction by accepting all changes to the database since the beginning of the transaction.



<b>Committed Read</b>	An Informix level of isolation in which a user can view only rows that are currently committed at the moment of the query request; that is, a user cannot view rows that were changed as a part of a currently uncommitted transaction. COMMITTED READ is available through INFORMIX-OnLine Dynamic Server and set with the SET ISOLATION statement. It is the default level of isolation under OnLine for databases that are not ANSI compliant. See <i>isolation</i> .
<b>compile</b>	To translate a file that contains instructions (in a higher-level language) into a file containing the corresponding machine-level instructions.
<b>compile-time errors</b>	The errors that occur at the time the program source code is converted to executable form. Compare with <i>run-time errors</i> .
<b>component</b>	In the High-Performance Loader, the information required to load or unload data is organized in several <i>components</i> . The components are format, map, filter, query, project, device array, load job, and unload job.
<b>composite index</b>	An index constructed on two or more columns of a table. The ordering imposed by the composite index varies least frequently on the first-named column and most frequently on the last-named column.
<b>composite join</b>	A join between two tables based on the relationship among two or more columns in each table. See <i>join</i> .
<b>concatenate</b>	To append a second string to the end of a first string.
<b>concatenation operator</b>	A symbolic notation composed of two pipe symbols (     ) used in expressions to indicate the joining of two strings.
<b>concurrency</b>	The ability of two or more processes to access the same database simultaneously.
<b>configuration file</b>	A file read during INFORMIX-OnLine Dynamic Server disk or shared-memory initialization that contains the parameters that specify values for configurable behavior. OnLine and its archiving tool, ON-Archive, use configuration files.
<b>connection</b>	An association between an application and a database environment, created by a CONNECT or DATABASE statement. Database servers can also have connections to one another. See also <i>explicit connection</i> and <i>implicit connection</i> .
<b>constant</b>	A nonvarying data element or value.

<b>constraint</b>	A restriction on what kinds of data can be inserted or updated in tables. See also <i>check constraint</i> , <i>primary-key constraint</i> , <i>referential constraint</i> , <i>NOT NULL constraint</i> , and <i>unique constraint</i> .
<b>control character</b>	A character whose occurrence in a particular context initiates, modifies, or stops a control function (an operation to control a device, for example, in moving a cursor or in reading data). In a program, you can define actions that use the CTRL key with another key to execute some programming action (for example, entering CTRL-W to obtain on-line Help in Informix products). A control character is sometimes referred to as a <i>control key</i> . Compare to <i>printable character</i> .
<b>correlation name</b>	The prefix that you can use with a column name in a triggered action to refer to an old (before triggering statement) or a new (after triggering statement) column value. The associated column name must belong to the triggering table.
<b>corrupted database</b>	A database whose tables or indexes contain incomplete or invalid data.
<b>corrupted index</b>	An index that does not correspond exactly to its table.
<b>current row</b>	The most recently retrieved row of the active set of a query.
<b>cursor</b>	An identifier associated with a group of rows; conceptually, the pointer to the current row. You can use cursors for SELECT statements or EXECUTE PROCEDURE statements (associating the cursor with the rows returned by a query) or INSERT statements (associating the cursor with a buffer to insert multiple rows as a group). A select cursor is declared for sequential only (regular cursor) or nonsequential (scroll cursor) retrieval of row information. In addition, you can declare a select cursor for update (initiating locking control for updated and deleted rows) or WITH HOLD (completing a transaction does not close the cursor). In ESQL/C and ESQL/COBOL, a cursor can be dynamic, meaning that it can be an identifier or a character/string variable.
<b>cursor manipulation statements</b>	The SQL statements that control cursors; specifically, the CLOSE, DECLARE, FETCH, FLUSH, OPEN, and PUT statements.
<b>Cursor Stability</b>	An Informix level of isolation available through OnLine and set with the SET ISOLATION statement in which the database server must secure a shared lock on a fetched row before the row can be viewed. The database server retains the lock until it receives a request to fetch a new row. See <i>isolation</i> .

<b>data access statements</b>	The SQL statements that you use to grant and revoke permissions and to lock tables.
<b>data definition statements</b>	The SQL statements that you use to create, alter, drop, and rename data objects, including databases, tables, views, synonyms, triggers, and stored procedures.
<b>data dictionary</b>	The collection of tables that keeps track of the structure of the database. Information about the database is maintained in the data dictionary, which is also referred to as the system catalog. See <i>system catalog</i> .
<b>data distribution</b>	A mapping of the data in a column into a set of the column values. The contents of the column are examined and divided into bins, each of which represents a percentage of the data. The organization of column values into bins is called the distribution for that column. You use the UPDATE STATISTICS statement to create data distributions.
<b>data integrity</b>	The process of ensuring that data corruption does not occur when multiple users simultaneously try to alter the same data. Locking and transaction processing are used to control data integrity.
<b>data integrity statements</b>	The SQL statements that you use to control transactions and audits. Data integrity statements also include statements for repairing and recovering tables.
<b>data manipulation statements</b>	The SQL statements that you use to query tables, insert into tables, delete from tables, update tables, and load into and unload from tables.
<b>data replication</b>	When database objects have more than one representation at more than one distinct site. INFORMIX-OnLine Dynamic Server implements data replication at the level of database servers.
<b>data restriction</b>	Synonym for constraint. See <i>constraint</i> .
<b>data type</b>	A descriptor assigned to each column in a table or program variable, which indicates the type of data the column or program variable is intended to hold. Informix data types include SMALLINT, INTEGER, SERIAL, SMALLFLOAT, FLOAT, DECIMAL, MONEY, DATE, DATETIME, INTERVAL, CHAR, VARCHAR, TEXT, and BYTE. When NLS is enabled, Informix data types include NCHAR and NVARCHAR.

<b>database</b>	A collection of information (contained in tables) that is useful to a particular organization or used for a specific purpose.
<b>Database Administrator</b>	See <i>DBA</i> .
<b>database application</b>	A program that applies database management techniques to implement specific data manipulation and reporting tasks.
<b>database environment</b>	Used in the <code>CONNECT</code> statement, either the database server or the database server and database to which a user connects.
<b>database locale</b>	The environment that defines the language conventions and the behavior of read and write operations on the database.
<b>database management system</b>	See <i>DBMS</i> .
<b>database object</b>	In the broad sense, any SQL entity recorded in a system catalog table, such as a table, index, or stored procedure. In the restricted context of the <code>SET</code> statement, a database object is a constraint, index, or trigger whose name and current object mode are recorded in the <b>sysobjstate</b> system catalog table. You use the <code>SET</code> statement to change the object mode of database objects.
<b>database server process</b>	The portion of the INFORMIX-SE database management system that actually manipulates the database files. It receives SQL statements from the application process, parses them, optimizes the approach to data retrieval, retrieves the database, and returns the data to the application. In the INFORMIX-OnLine Dynamic Server database management system, these activities are distributed among threads instead of using a single process. See <i>thread</i> .
<b>DBA</b>	Acronym for <i>Database Administrator</i> . The DBA is the individual who is responsible for the contents and use of a database. This is different from the administrator of an INFORMIX-OnLine Dynamic Server database server, who is responsible for managing one or more OnLine database servers.
<b>DBA-privileged</b>	Refers to a class of stored procedures created only by a user with DBA database privileges.
<b>DBMS</b>	Acronym for <i>database management system</i> . It is all the components necessary to create and maintain a database, including the application development tools and the database server.

<b>dbspace</b>	A logical collection of one or more INFORMIX-OnLine Dynamic Server chunks. Because chunks represent specific regions of disk space, the creators of databases and tables can control where their data is physically located by placing databases or tables in specific dbspaces.
<b>DDL</b>	Acronym for data definition language. See <i>data definition statements</i> .
<b>deadlock</b>	A situation in which two or more threads cannot proceed because each is waiting for data locked by the other (or another) thread. INFORMIX-OnLine Dynamic Server monitors and prevents potential deadlock situations by sending an error message to the application whose request for a lock may result in a deadlock.
<b>debug file</b>	A file that receives output used for debugging purposes.
<b>decision-support application</b>	An application that provides information which is used for strategic planning, decision-making, and reporting. It typically executes in a batch environment in a sequential scan fashion and returns a large fraction of the rows scanned. Decision-support queries typically scan the entire database. See <i>OLTP application</i> .
<b>decision-support query</b>	A query that is generated by a decision-support application. It often requires operations such as multiple joins, temporary tables, and extensive calculations, and can benefit significantly from PDQ. Also see <i>OLTP query</i> .
<b>declaration statement</b>	A programming language statement that describes or defines objects, for example, defining a program variable. Compare to <i>procedural statement</i> .
<b>default</b>	How a program acts or the values that are assumed if the user does not explicitly specify an action.
<b>default value</b>	A value inserted into a column or variable when an explicit value is not specified. Default values can be assigned to columns using the ALTER TABLE and CREATE TABLE statements and to variables in stored procedures.
<b>delete</b>	To remove any row or combination of rows with the DELETE statement.
<b>delimited identifier</b>	An identifier surrounded by double quotes. The purpose of a delimited identifier is to allow usage of identifiers that are otherwise identical to SQL reserved keywords or that contain non-alphabetical characters. See also <i>identifier</i> .

<b>delimiter</b>	A boundary on an input field or the terminator for a column or row. Some files and prepared objects require semicolon (;), comma (,), space, or tab delimiters between statements.
<b>descriptor</b>	A quoted string or embedded variable name that identifies an allocated system-descriptor area or an <b>sqlda</b> structure. It is used for the Informix SQL APIs. See <i>identifier</i> .
<b>detached index</b>	An index that is created with a fragmentation strategy or with the IN <i>dbspace</i> storage option.
<b>device array</b>	A list of I/O devices. See <i>component</i> .
<b>diagnostic area</b>	A data structure that stores diagnostic information about an executed SQL statement.
<b>diagnostics table</b>	A special table that holds information about the integrity violations caused by each row in a violations table. You use the START VIOLATIONS TABLE statement to create violations and diagnostics tables and associate them with a base table.
<b>Dirty Read</b>	An Informix level of isolation set with the SET ISOLATION statement that does not account for locks and allows viewing of any existing rows, even rows that currently can be altered from inside an uncommitted transaction. DIRTY READ is the lowest level of isolation (no isolation at all). It is the level at which INFORMIX-SE normally operates and it is an optional level under INFORMIX-OnLine Dynamic Server. See <i>isolation</i> .
<b>disabled mode</b>	The object mode in which a database object is disabled. When a constraint, index, or trigger is in the disabled mode, the database server acts as if the object does not exist and does not take it into consideration during the execution of data manipulation statements.
<b>disk configuration</b>	The organization of data on a disk; also refers to the process of preparing a disk to store data.
<b>disk I/O</b>	The process of transferring data between memory and disk.
<b>display label</b>	A temporary name for a column or expression in a query.
<b>distributed data</b>	The ability to access data in multiple databases. The databases can be on the same hardware or on a network. (INFORMIX-OnLine Dynamic Server can perform multiple-database queries.)

<b>distribution</b>	See <i>data distribution</i> .
<b>distribution scheme</b>	A synonym for fragmentation scheme. It is a method that OnLine uses to distribute rows or index entries to fragments and in some cases, to reduce the number of fragments that OnLine scans. In an expression-based distribution scheme, you decide where a fragment is to be stored in addition to providing a rule or algorithm that OnLine uses to place the rows into the fragments.
<b>DML</b>	Acronym for data manipulation language. See <i>data manipulation statements</i> .
<b>dominant table</b>	See <i>outer join</i> .
<b>DRDA</b>	Acronym for Distributed Relational Database Architecture. DRDA is an IBM-defined set of protocols that software manufacturers can follow to develop connectivity solutions between heterogeneous relational database management environments.
<b>duplicate index</b>	An index that allows duplicate values in the indexed column.
<b>dynamic management statements</b>	The SQL statements that describe, execute, and prepare statements.
<b>dynamic SQL</b>	The statements and structures that allow a program to form an SQL statement during execution, so that portions of the statement can be determined by user input.
<b>dynamic statements</b>	The SQL statements that are created at the time the program is executed, rather than when the program is written. You use the PREPARE statement to create dynamic statements.
<b>embedded SQL</b>	The SQL statements that are placed within a host language. Informix supports embedded SQL in C and COBOL.
<b>enabled mode</b>	The default object mode of database objects. When a constraint, index, or trigger is in this mode, the database server recognizes the existence of the object and takes the object into consideration while executing data manipulation statements. Also see <i>object mode</i> .
<b>environment variable</b>	A variable that is maintained by the operating system for each user and made available to all programs that the user runs.
<b>error log</b>	A file that receives error information whenever a program runs.

<b>error message</b>	A message that is associated with a (usually negative) designated number. Informix applications display error messages on the screen or write them to files.
<b>error trapping</b>	The code within a program that anticipates and reacts to run-time errors.
<b>escape character</b>	A character that indicates that the following character, normally interpreted by the program, is to be printed as a literal character instead. The escape character is used with the interpreted character to “escape” or ignore the interpreted meaning.
<b>escape key</b>	The keyboard key, usually marked ESC, that is used to terminate one mode and start another mode in most UNIX and DOS systems.
<b>exception</b>	An error or warning returned by the database server or a state initiated by a stored procedure statement.
<b>exclusive access</b>	When a user has sole access to a database or table and other users are prevented from using it.
<b>exclusive lock</b>	A lock on an object (row, page, table, or database) that is held by a single thread that prevents other processes from acquiring a lock of any kind on the same object.
<b>executable file</b>	A binary file containing compiled code that can be run as a program; can also refer to a UNIX shell script or an MS-DOS batch file.
<b>execute</b>	To carry out a program, procedure, or a set of instructions.
<b>explicit connection</b>	A connection made to a database environment that uses the CONNECT statement.
<b>exponent</b>	The power to which a value is to be raised.
<b>expression</b>	Anything from a simple numeric or alphabetic constant to a more complex series of column values, functions, quoted strings, operators, and keywords. A Boolean expression contains a logical operator (>, <, =, !=, IS NULL, and so on) and evaluates as TRUE, FALSE, or UNKNOWN. An arithmetic expression contains the operators (+, -, ×, /, and so on) and evaluates as a number.
<b>expression-based distribution scheme</b>	User-defined distribution scheme created by formulating a series of fragment expressions to be used by OnLine to distribute rows to fragments.



<b>extent</b>	A continuous segment of disk space that OnLine allocated to a tblspace (a table). The user can specify both the initial extent size for a table and the size of all subsequent extents that OnLine allocates to the table.
<b>external table</b>	A database table that is not in the current database. It may or may not be in a database managed by the same database server.
<b>family name</b>	A quoted string constant that specifies a family name in the optical family. See <i>optical family</i> .
<b>fast recovery</b>	An automatic, fault-tolerant feature that INFORMIX-OnLine Dynamic Server implements any time the operating mode changes from off-line to quiescent mode. The aim of fast recovery is to return OnLine to a state of physical and logical consistency with a minimal loss of work in the event of a system failure.
<b>fault tolerance</b>	See <i>high availability</i> .
<b>fetch</b>	The action of moving a cursor to a new row and retrieving the row values into memory.
<b>fetch buffer</b>	A buffer in the application process that the database server uses to send fetched row data (except blob data) to the application. See also <i>application process</i> .
<b>field</b>	See <i>column</i> .
<b>file</b>	A collection of related information stored together on a system, such as the words in a letter or report, a computer program, or a listing of data.
<b>file server</b>	A network node that manages a set of disks and provides storage services to computers on the network.
<b>filename extension</b>	The part of a filename following the period. For example, DB-Access appends the extension <b>.sql</b> to command files.
<b>filter</b>	A set of conditions for selecting records from an input file. See <i>component</i> .
<b>filtering mode</b>	The object mode of a database object that causes bad rows to be filtered out to the violations table during data manipulation operations. Only constraints and unique indexes can be in the filtering mode. When a constraint or unique index is in this mode, the database server enforces the constraint or the unique index requirement during INSERT, DELETE, and UPDATE operations but filters out rows that would violate the constraint or unique index requirement.

<b>fixchar</b>	A character data type, available in INFORMIX-ESQL/C programs, in which the character string is fixed in length, padded with trailing blanks if necessary, and not null-terminated.
<b>fixed-point number</b>	A number where the decimal point is fixed at a specific place regardless of the value of the number.
<b>flag</b>	A command-line option, usually indicated by a minus ( - ) sign in UNIX systems. For example, in DB-Access the <b>-e</b> flag echoes input to the screen.
<b>floating-point number</b>	A number with fixed precision (total number of digits) and undefined scale (number of digits to the left of the decimal point). The decimal point <i>floats</i> as appropriate to represent an assigned value.
<b>forced residency</b>	An option that forces UNIX to keep the <i>resident</i> portion of INFORMIX-OnLine Dynamic Server shared-memory segments resident in memory, preventing UNIX from swapping out these segments to disk. (This option is not available on all UNIX systems.)
<b>foreign key</b>	A column, or set of columns, that references a unique or primary key in a table. For every entry in a foreign-key column, there must exist a matching entry in the unique or primary column, if all foreign-key columns contain non-null values.
<b>format</b>	A description of the organization of a data file. See <i>component</i> .
<b>fragment</b>	See <i>index fragment</i> and <i>table fragment</i> .
<b>fragmentation</b>	An OnLine feature that enables you to define groups of rows within a table based on a rule. OnLine stores these groups or fragments in separate dbspaces that you specify when you create a table or index fragmentation strategy.
<b>fragmentation strategy</b>	Consists of a distribution scheme (round-robin or expression), a rule or algorithm, and a location for the fragments. The rule or algorithm is OnLine-defined for a round robin-based distribution scheme and user defined for an expression-based distribution scheme.
<b>function</b>	See <i>program block</i> .
<b>gateway</b>	A data communications device that establishes communications between networks.

<b>gigabyte</b>	Gigabyte is a unit of storage. A gigabyte equals 1024 megabytes or 1024 <sup>3</sup> bytes.
<b>Global Language Support (GLS)</b>	An application environment that allows Informix APIs and database servers to handle different languages, cultural conventions, and code sets.
<b>global variable</b>	A variable whose value you can access from any module or function in a program or stored procedure. See <i>variable</i> and <i>scope of reference</i> .
<b>GLS</b>	See <i>Global Language Support</i> .
<b>hash rule</b>	A user-defined algorithm that maps each row in a table to a set of integers called hash values. OnLine uses these values to determine in which fragment it will store a given row. Hash rules are usually implemented using the MOD function.
<b>help message</b>	On-line text displayed automatically or at the request of the user to assist the user in interactive programs. Such messages are stored in help files.
<b>hierarchy</b>	A tree-like data structure in which some groups of data are subordinate to others such that only one group (called <i>root</i> ) exists at the highest level, and each group except root is related to only one parent group on a higher level.
<b>high availability</b>	The ability of a system to resist failure and data loss. High availability includes features such as fast recovery and mirroring. It is sometimes referred to as <i>fault tolerance</i> .
<b>High-Performance Loader</b>	The High-Performance Loader utility is part of INFORMIX-OnLine Dynamic Server. The HPL loads and unloads data using parallel access to devices.
<b>highlight</b>	A rectangular inverse-video area that marks your place on the screen. A highlight often indicates the current option on a menu or the current character in an editing session. If a terminal cannot display highlighting, the current option often appears in angle brackets, and the current character is underlined.
<b>hold cursor</b>	A cursor that is created using the WITH HOLD keywords. A hold cursor remains open past the end of a transaction. It allows uninterrupted access to a set of rows across multiple transactions.

<b>home page</b>	The page that contains the first byte of the data row. Even if a data row outgrows its original storage location, the home page does not change. The home page contains a forward pointer to the new location of the data row. See <i>remainder page</i> .
<b>host variable</b>	A C or COBOL program variable that is referenced in an embedded statement. A host variable is identified by the dollar sign ( \$ ) or colon ( : ) that precedes it.
<b>HPL</b>	See <i>High-Performance Loader</i> .
<b>identifier</b>	A sequence of letters, digits, and underscores ( _ ) that represents the name of a database, table, column, cursor, function, index, synonym, alias, view, prepared object, constraint, or procedure name.
<b>implicit connection</b>	A connection made using a database statement (DATABASE, CREATE DATABASE, START DATABASE, DROP DATABASE). Also see <i>explicit connection</i> .
<b>incremental archiving</b>	A system of archiving that allows the option to archive only those parts of the data that have changed since the last archive was created.
<b>index</b>	A structure of pointers that point to rows of data in a table. An index optimizes the performance of database queries by ordering rows to make access faster.
<b>index fragment</b>	Consists of zero or more index items grouped together, which can be stored in the same dbspace as the associated table fragment or, if you choose, in a separate dbspace.
<b>Informix user ID</b>	A login user ID (login user name) that must be valid on all computer systems (operating systems) involved in the client's database access. Often referred to as the client's user ID or user name. The user ID does not need to refer to a fully functional user account on the computer system; only the user identity components of the user account information is significant to Informix database servers. Any given user typically has the same Informix user ID on all networked computer systems involved in the database access.
<b>Informix user password</b>	A user ID password that must be valid on all computer systems (operating systems) involved in the client's database access. When the client specifies an explicit user ID, most computer systems require the Informix user password to validate the user ID.
<b>initialize</b>	To assign a starting value.

<b>inmigration</b>	The process by which INFORMIX-OnLine/Optical migrates a blob from the optical storage subsystem into the INFORMIX-OnLine Dynamic Server environment.
<b>in-place alter</b>	An algorithm used by the INFORMIX-OnLine Dynamic Server to execute the ALTER TABLE statement under certain conditions. When the database server uses this algorithm, the table is unavailable to users for no longer than the time it takes to update the table definition. The addition of a new column to the table definition occurs essentially in place as rows are updated, without requiring a second copy of the table to be created.
<b>input</b>	The information that is received from an external source (for example, from the keyboard, a file, or another program) and processed by a program.
<b>input parameter</b>	A placeholder within a prepared SQL statement that indicates a value is to be provided at the time the statement is executed.
<b>insert cursor</b>	A cursor for insert operations. Allows bulk insert data to be buffered in memory and written to disk.
<b>installation</b>	The loading of software from some magnetic medium (tape, cartridge, or floppy disk) or CD onto a computer and preparing it for use.
<b>interactive</b>	Refers to a program that accepts input from the user, processes the input, and then produces output on the screen, in a file, or on a printer.
<b>interquery parallelization</b>	Occurs when OnLine processes multiple queries simultaneously. A common bottleneck develops when multiple, independent queries access the same table. Fragmentation combined with interquery parallelization can effectively eliminate this bottleneck. Also see <i>intraquery parallelization</i> .
<b>interrupt</b>	A signal from a user or another process that can stop the current process temporarily or permanently. See <i>signal</i> .
<b>interrupt key</b>	A key used to cancel or abort a program or to leave a current menu and return to the menu one level above. On many systems, the CONTROL-C keypress is used for the interrupt key. On other systems, the interrupt key is DEL or CONTROL-Break.
<b>intraquery parallelization</b>	Occurs when OnLine breaks a single query using PDQ into subqueries and then processes the subqueries in parallel. Parallel processing of this type has important implications when each subquery retrieves data from a fragment of a table. Because each partial query operates on a smaller amount of data, the retrieval time is significantly reduced. Also see <i>interquery parallelization</i> .

<b>IPX/SPX</b>	Acronym for Internetwork Packet Exchange/Sequenced Packet Exchange. It refers to the NetWare network protocol by Novell.
<b>ISAM</b>	Acronym for Indexed Sequential Access Method. An indexed sequential access method allows you to find information in a specific order or to find specific pieces of information quickly through an index. See <i>access method</i> .
<b>ISAM error</b>	Operating system or file access error.
<b>ISO</b>	Acronym for the International Standards Organization. ISO sets worldwide standards for the computer industry, including standards for character input and manipulation, code sets, and SQL syntax.
<b>isolation</b>	The level of independence among multiple users when they attempt to access common data, specifically relating to the locking strategy for read-only SQL requests. The various levels of isolation are distinguished primarily by the length of time that shared locks are (or can be) acquired and held. INFORMIX-SE sets a level of <i>no isolation</i> (referred to as a Dirty Read), which cannot be changed. INFORMIX-OnLine Dynamic Server allows the programmer to choose from Informix levels of isolation or ANSI levels of isolation. See the Informix levels of isolation: Dirty Read, Committed Read, Cursor Stability, and Repeatable Read. See the ANSI levels of isolation: Read Uncommitted, Read Committed, Repeatable Read, and Serializable.
<b>join</b>	The process of combining information from two or more tables based on some common domain of information. Rows from one table are paired with rows from another table when information in the corresponding rows match on the joining criterion. For example, if a <b>customer_num</b> column exists in the <b>customer</b> and the <b>orders</b> tables, you can construct a query that pairs each <b>customer</b> row with all the associated <b>orders</b> rows based on the common <b>customer_num</b> . See <i>Cartesian product</i> and <i>outer join</i> .
<b>jukebox</b>	A cabinet that consists of one or more optical-disc drives, slots that store optical platters when they are not mounted, and a robotic arm that transfers platters between the slots and the drives. A jukebox is also known as an <i>autochanger</i> .
<b>kernel</b>	The part of the UNIX operating system that controls processes and the allocation of resources.

<b>key</b>	The pieces of information that are used to locate a row of data. A key defines the pieces of information you want to search for, as well as the order in which you want to process information in a table. For example, you can index the <b>last_name</b> column in a <b>customer</b> table to find specific customers or to process the customers in alphabetical or reverse alphabetical order, according to their last names ( <b>last_name</b> serves as the key).
<b>keyword</b>	A word that has meaning to a program. For example, the word SELECT is a keyword in SQL.
<b>kilobyte</b>	Kilobyte is a unit of storage. A kilobyte equals 1024 bytes.
<b>language supplement</b>	The result of the product localization process. A language supplement for a specific Western European language can be installed with an Informix product to allow the user to see error and warning messages in a language other than U.S. English. If installed with DB-Access, the menu names and options and on-line Help for that product also appear in the specified language.
<b>latch</b>	A mechanism of shared-memory resource management that is used by INFORMIX-OnLine Dynamic Server to coordinate processes (virtual processors) as they attempt to modify entries in shared memory.
<b>level of isolation</b>	See <i>isolation</i> .
<b>library</b>	A collection of precompiled functions or routines that are designed to perform tasks which are common to a particular kind of application. Your product can include library functions or routines that you can call from your programs.
<b>link</b>	The process of combining separately compiled program modules into an executable program.
<b>literal</b>	A character or numeric constant.
<b>load job</b>	The information required to load data into an OnLine database using the HPL. This information includes format, map, filter, device array, project, and special options.
<b>local character</b>	A character in a native language character set; also known as a <i>national character</i> or a <i>native character</i> .
<b>local loopback</b>	A connection between the client and database server that uses a network connection even though the client and the database servers are on the same computer.

<b>local variable</b>	A variable that has meaning only in the module in which it is defined. See <i>variable</i> and <i>scope of reference</i> .
<b>locale</b>	The environment that defines the behavior of the program at runtime by specifying a language, code set, and local customs. It usually is based on the linguistic customs and rules of the region or territory. The locale can be expressed through an environment variable setting that dictates output formats for numbers, currency symbols, dates, and time or collation order for character strings and regular expressions.
<b>lock mode</b>	An option that describes whether a user who requests a lock on an already locked object is to not wait for the lock and instead receive an error, wait until the object is released to receive the lock, or wait a certain amount of time before receiving an error (available only with INFORMIX-OnLine Dynamic Server). The lock mode also can refer to the standard unit of locking (either page or row) chosen by the programmer. The lock mode is set with the SET LOCK MODE statement.
<b>locking</b>	The process of temporarily limiting access to an object (database, table, page, or row) to prevent conflicting interactions among concurrent processes. Locks can be in either exclusive mode, which restricts read and write access to only one user; or share mode, which allows read-only access to other users. In addition, update locks exist that begin in share mode but are upgraded to exclusive mode when a row is changed.
<b>locking granularity</b>	The size of a locked object. The size may be a database, table, page, or row.
<b>logical log</b>	An allocation of disk space managed by OnLine that contains records of all changes that were performed on a database during the period the log was active. The logical log is used to roll back transactions, recover from system failures, and restore databases from archives.
<b>login</b>	The process of identifying oneself to a computer.
<b>login password</b>	See <i>Informix user password</i> .
<b>login user ID</b>	See <i>Informix user ID</i> .
<b>macro</b>	A named set of instructions that the computer executes whenever the name is referenced.
<b>map</b>	A description of the relation between the records of a data file and the columns of an OnLine database. See <i>component</i> .



<b>mantissa</b>	The significant digits in a floating-point number.
<b>math functions</b>	See <i>aggregate functions</i> .
<b>Memory Grant Manager (MGM)</b>	An OnLine component that coordinates the use of memory and I/O bandwidth for decision-support queries. MGM uses the DS_MAX_QUERIES, DS_TOTAL_MEMORY, DS_MAX_SCANS, and PDQPRIORITY configuration parameters to determine what resources can or cannot be granted to a decision-support query.
<b>megabyte</b>	Megabyte is a unit of storage. A megabyte equals 1024 kilobytes or 1024 <sup>2</sup> bytes.
<b>menu</b>	A screen display that allows you to choose the commands that you want the computer to perform.
<b>message log</b>	The UNIX file that INFORMIX-OnLine Dynamic Server keeps to record significant events, such as checkpoints, logical log file backups, recovery data, and errors.
<b>mirroring</b>	Storing the same data on two chunks simultaneously. If one chunk fails, the data is still usable on the other chunk in the mirrored pair. This data storage option is available with INFORMIX-OnLine Dynamic Server and is handled by the OnLine administrator.
<b>MODE ANSI</b>	The keywords specified on the CREATE DATABASE statement to make a database ANSI compliant.
<b>monochrome</b>	A term that describes a monitor that can display only one color.
<b>multibyte character</b>	A character that requires more than one byte to represent it.
<b>multithreading</b>	Refers to multiple threads that are run within the same process. Also see <i>thread</i> .
<b>national character</b>	See <i>local character</i> .
<b>node</b>	In indexing of relational databases, a node is an ordered group of key values having a fixed number of elements. (A key is a value from a data record.) A B+ tree, for example, is a set of nodes that contain keys and pointers that are arranged in a hierarchy.

<b>not null constraint</b>	A constraint on a column that specifies the column cannot contain null values.
<b>null value</b>	A value representing unknown or not applicable. (A null is not the same as a value of zero or blank.)
<b>object</b>	See <i>database object</i> .
<b>object mode</b>	The state of a database object as recorded in the <b>sysobjstate</b> system catalog table. A constraint or unique index can be in the enabled, disabled, or filtering mode. A trigger or duplicate index can be in the enabled or disabled mode. You use the SET statement to change the object mode of an object.
<b>offset</b>	A term that is used in INFORMIX-OnLine Dynamic Server to specify the physical position of a chunk on a disk. The offset is the number of kilobytes indented into the named device (which is the specified disk partition) before starting the chunk.
<b>OLTP application</b>	Characterized by quick, indexed access to a small number of data items. The applications are typically multiuser, and response times are measured in fractions of seconds.
<b>OLTP queries</b>	The transactions handled by OLTP applications are usually simple and pre-defined. A typical OLTP system is an order-entry system where only a limited number of rows is accessed by a single transaction many times.
<b>OnLine instance</b>	One OnLine database server.
<b>ON-Monitor</b>	An interface that presents a series of screens through which an INFORMIX-OnLine Dynamic Server administrator can monitor and modify an OnLine database server.
<b>open</b>	The process of making a resource available, such as preparing a file for access, activating a cursor, or initiating a window.
<b>operating mode</b>	The INFORMIX-OnLine Dynamic Server state of operation. The operating modes are off-line, quiescent, on-line, read-only, shutdown, and recovery.
<b>optical cluster</b>	An amount of space, on an optical disc, that is reserved for storing a group of logically related blobs.
<b>optical family</b>	A group of optical discs, theoretically unlimited in number.
<b>optical platters</b>	The removable optical discs that store data in an optical storage subsystem.

<b>optical statements</b>	The SQL statements that you use to control optical clustering.
<b>optical volume</b>	One side of a removable Write-Once-Read-Many (WORM) optical disc.
<b>outer join</b>	An asymmetric joining of a dominant and a subordinate table in a query; the joining restrictions apply only to the subordinate or <i>outer</i> table. Rows in the dominant table are retrieved without considering the join, but rows from the outer table are included only if they also satisfy the join conditions. Any dominant-table rows that do not have a matching row from the outer table receive a row of nulls in place of an outer-table row.
<b>outmigration</b>	The process by which INFORMIX-OnLine/Optical migrates a blob from the INFORMIX-OnLine Dynamic Server environment to an optical storage subsystem.
<b>output</b>	The result that the computer produces in response to a query or a request for a report.
<b>owner-privileged</b>	Refers to a class of stored procedures that can be created by any user who has Resource database privileges.
<b>pad</b>	Usually a space or blank to fill empty places at the beginning or end of a line, string, or field.
<b>page</b>	The basic unit of disk and memory storage that is used by INFORMIX-OnLine Dynamic Server. The size is fixed for a particular operating system and hardware platform, and the OnLine administrator cannot change it.
<b>parallelism</b>	Refers to ability of OnLine to process a task in parallel by breaking the task into subtasks and then processing them simultaneously.
<b>parameter</b>	A variable that is given a constant value for a specified application. In a subroutine, a parameter is the placeholder for the argument values that are passed to the subroutine at runtime.
<b>parent-child relationship</b>	See <i>referential constraint</i> .
<b>parent table</b>	The referenced table in a referential constraint. See <i>child table</i> .
<b>partial character</b>	A multibyte character that has lost one or more bytes so that the original intended meaning of the character is lost. GLS (Global Language Support) software provides context-specific solutions that prevent partial characters from being generated during string-processing operations.

<b>partition</b>	See <i>table fragment</i> .
<b>pattern</b>	An identifiable or repeatable series of characters or symbols.
<b>PDQ</b>	Acronym for Parallel Database Query (or Queries). An OnLine feature that permits parallel rather than sequential execution of SQL queries by distributing the execution of a single query across several processors, which enhances performance.
<b>PDQ priority</b>	Determines the amount of resources OnLine allocates to process a query in parallel. These resources include memory, threads (such as scan threads), and sort space. The level of parallelism is established by using the <b>PDQPRIORITY</b> environment variable or various OnLine configuration parameters (including <b>PDQPRIORITY</b> and <b>MAX_PDQPRIORITY</b> ) or dynamically through the <b>SET PDQPRIORITY</b> statement.
<b>permission</b>	On some operating systems, the right to access files and directories.
<b>phantom row</b>	A row of a table that is initially modified or inserted during a transaction but is subsequently rolled back. Another user can see a phantom row if the isolation level is Informix DIRTY READ or ANSI READ UNCOMMITTED. No other isolation levels allow a changed but uncommitted row to be seen.
<b>physical log</b>	An allocation of disk space in INFORMIX-OnLine Dynamic Server that contains the before-images of all pages changed since the last checkpoint.
<b>pointer</b>	A number that specifies the “address-in-memory” of the data or variable of interest.
<b>precision</b>	The total number of significant digits in a real number, both to the right and left of the decimal point. For example, the number 1437.2305 has a precision of 8. See <i>scale</i> .
<b>prepared statement</b>	An SQL statement that is generated by the PREPARE statement from a character string or from a variable containing a character string. This feature allows you to form your request while the program is executing without having to modify and recompile the program.
<b>preprocessor</b>	A program that takes high-level programs and produces code that a standard language compiler, such as C or Micro Focus COBOL/2, can compile.
<b>primary key</b>	The information from a column or set of columns that uniquely identifies each row in a table. The primary key sometimes is called a <i>unique key</i> .

<b>primary-key constraint</b>	Specifies that each entry in a column or set of columns contains a non-null unique value.
<b>printable character</b>	A character that can be displayed on a terminal, screen, or printer. Printable characters include A-Z, a-z, 0-9, and punctuation marks. Compare with <i>control character</i> .
<b>privilege</b>	The right to use or change the contents of a database, table, table fragment, or column. See <i>access privileges</i> .
<b>procedural statement</b>	A programming language statement that specifies actions; for example, looping and branching if a condition is met. Compare with <i>declaration statement</i> .
<b>procedure</b>	See <i>program block</i> and <i>stored procedure</i> .
<b>procedure cursor</b>	A cursor that is associated with an EXECUTE PROCEDURE statement. It enables you to scan multiple rows of data, moving data row by row into a set of receiving variables.
<b>process</b>	A discrete task, generally a program, that the operating system executes.
<b>program block</b>	A named collection of statements, such as a function, routine, or procedure, that performs a particular task; a unit of program code.
<b>program control</b>	The actions that a computer takes, as opposed to actions that a user takes.
<b>project</b>	A group of related components used by the HPL. See <i>component</i> .
<b>projection</b>	Taking a subset from the columns of a single table. Projection is implemented through the select list in the SELECT clause of a SELECT statement and returns some of the columns and all the rows in a table. See <i>selection</i> and <i>join</i> .
<b>promotable lock</b>	A lock that can be changed from a shared lock to an exclusive lock. See <i>update lock</i> .
<b>protocol</b>	A set of rules that govern communication among computers. These rules govern format, timing, sequencing, and error control.
<b>query</b>	A request to the database to retrieve data that meets certain criteria, usually with the SELECT statement. When used with the High Performance Loader, selects records to unload from an OnLine database. See <i>component</i> .

<b>query optimization information statements</b>	The SQL statements that are used to optimize queries. These statements include SET EXPLAIN, SET OPTIMIZATION, and UPDATE STATISTICS.
<b>range rule</b>	A user-defined algorithm that you use to define the boundaries of each fragment in a table using SQL relational and logical operators. Expressions in a range rule can use the following restricted set of operators: >, <, >=, <=, and the logical operator AND.
<b>raw device</b>	A UNIX disk partition that is defined as a character-special device, which is not mounted. OnLine can use raw files more efficiently than cooked files (UNIX files).
<b>Read Committed</b>	An ANSI level of isolation available through INFORMIX-OnLine Dynamic Server and set with the SET TRANSACTION statement in which a user can view only rows that are currently committed at the moment of the query request; that is, a user cannot view rows that were changed as a part of a currently uncommitted transaction. It is the default level of isolation under OnLine for databases that are not ANSI compliant. See <i>isolation</i> .
<b>Read Uncommitted</b>	An ANSI level of isolation set with the SET TRANSACTION statement that does not account for locks and allows viewing of any existing rows, even rows that currently can be altered from inside an uncommitted transaction. Read Uncommitted is the lowest level of isolation (no isolation at all). See <i>isolation</i> .
<b>real user ID</b>	See <i>Informix user ID</i> .
<b>record</b>	See <i>row</i> .
<b>recover a database</b>	To restore a database to a former condition after a system failure or other destructive event. The recovery restores the database as it existed immediately before the crash. This is sometimes referred to as <i>restore a database</i> .
<b>referential constraint</b>	Defines the relationship between columns within a table or between tables; also known as a <i>parent-child relationship</i> . Referencing columns also are known as <i>foreign keys</i> .
<b>relation</b>	See <i>table</i> .

<b>relational database</b>	A database that uses table structures to store data. Data in a relational database is divided across tables in such a way that additions and modifications to the data can be made easily without loss of information.
<b>remainder page</b>	An additional page that is filled with data from a single row. INFORMIX-OnLine Dynamic Server uses remainder pages when the data for a row cannot fit in the initial page. Remainder pages are added and filled as needed. The original page entry contains pointers to the remainder pages. See <i>home page</i> .
<b>remote</b>	A connection that requires a network.
<b>Repeatable Read</b>	An Informix and ANSI level of isolation available through OnLine with the Informix SET ISOLATION statement or ANSI SET TRANSACTION statement, which ensures all data read during a transaction is not modified during the entire transaction. Transactions under ANSI Repeatable Read are also known as Serializable. Informix Repeatable Read is the default level of isolation under OnLine for ANSI-compliant databases. See <i>isolation</i> and <i>Serializable</i> .
<b>reserved word</b>	A word in a statement or command that you cannot use in any other context of the language or program without receiving a warning or error message.
<b>restore a database</b>	See <i>recover a database</i> .
<b>role</b>	A classification or work task, such as <b>payroll</b> , assigned by the DBA. Assignment of roles makes management of privileges convenient.
<b>role separation</b>	An OnLine installation option that allows different users to perform different administrative tasks.
<b>roll back</b>	The process that reverses an action or series of actions on a database. The database is returned to the condition that existed before the actions were executed. See <i>transaction</i> .
<b>roll forward</b>	The process that brings a database up to date. This process usually takes place when a database is recovered after a system crash or other failure. In INFORMIX-SE, an archive copy of the database is restored to the disk, and then the database is rolled forward to a point just before the failure. In INFORMIX-OnLine Dynamic Server, an archive copy of the database is restored to the disk, and then the logical log records are rolled forward to a point just before the failure.

<b>root dbspace</b>	The initial dbspace for an INFORMIX-OnLine Dynamic Server system. In addition to any data, the root dbspace contains reserved pages and internal tables that track OnLine storage, recovery, and consistency information.
<b>round-robin distribution scheme</b>	An OnLine-defined distribution scheme. OnLine distributes rows in such a way that the number of rows in each of the fragments remains approximately the same.
<b>routine</b>	See <i>program block</i> .
<b>row</b>	A group of related items of information about a single entity in a database table. In a table of customer information, for example, a row contains information about a single customer. A row is sometimes referred to as a <i>record</i> or <i>tuple</i> . (In a screen form, a row can refer to a line of the screen.)
<b>rowid</b>	In nonfragmented tables, rowid refers to an integer that defines the physical location of a row. Rowids must be explicitly created to be used in fragmented tables and they do not define a physical location for a row. Rowids in fragmented tables are accessed by an index that is created when the rowid is created; this access method is slow. Informix recommends that users creating new applications move toward using primary keys as a method of row identification instead of using rowids.
<b>rule</b>	How OnLine or the user determines into which fragment rows are placed. OnLine determines the rule for a round robin-based distribution scheme. The user determines the rule for an expression-based distribution scheme.
<b>run-time environment</b>	The hardware and operating system services available at the time a program runs.
<b>run-time errors</b>	Errors that occur during program execution. Compare with <i>compile-time errors</i> .
<b>scale</b>	The number of digits to the right of the decimal place in DECIMAL notation. The number 14.2350 has a scale of 4 (four digits to the right of the decimal point). See <i>precision</i> .
<b>scan thread</b>	An OnLine thread that is assigned the task of reading rows from a table. When a query is executed in parallel, OnLine allocates multiple scan threads to perform the query in parallel.
<b>schema</b>	The structure of a database or a table. The schema for a table lists the names of the columns, their data types, and (where applicable) the lengths, indexing, and other information about the structure of the table.



<b>scope of reference</b>	The portion of a program in which an identifier applies and can be accessed. Three possible scope sizes exist: local (an identifier applies only within a single program block), modular (the identifier applies throughout a single module), and global (an identifier applies throughout the entire program).
<b>scroll cursor</b>	A cursor created with the SCROLL keyword that allows you to fetch rows of the active set in any sequence.
<b>secure auditing</b>	A facility of the INFORMIX-OnLine Dynamic Server that lets OnLine administrators keep track of unusual or potentially harmful user activity. Use the <b>onaudit</b> utility to enable auditing of events and create audit masks, and the <b>onshowaudit</b> utility to extract the audit event information for analysis.
<b>select</b>	See <i>query</i> .
<b>select cursor</b>	A cursor associated with the SELECT statement. It enables you to scan multiple rows of data, moving data row by row into a set of receiving variables.
<b>selection</b>	Taking a horizontal subset of the rows of a single table that satisfies a particular condition. Selection is implemented through the WHERE clause of a SELECT statement and returns some of the rows and all of the columns in a table. See <i>projection</i> and <i>join</i> .
<b>self-join</b>	A join between a table and itself. A self-join occurs when a table is used two or more times in a SELECT statement (with different aliases) and joined to itself.
<b>semaphore</b>	A UNIX communication device that signals a process to awaken.
<b>Serializable</b>	An ANSI level of isolation available through INFORMIX-OnLine Dynamic Server and set with the SET TRANSACTION statement, ensuring all data read during a transaction is not modified during the entire transaction. ANSI Serializable is the default level of isolation under OnLine for an ANSI-compliant database that is set with the SET TRANSACTION statement.
<b>server locale</b>	The environment that defines the locale that the database server uses when it performs read and write operations on the database server computer.
<b>server name</b>	The unique name of a database server. The database server name is used by an application to select a database server. It is assigned by the administrator of the database server.

<b>server number</b>	A unique number between 0 and 255, inclusive, that the INFORMIX-OnLine Dynamic Server administrator assigns to an OnLine database server at the time of initialization. If more than one OnLine database server is installed on the same computer, each database server must have a unique number.
<b>server processing locale</b>	The environment that the database server dynamically determines based on the client locales and information that is stored in the database being accessed.
<b>session</b>	The structure that is created for an application using INFORMIX-OnLine Dynamic Server.
<b>set functions</b>	See <i>aggregate functions</i> .
<b>shared library</b>	Like a standard or static library, a shared library contains routines that are used by applications in the course of processing data. Unlike static libraries, shared libraries are not linked at compile time to the application, but instead are loaded into memory by the operating system as they are needed. The copy of the library that the operating system loads into memory is shared by applications.
<b>shared lock</b>	A lock that more than one thread can acquire on the same object. Shared locks allow for greater concurrency with multiple users; if two users have shared locks on a row, a third user cannot change the contents of that row until both users (not just the first) release the lock. Shared-locking strategies are used in all levels of isolation except Informix DIRTY READ and ANSI READ UNCOMMITTED.
<b>shared memory</b>	Memory that is accessible to multiple processes. Shared memory allows multiple processes to access a common data space in memory. Common data does not have to be reread from disk for each process, reducing disk I/O and improving performance. Also used as an Inter-Process Communication (IPC) mechanism to communicate between two processes running on the same computer.
<b>shelf</b>	The location of an optical platter that is neither on an optical drive nor in a jukebox slot.
<b>shuffling</b>	Shuffling refers to the process that occurs when OnLine moves rows or key values from one fragment to another. Shuffling occurs in a variety of circumstances including when you attach, detach, or drop a fragment.

<b>signal</b>	A means of asynchronous communication between two processes. For example, signals are sent when a user or a program wants to interrupt or suspend the execution of a process. See <i>interrupt</i> .
<b>single-byte character</b>	A character that consists of one byte.
<b>singleton select</b>	A SELECT statement that returns a single row.
<b>SMI</b>	Acronym for <i>system monitoring interface</i> . SMI is a collection of tables in the <b>sysmaster</b> database that maintains dynamically updated information about the operation of an INFORMIX-OnLine Dynamic Server database server.
<b>source file</b>	A file containing instructions (in ASCII text) that is used as the source for generating compiled programs.
<b>SPL</b>	Acronym for Stored Procedure Language. See <i>stored procedure</i> .
<b>SQL</b>	Acronym for Structured Query Language. SQL is a database query language that was developed by IBM and standardized by ANSI. Informix relational database management products are based on an extended implementation of ANSI-standard SQL.
<b>SQL API</b>	An SQL application programming interface that includes a library of callable functions, which are used to develop an application that accesses a relational database. Examples include the embedded-language products such as INFORMIX-ESQL/C and INFORMIX-ESQL/COBOL. See <i>host variable</i> .
<b>SQLCA</b>	Acronym for SQL Communications Area. The SQLCA is a data structure that stores information about the most recently executed SQL statement. The result code returned by the database server to the SQLCA is used for error handling by Informix SQL APIs.
<b>sqlda</b>	Acronym for SQL descriptor area. A dynamic SQL management structure that can be used with the DESCRIBE statement to store information about database columns or host variables used in dynamic SQL statements. The structure contains an <b>sqlvar_struct</b> structure for each column; each <b>sqlvar_struct</b> structure provides information such as the name, data type, and length of the column. The sqlda structure is an Informix-specific structure for handling dynamic columns. It is available only within an INFORMIX-ESQL/C program. See also <i>descriptor</i> and <i>system-descriptor area</i> .

<b>sqlxecd</b>	A daemon process that receives a connection request from a client and spawns an INFORMIX-SE database server process.
<b>stack operator</b>	Operators that allow programs to manipulate values that are on the stack.
<b>staging-area blob space</b>	The blob space where INFORMIX-OnLine Dynamic Server temporarily stores a blob that is being outmigrated to an optical storage subsystem.
<b>statement</b>	A line, or set of lines, of program code that describes a single action (for example, a SELECT statement or an UPDATE statement).
<b>statement block</b>	A section of a program that usually begins and terminates with special symbols such as <i>begin</i> and <i>end</i> . A statement block is the smallest unit of scope of reference for program variables.
<b>statement identifier</b>	An embedded variable name or SQL statement identifier that represents a data structure defined in a PREPARE statement. It is used for dynamic SQL statement management by Informix SQL APIs.
<b>status variable</b>	A program variable that indicates the status of some aspect of program execution. Status variables often store error numbers or act as flags to indicate that an error has occurred.
<b>stored procedure</b>	A function that is used along with SQL statements in an Informix program. Stored procedures are written using SQL and Stored Procedure Language (SPL) statements. The procedure is stored in the database in executable form.
<b>string</b>	A set of characters (generally alphanumeric) that is manipulated as a single unit. A string might consist of a word (such as 'Smith'), a set of digits representing a number (such as '19543'), or any other collection of characters. Strings generally are surrounded by single quotes. A string is also a character data type, available in INFORMIX-ESQL/C programs, in which the character string is stripped of trailing blanks and is null-terminated.
<b>subordinate table</b>	See <i>outer join</i> .
<b>subquery</b>	A query that is embedded as part of another SQL statement. For example, an INSERT statement can contain a subquery in which a SELECT statement supplies the inserted values in place of a VALUES clause; an UPDATE statement can contain a subquery in which a SELECT statement supplies the updating values; or a SELECT statement can contain a subquery in which a second SELECT statement supplies the qualifying conditions of a WHERE clause for the first SELECT statement. (Parentheses always delimit a subquery, unless you are referring to a CREATE VIEW statement or unions.)

<b>subscript</b>	A subscript is an offset into an array. Subscripts can be used to indicate the start or end position in a CHAR variable.
<b>substring</b>	A portion of a character string.
<b>synonym</b>	A name that is assigned to a table and used in place of the original name for that table. A synonym does not replace the original table name; instead, it acts as an alias for the table.
<b>sysmaster database</b>	A database that every INFORMIX-OnLine Dynamic Server database server contains. It holds the ON-Archive catalog tables and system monitoring interface (SMI) tables.
<b>system call</b>	A call to a function provided by the operating system.
<b>system catalog</b>	A group of database tables that contain information about the database itself, such as the names of tables or columns in the database, the number of rows in a table, the information about indexes and database privileges, and so on. See <i>data dictionary</i> .
<b>system-descriptor area</b>	A dynamic SQL management structure that is used with the ALLOCATE DESCRIPTOR, DEALLOCATE DESCRIPTOR, DESCRIBE, GET DESCRIPTOR, and SET DESCRIPTOR statements to store information about database columns or host variables used in dynamic SQL statements. The structure contains an item descriptor for each column; each item descriptor provides information such as the name, data type, length, scale, and precision of the column. The system-descriptor area is the X/Open standard for handling dynamic columns. See <i>descriptor</i> and <i>sqlda</i> .
<b>system monitoring interface</b>	See <i>SMI</i> .
<b>table</b>	A rectangular array of data in which each row describes a single entity and each column contains the values for each category of description. For example, a table can contain the names and addresses of customers. Each row corresponds to a different customer and the columns correspond to the name and address items. A table is sometimes referred to as a <i>base table</i> to distinguish it from the views, indexes, and other objects defined on the underlying table or associated with it.
<b>table fragment</b>	Consists of zero or more rows that are grouped together and stored in a dspace that you specify when you create the fragment.

<b>target table</b>	The underlying base table that a violations table and diagnostics table are associated with. You use the <code>START VIOLATIONS TABLE</code> statement to create the association between the target table and the violations and diagnostics tables.
<b>tblspace</b>	The logical collection of extents that are assigned to a table under INFORMIX-OnLine Dynamic Server.
<b>TCP/IP</b>	The specific name of a particular standard transport layer protocol (TCP) and network layer protocol (IP). A popular network protocol used in DOS, UNIX, and other environments.
<b>temporary</b>	An attribute of any file, index, or table that is used only during a single session. Temporary files or resources are typically removed or freed when program execution terminates or an on-line session ends.
<b>thread</b>	A thread is a task that the OnLine virtual processor schedules internally for processing. Just as the CPU runs operating system processes for multiple users, so does the OnLine virtual processor run multiple threads for multiple SQL client applications.
<b>timeout</b>	The point at which a lock request is aborted because the requesting thread waited longer for the lock than the specified maximum time limit. A program developer can set a time limit in INFORMIX-OnLine Dynamic Server through the <code>SET LOCK MODE</code> statement.
<b>TLI</b>	Acronym for Transport Level Interface. It is the interface designed for use by application programs that are independent of a network protocol.
<b>trace</b>	To keep a running list of the values of program variables, arguments, expressions, and so on, in a program or stored procedure.
<b>transaction</b>	A collection of one or more SQL statements that is treated as a single unit of work. If one statement in a transaction fails, the entire transaction can be <i>rolled back</i> (canceled). If the transaction is successful, the work is <i>committed</i> and all changes to the database from the transaction are accepted.
<b>transaction logging</b>	The process of keeping records of transactions. See <i>logical log</i> .

<b>transaction mode</b>	The method by which constraints are checked during transactions. You use the SET statement to specify whether constraints are checked at the end of each data manipulation statement or after the transaction is committed.
<b>trigger</b>	A mechanism that resides in the database. It specifies that when a particular action (insert, delete, or update) occurs on a particular table, the database server should automatically perform one or more additional actions.
<b>tuple</b>	See <i>row</i> .
<b>unique constraint</b>	Specifies that each entry in a column or set of columns has a unique value.
<b>unique index</b>	An index that prevents duplicate values in the indexed column.
<b>unique key</b>	See <i>primary key</i> .
<b>UNIX real user ID</b>	See <i>Informix user ID</i> .
<b>unload job</b>	The information required to unload data from an OnLine database using the HPL. This information includes format, map, query, device array, project, and special options.
<b>unlock</b>	To free an object (database, table, page, or row) that has been locked. For example, a locked table prevents others from adding, removing, updating, or (in the case of an exclusive lock) viewing rows in that table as long as it is locked. When the user or program unlocks the table, others are permitted access again.
<b>update</b>	The process of changing the contents of one or more columns in one or more existing rows of a table.
<b>update lock</b>	A promotable lock that is acquired during a SELECT..FOR UPDATE. An update lock behaves like a shared lock until the update actually occurs, and it then becomes an exclusive lock. It differs from a shared lock in that only one update lock can be acquired on an object at a time.
<b>user ID</b>	See <i>Informix user ID</i> .
<b>user ID password</b>	See <i>Informix user password</i> .
<b>user name</b>	See <i>Informix user ID</i> .
<b>user password</b>	See <i>Informix user password</i> .

<b>variable</b>	The identifier for a location in memory that stores the value of a program object whose value can change during the execution of the program.
<b>view</b>	A dynamically controlled picture of the contents in a database that allows a programmer to determine what information the user sees and manipulates. A view represents a virtual table based on a specified SELECT statement.
<b>violations table</b>	A special table that holds rows that fail to satisfy constraints and unique index requirements during data manipulation operations on base tables. You use the START VIOLATIONS TABLE statement to create a violations table and associate it with a base table.
<b>virtual column</b>	A derived column of information that is not stored in the database. For example, you can create virtual columns in a SELECT statement by arithmetically manipulating a single column, such as multiplying existing values by a constant, or by combining multiple columns, such as adding the values from two columns.
<b>virtual processors</b>	The multithreaded processes that make up the INFORMIX-OnLine Dynamic Server database server. Virtual processors service a large number of clients by functioning in a way that is analogous to the way that hardware processors function in the computer.
<b>warning</b>	A state or situation that is detected by the database server or compiler, possibly incorrect syntax or a problem. A warning does not necessarily affect the ability of the code to run.
<b>white space</b>	A series of one or more space characters. The locale file defines what characters are considered to be space characters.
<b>wildcard</b>	A special symbol that represents any sequence of zero or more characters or any single character. In SQL, for example, you can use the asterisk (*), question mark (?), brackets ([ ]), percent sign (%), and underscore (_) as wildcard characters. (The asterisk, question mark, and brackets are also wildcards in UNIX.)
<b>window</b>	A rectangular area on the screen in which you can take actions without leaving the context of the background program.



<b>WORM</b>	Acronym for Write-Once-Read-Many optical media. When a bit of data is written to a WORM platter, a permanent mark is made on the platter.
<b>X/Open</b>	An independent consortium that produces and develops specifications and standards for open-systems products and technology such as dynamic SQL.
<b>X/Open Portability Guide</b>	A set of specifications which vendors and users can use to build portable software. Any vendor carrying the XPG brand on any particular software product is guaranteeing that the software correctly implements the X/Open Common Applications Environment (CAE) specifications. There are CAE specifications for SQL, XA, ISAM, RDA, and so on.



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