HP NonStop SQL/MX Quick Start

Abstract

Providing the basic techniques for using HP NonStop™ SQL/MX, this Quick Start is designed to enable you to get immediate access to your database without extensive preparation.

Product Version

NonStop SQL/MX Release 2.0

Supported Release Version Updates (RVUs)

This publication supports G06.23 and all subsequent G-series RVUs until otherwise indicated by its replacement publication.

Part Number	Published
523724-002	August 2004

Document History

Part Number	Product Version	Published
424297-001	NonStop SQL/MX Release 1.0	March 2001
429989-001	NonStop SQL/MX Release 1.5	November 2001
523399-001	NonStop SQL/MX Release 1.8	November 2002
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523724-002	NonStop SQL/MX Release 2.0	August 2004

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New and Changed Information

- Added a new subsection, "Working with SQL/MP Tables," to Selecting Information From a Table on page 2-1.
- Updated examples in Creating Database Objects on page 9-1.

About This Manual

This Quick Start is designed to help you learn some basic techniques for using SQL/MX and to allow you to get immediate access to your database without extensive preparation.

Audience

The Quick Start is useful if:

- You plan to be a user of MXCI (SQL/MX conversational interface).
- You want a quick introduction to using SQL.
- You want to use MXCI to retrieve information from your database or to add or modify data.

Related Documentation

This manual is part of the SQL/MX library of manuals, which includes:

Introductory Guides

SQL/MX Comparison Guide for SQL/MP Users	Describes SQL differences between SQL/MP and SQL/MX.
SQL/MX Quick Start	Describes basic techniques for using SQL in the SQL/MX conversational interface (MXCI). Includes information about installing the sample database.

Reference Manuals

SQL/MX Reference Manual	Describes the syntax of SQL/MX statements, MXCI commands, functions, and other SQL/MX language elements.
SQL/MX Connectivity Service Administrative Command Reference	Describes the SQL/MX administrative command library (MACL) available with the SQL/MX conversational interface (MXCI).
DataLoader/MX Reference Manual	Describes the features and functions of the DataLoader/MX product, a tool to load SQL/MX databases.
SQL/MX Messages Manual	Describes SQL/MX messages.
SQL/MX Glossary	Defines SQL/MX terminology.

Programming Manuals

SQL/MX Programming Manual for C and COBOL	Describes how to embed SQL/MX statements in ANSI C and COBOL programs.
SQL/MX Programming Manual for Java	Describes how to embed SQL/MX statements in Java programs according to the SQLJ standard.

Specialized Guides

SQL/MX Installation and Management Guide	Describes how to plan for, install, create, and manage an SQL/MX database. Explains how to use installation and management commands and utilities.
SQL/MX Query Guide	Describes how to understand query execution plans and write optimal queries for an SQL/MX database.
SQL/MX Data Mining Guide	Describes the SQL/MX data structures and operations to carry out the knowledge-discovery process.
SQL/MX Queuing and Publish/Subscribe Services	Describes how SQL/MX integrates transactional queuing and publish/subscribe services into its database infrastructure.
SQL/MX Report Writer Guide	Describes how to produce formatted reports using data from a NonStop SQL/MX database.
SQL/MX Connectivity Service Manual	Describes how to install and manage the SQL/MX Connectivity Service (MXCS), which enables applications developed for the Microsoft Open Database Connectivity (ODBC) application programming interface (API) and other connectivity APIs to use SQL/MX.
SQL/MX Guide to Stored Procedures in Java	Describes how to use stored procedures that are written in Java within SQL/MX.

Online Help

The SQL/MX Online Help consists of:

Reference Help	Overview and reference entries from the *SQL/MX Reference Manual*.
Messages Help	Individual messages grouped by source from the *SQL/MX Messages Manual.*
Glossary Help	Terms and definitions from the *SQL/MX Glossary*.
NSM/web Help	Context-sensitive help topics that describe how to use the NSM/web management tool.
Visual Query Planner Help	Context-sensitive help topics that describe how to use the Visual Query Planner graphical user interface.

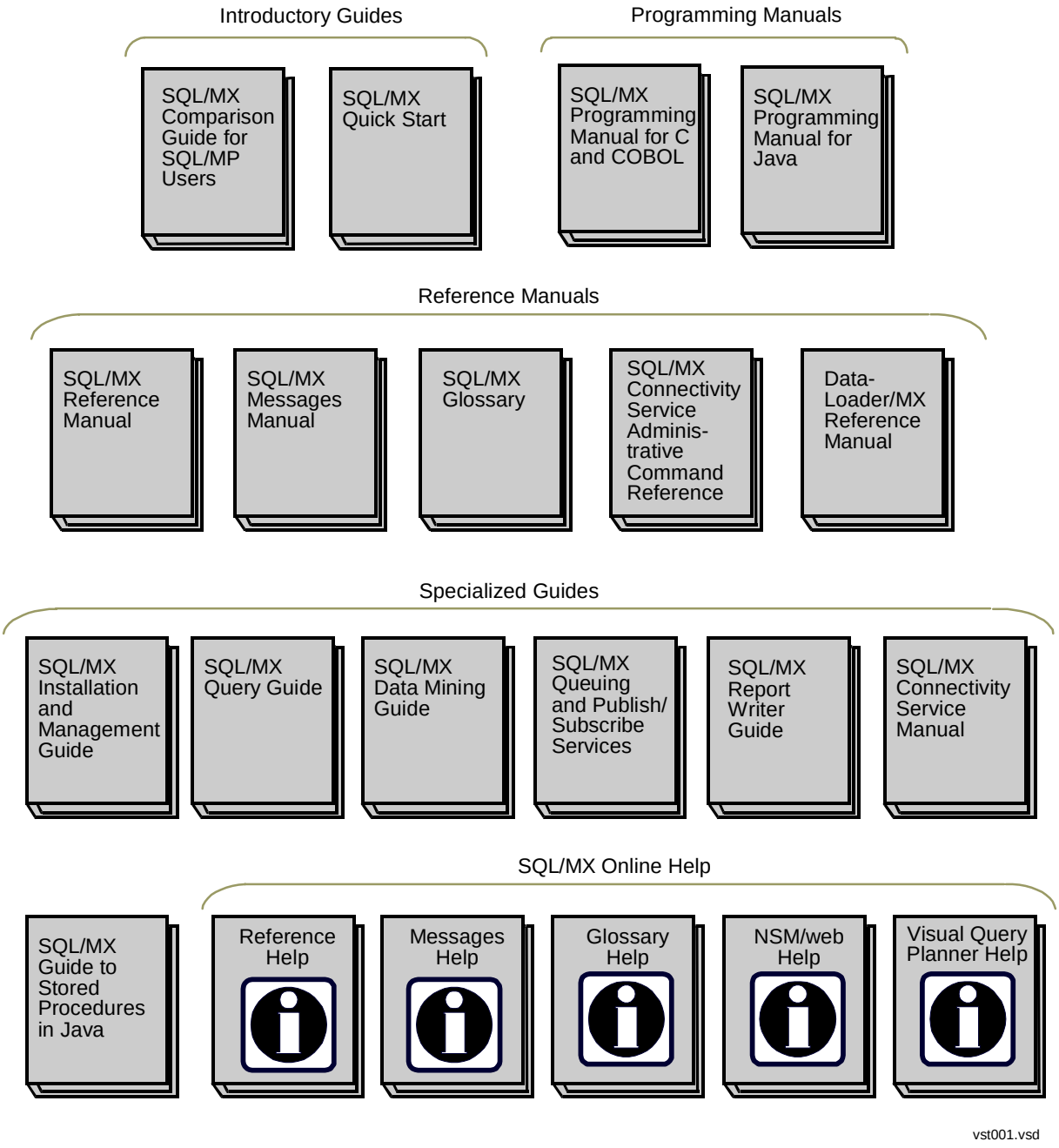
The NSM/web and Visual Query Planner help systems are accessible from their respective applications. You can download the Reference, Messages, and Glossary online help from the $SYSTEM.ZMXHELP subvolume or from the HP NonStop Technical Library (NTL). For more information about downloading online help, see the *SQL/MX Installation and Management Guide*.

The following manuals are part of the SQL/MP library of manuals and are essential references for information about SQL/MP Data Definition Language (DDL) and SQL/MP installation and management:

Related SQL/MP Manuals

SQL/MP Reference Manual	Describes the SQL/MP language elements, expressions, predicates, functions, and statements.
SQL/MP Installation and Management Guide	Describes how to plan, install, create, and manage an SQL/MP database. Describes installation and management commands and SQL/MP catalogs and files.

This figure shows the manuals in the SQL/MX library:



Notation Conventions

Hypertext Links

Blue underline is used to indicate a hypertext link within text. By clicking a passage of text with a blue underline, you are taken to the location described. For example:

This requirement is described under Backup DAM Volumes and Physical Disk Drives on page 3-2.

General Syntax Notation

This list summarizes the notation conventions for syntax presentation in this manual.

UPPERCASE LETTERS. Uppercase letters indicate keywords and reserved words. Type these items exactly as shown. Items not enclosed in brackets are required. For example:

```
MAXATTACH
```

lowercase italic letters. Lowercase italic letters indicate variable items that you supply. Items not enclosed in brackets are required. For example:

```
file-name
```

computer type. `Computer type` letters within text indicate C and Open System Services (OSS) keywords and reserved words. Type these items exactly as shown. Items not enclosed in brackets are required. For example:

```
myfile.c
```

italic computer type. *`Italic computer type`* letters within text indicate C and Open System Services (OSS) variable items that you supply. Items not enclosed in brackets are required. For example:

```
pathname
```

[ ] Brackets. Brackets enclose optional syntax items. For example:

```
TERM [\system-name.]$terminal-name
```

```
INT[ERRUPTS]
```

A group of items enclosed in brackets is a list from which you can choose one item or none. The items in the list can be arranged either vertically, with aligned brackets on each side of the list, or horizontally, enclosed in a pair of brackets and separated by vertical lines. For example:

```
FC [ num  ]
   [ -num ]
   [ text ]
```

```
K [ X | D ] address
```

{ } Braces. A group of items enclosed in braces is a list from which you are required to choose one item. The items in the list can be arranged either vertically, with aligned

braces on each side of the list, or horizontally, enclosed in a pair of braces and separated by vertical lines. For example:

```
LISTOPENS PROCESS { $appl-mgr-name }
                  { $process-name  }

ALLOWSU { ON | OFF }
```

| Vertical Line. A vertical line separates alternatives in a horizontal list that is enclosed in brackets or braces. For example:

```
INSPECT { OFF | ON | SAVEABEND }
```

… Ellipsis. An ellipsis immediately following a pair of brackets or braces indicates that you can repeat the enclosed sequence of syntax items any number of times. For example:

```
M address [ , new-value ]...

[ - ] {0|1|2|3|4|5|6|7|8|9}...
```

An ellipsis immediately following a single syntax item indicates that you can repeat that syntax item any number of times. For example:

```
"s-char..."
```

Punctuation. Parentheses, commas, semicolons, and other symbols not previously described must be typed as shown. For example:

```
error := NEXTFILENAME ( file-name ) ;

LISTOPENS SU $process-name.#su-name
```

Quotation marks around a symbol such as a bracket or brace indicate the symbol is a required character that you must type as shown. For example:

```
"[" repetition-constant-list "]"
```

Item Spacing. Spaces shown between items are required unless one of the items is a punctuation symbol such as a parenthesis or a comma. For example:

```
CALL STEPMOM ( process-id ) ;
```

If there is no space between two items, spaces are not permitted. In this example, no spaces are permitted between the period and any other items:

```
$process-name.#su-name
```

Line Spacing. If the syntax of a command is too long to fit on a single line, each continuation line is indented three spaces and is separated from the preceding line by a blank line. This spacing distinguishes items in a continuation line from items in a vertical list of selections. For example:

```
ALTER [ / OUT file-spec / ] LINE

   [ , attribute-spec ]...
```

1 Welcome to Quick Start

This section provides information about how to use MXCI and how to install the sample database that is used in the Quick Start tutorial.

What Is MXCI?

MXCI is the conversational interface to the SQL/MX relational database management system. Use MXCI to perform data manipulation operations without any programming. Use SQL (the structured query language) within MXCI to display and modify information in your database.

Using MXCI

Data Manipulation Language (DML) statements are used to access SQL/MP and SQL/MX tables. For more information about using DML statements, see the *SQL/MX Reference Manual*.

Starting MXCI

MXCI runs as an HP NonStop Kernel Open System Services (OSS) process and must be started from within the OSS environment:

1. Log on to the server by using your user ID and password.
2. To set the default directory, set the TACL `HOME` parameter to specify the location for your home directory. Note that the OSS environment is case-sensitive.

   For example, to set your home directory to `/usr/yourname`, insert this line in your TACLCSTM file:

   ```
   PARAM HOME /usr/yourname
   ```
3. Start the OSS shell by entering the `osh` command at the TACL prompt:

   ```
   >osh
   ```

   You are now in the OSS environment.
4. Start MXCI by entering the `mxci` command at the OSS prompt:

   ```
   >mxci

   /G/SYSTEM/SYSTEM: mxci
   Hewlett-Packard NonStop(TM) SQL/MX Conversational Interface
   2.0 (c) Copyright 2003 Hewlett-Packard Development Company,
   LP.
   >>
   ```

You have started an MXCI session.

Entering a Command

To enter commands at the MXCI prompt (>>), you must indicate the end of an MXCI command by typing a semicolon (;). If you press Enter without typing a semicolon, MXCI displays the command continuation prompt (+>). You can either continue the command or type a semicolon and press Enter to execute the command:

```
>>BEGIN WORK
+>;

--- SQL operation complete.
>>
```

Stopping MXCI

To end your MXCI session, type this command and press Enter:

```
>>exit;

End of MXCI Session
```

You are now back in the OSS environment.

The Sample Database

You will be accessing tables in the sample database for SQL/MX as you work through the examples in this tutorial. A table consists of rows and columns. MXCI displays rows horizontally and columns vertically. Columns have names, rows do not. Stored data is retrieved and displayed in rows and columns.

- Each row contains pieces of related data, such as the number of a part, its description, price, and the quantity available.
- Each column contains data of the same type, such as all part numbers.

Use the sample database to follow each lesson and perform the operations shown in the examples. The results of your work should be similar to the results shown in the examples.

The sample database consists of a catalog and three schemas:

SAMDBCAT	Sample database catalog.
PERSNL	Contains the EMPLOYEE, JOB, DEPT, and PROJECT tables, which are used to store personnel data.
SALES	Contains the CUSTOMER, ORDERS, ODETAIL and PARTS tables, which are used to store order data.
INVENT	Contains the SUPPLIER, PARTSUPP, and PARTLOC tables, which are used to store inventory data.

- The Quick Start examples use these tables in the sample database: PARTS Table, ORDERS Table, ODETAIL Table, EMPLOYEE Table, and DEPT Table.

PARTS Table

Part/Num	Part Description	Price	Qty/Avail
212	PC SILVER, 20 MB	2500.00	3525
244	PC GOLD, 30 MB	3000.00	4426
255	PC DIAMOND, 60 MB	4000.00	3321
2001	GRAPHIC PRINTER, M1	1100.00	2100
6500	DISK CONTROLLER	95.00	2532
6603	PRINTER CONTROLLER	45.00	430
7102	SMART MODEM, 1200	275.00	2200
7301	SMART MODEM, 2400	425.00	2332
...	...	...	...

ORDERS Table

Order/Num	Order/Date	Deliv/Date	Sales/Rep	Cust/Num
100210	2003-04-10	2003-04-10	220	1234
100250	2003-01-23	2003-06-15	220	7777
110220	2003-07-21	2003-12-15	221	5635
...	...	...	...	...

ODETAIL Table

Order/Num	Part/Num	Unit/Price	Qty/Ord
100210	244	3000.00	3
100210	2001	1100.00	3
100210	2403	620.00	6
100210	5100	150.00	10
100250	244	3500.00	4
100250	5103	400.00	10
...	...	...	...
800660	7102	275.00	6
800660	7301	425.00	12

EMPLOYEE Table

Employee/Number	First Name	Last Name	Dept/Num	Job/Code	Salary
1	ROGER	GREEN	9000	100	175500.00
23	JERRY	HOWARD	1000	100	137000.10
29	JANE	RAYMOND	3000	100	136000.00
32	THOMAS	RUDLOFF	2000	100	138000.40
39	KLAUS	SAFFERT	3200	100	75000.00
43	PAUL	WINTER	3100	100	90000.00
65	RACHEL	MCKAY	4000	100	118000.00
72	GLENN	THOMAS	3300	100	80000.00
75	TIM	WALKER	3000	300	32000.00
87	ERIC	BROWN	4100	400	89000.00
89	PETER	SMITH	3300	300	37000.40
...	...	...	...	...	...

DEPT Table

Dept/Num	Dept/Name	Mgr	Rpt/Dept	Location
1000	FINANCE	23	9000	CHICAGO
1500	PERSONNEL	213	1000	CHICAGO
2000	INVENTORY	32	9000	LOS ANGELES
2500	SHIPPING	234	2000	PHOENIX
3000	MARKETING	29	9000	NEW YORK
3100	CANADA SALES	43	3000	TORONTO
3200	GERMNY SALES	39	3000	FRANKFURT
3300	ENGLND SALES	72	3000	LONDON
3500	ASIA SALES	111	3000	HONG KONG
4000	RESEARCH	65	9000	NEW YORK
4100	PLANNING	87	4000	NEW YORK
9000	CORPORATE	1	9000	CHICAGO

For more information about the tables in the sample database, see the *SQL/MX Reference Manual*.

Installing the setmxdb Script

Note. To install the SQL/MX Release 2.0 `setmxdb` script, you must have a license for the use of SQL/MX DDL statements. To acquire the license, you must purchase product T0394. If you did not purchase T0394 and you try to install `setmxdb`, an error message informs you that the system is not licensed. If the system is not licensed, see “Using a SQL/MX Release 1.8 setmxdb Script in the SQL/MX Release 2.0 Environment” on page 1-10.

The OSS installation script, `setmxdb`, creates and populates the sample database and is provided as a `pax` file, `T0517PAX`, in the temporary OSS installation subvolume `$SYSTEM.ZOSSUTL`. The `pax` file is a multifile archive file that is created by the `pax` utility on UNIX-compatible systems. For OSS, `pax` files provide the form by which product files are distributed for installation.

If OSS has been installed and the **Manage OSS files** option has been selected, DSM/SCM automatically extracts the `setmxdb` script from the `pax` file and installs it in the `/usr/tandem/sqlmx/bin` directory.

If the files are not present in this directory, DSM/SCM might not be configured to extract the files automatically. In this case, you must extract the files manually:

1. At the TACL prompt, change to the `$SYSTEM.ZOSSUTL` subvolume:

   ```
   volume $system.zossutl
   ```

2. Use the `copyoss` command to extract the files:

   ```
   run copyoss t0517pax
   ```

3. In OSS, verify that the `setmxdb`, readme, and sample SQLJ.sqlj files were extracted to the `/usr/tandem/sqlmx/bin` directory.

For more information on the `pax` command, see the *Open System Services Shell and Utilities Reference Manual*.

Installing or Removing the Sample Database

Use the `setmxdb` script to install or remove the sample database for SQL/MX. You do not need to have super user ID privileges, but you must have permissions to create tables in the volume where you plan to put the database. Usage format and command options you can use with `setmxdb` are described below. Online help also shows the usage format and command options. To display the online help from OSS, use this command:

```
setmxdb -help
```

To install or remove the SQL/MX sample database:

1. Log on to the NonStop system where SQL/MX is installed.
2. Start the OSS shell by entering this command at the TACL prompt:

   ```
   osh
   ```

   You are now in the OSS environment. The OSS environment is case-sensitive.

3. Before you run the script, change the directory to the location of the script by entering:

   ```
   cd /usr/tandem/sqlmx/bin
   ```

4. Run the `setmxdb` script. The usage format for `setmxdb` is:

   ```
   setmxdb [ operation ...] [option ... ]
   ```

The supported operations are:

`-iall`	Installs the SQL/MX, Data Mining, and Pub/Sub sample databases. This is the default operation.
`-imx`	Installs the SQL/MX sample database.
`-idm`	Installs the Data Mining sample database.
`-ips`	Installs the Pub/Sub sample database.
`-rall`	Removes all three sample databases.
`-rmx`	Removes the SQL/MX sample database.
`-rdm`	Removes the Data Mining sample database.
`-rps`	Removes the Pub/Sub sample database.

The available options are:

`-vol <volume>`	Specifies the disk volume on which sample databases are to be created. (Note that a backslash character must precede the volume name, for example, `-vol \$MYMXDB`, so the OSS shell does not treat the name as an environment variable.) The default value for this option is the volume specified via the `=_DEFAULTS` define. (The OSS command `info_define =_DEFAULTS` may be used to view this value.)

`-part <p1> <p2>`	Specifies additional or alternate volume names on which partitioned tables in the sample database are to be created. Only one table in the SQL/MX sample database, the PARTLOC table, may be partitioned. If the `-part` option is specified, then the PARTLOC table is created with two partitions, using the volumes designated via this option. If the `-part` option is not specified, then a non-partitioned PARTLOC table is created. All tables in the Data Mining database have three partitions. The `-vol` option is used to specify the location of the first (or primary) partition, while the `-part` option is used to specify the locations of the second and third partitions. Only one table in the Pub/Sub sample database, the INBOX table, is partitioned. This table has three partitions. The `-vol` option is used to specify the location of the first (or primary) partition, while the `-part` option is used to specify the locations of the second and third partitions. The default value for each of the `-part` partitions is the volume specified via the `=_DEFAULTS` define. (The OSS command `info_define =_DEFAULTS` may be used to view this value.)
`-catalog <name>`	Specifies the catalog in which to create sample database tables. The default catalog is SAMDBCAT.
`-quiet`	Suppresses the display of results except for errors. The default behavior is for results to be displayed.
`-log <file>`	Specifies the log file to which the non-error results of running the script are written. The default value is `/dev/tty` (that is, displayed on the terminal from which the script is executed).

Extra help options:

`-v`	Prints the version and date of the script.
`-mult`	Prints advice on creating multiple sample databases.

- If you use the `-v` option, `setmxdb` displays a message with its version and date:

  ```
  Version 2.0, February 11, 2004
  ```

- To create multiple sample databases on the same system, use one of these approaches:
  - To install another copy of the sample database on another volume, rerun `setmxdb` by using the `-vol` option to specify the other volume.
  - To install another copy of the sample database on the same volume, use the `-catalog` option to provide a new catalog name. The ANSI names will be unique because the catalog name has changed.
- When you run the `setmxdb` script, a temporary text file name `mxdblog` is created and stored in the `/tmp` directory. The file shows:
  - The SQL statements that are executed to add or drop sample database objects
  - Execution results for the SQL statements
  - Status messages

  If `setmxdb` fails to run as expected, check this file for an indication of what went wrong. If the file is already present when you run `setmxdb`, `setmxdb` overwrites it. You can remove this file if you want, but do not try to remove it while the script is running.

Using a SQL/MX Release 1.8 setmxdb Script in the SQL/MX Release 2.0 Environment

If you migrated a node from SQL/MX Release 1.8 and retained a copy of the `setmxdb` installation script, as described in the *SQL/MX Installation and Management Guide*, read these considerations before running the Release 1.8 `setmxdb`.

- The SQL/MX Release 1.8 `setmxdb` script generates SQL/MP tables, while the SQL/MX Release 2.0 `setmxdb` script generates SQL/MX tables. (A sample database provided with the SQL/MP product also generates SQL/MP tables. For more information, see the *SQL/MP Reference Manual*.)
- SQL/MX Release 1.8 and SQL/MX Release 2.0 sample databases can coexist in a SQL/MX Release 2.0 environment. However, you must ensure that they use different catalogs. (The default catalog for both sample databases is SAMDBCAT.) To change the catalog:
  - Use the `-acat` option when running the SQL/MX Release 1.8 `setmxdb`.

  - Use the `-catalog` option when running the SQL/MX Release 2.0 `setmxdb`.

- Before running the SQL/MX Release 1.8 `setmxdb` in a SQL/MX Release 2.0 environment, you must create the catalog and schemas required by the script. (The default schemas are PERSNL, SALES, and INVENT.) Otherwise, the script will generate an error. Creating the catalog and schemas in advance is NOT required when running the SQL/MX Release 2.0 `setmxdb`.

  Alternately, you can run the SQL/MX Release 1.8 `setmxdb` and use the `-noansi` option. This method does not require you to create the catalog and schemas in advance, but it uses Guardian names for the tables. No SQL/MP aliases are created.

- You can run the SQL/MX Release 1.8 `setmxdb` script from any directory. For more information about running the SQL/MX Release 1.8 `setmxdb` script, see the *SQL/MX Quick Start* provided for any of these RVUs: G06.18, G06.19, G06.20, G06.21, or G06.22.

2

Selecting Information From a Table

This section provides information about how to select specific rows and columns and how to use the INVOKE command.

Working With SQL/MP Tables

SQL/MX supports DML operations on SQL/MP tables as well as SQL/MX tables. At the beginning of each new MXCI session, specify if you will use three-part logical names or Guardian physical file names to refer to SQL/MP tables. (You must use logical names to refer to SQL/MX tables.)

To use logical names, at the MXCI prompt, type:

```
SET NAMETYPE ANSI;
```

To use Guardian physical file names, at the MXCI prompt, type:

```
SET NAMETYPE NSK;
```

The `NAMETYPE` attribute value you specify with `SET NAMETYPE` remains in effect until the end of the session or until you execute another `SET NAMETYPE` statement. You can use logical names if you have created aliases using the `CREATE SQLMP ALIAS` statement.

For more information about the `SET NAMETYPE` command or the `CREATE SQLMP ALIAS` statement, see the *SQL/MX Reference Manual.*

Selecting All the Data From a Table

The simplest operation you can perform is to retrieve all the data from a single table. Typically, it is not practical to display all rows in a table. However, the number of rows in the sample database is small.

Example

To retrieve information from tables, use the SELECT statement. Enter this SELECT statement to display all rows and columns in the PARTS table:

```
SELECT * FROM PARTS;
```

Some selected rows are:

```
Part/Num  Part Description        Price         Qty/Avail
--------  ----------------       ------------  ----------
    186   186 MegaByte Disk         186186.86         186
    212   PC SILVER, 20 MB            2500.00        3525
    244   PC GOLD, 30 MB              3000.00        4426
    ...   ...                          ...            ...
```

Tip

- Using SELECT * is a short way of specifying all the columns in a table.
- The result of SET SCHEMA stays in effect until the end of your session or until you execute another SET SCHEMA.
- The FROM clause is always required in the SELECT statement.

Displaying Selected Columns.

You can display a specific set of columns and rows of data by providing additional information in the SELECT statement. Select columns by specifying the column names.

Example

Display only the part number and quantity available in the PARTS table:

```
SELECT PARTNUM, QTY_AVAILABLE FROM PARTS;
```

Some selected rows are:

```
Part/Num   Qty/Avail
--------   -----------
     186           186
     212          3525
     244          4426
     ...           ...
```

Tip

You can list column names in any order, but they must follow the keyword SELECT and precede the keyword FROM. The columns appear in the order you specify.

Displaying Selected Rows

In a typical query, you retrieve selected rows that satisfy some criteria. To select particular rows of data, specify the condition for selecting the data in a WHERE clause.

Example

Display the parts where the quantity available is less than 500:

```
SELECT PARTNUM, PARTDESC, QTY_AVAILABLE FROM PARTS
WHERE QTY_AVAILABLE < 500;
```

The selected rows are:

```
Part/Num  Part Description    Qty/Avail
--------  ------------------  -----------
     186  186 Megabyte Disk           186
```

```
    6603  PRINTER CONTROLLER          430

--- 2 row(s) selected.Example
```

Display the parts where part description is ”PRINTER CONTROLLER”:

```
SELECT PARTNUM, QTY_AVAILABLE FROM PARTS
WHERE PARTDESC = 'PRINTER CONTROLLER';
```

The selected row is:

```
Part/Num          Qty/Avail
--------          -----------
    6603                  430

--- 1 row(s) selected.
```

Tip

- To continue a long statement or command on the next line, press Enter. MXCI displays a continuation prompt (+>), and you can continue your statement. To end the statement, use the semicolon:

  ```
  >>SELECT PARTNUM, PARTDESC, QTY_AVAILABLE FROM PARTS
  +>WHERE QTY_AVAILABLE < 500;
  ```

- If a column contains text (character data), enclose its value in single quotes and enter the value to match the value that is stored. You can omit spaces at the end of a value.

- Remember that OSS is case-sensitive. If you are not sure whether a value in the table appears in uppercase or lowercase letters, use the UPSHIFT function to convert lowercase letters in the part description to uppercase before making the comparison:

  ```
  SELECT PARTNUM, QTY_AVAILABLE FROM PARTS
  WHERE UPSHIFT (PARTDESC) = 'PRINTER CONTROLLER';
  ```

- You can specify any column of the FROM table in the WHERE condition. The column does not have to be in the select list. For example, you can display only PARTNUM but use PARTDESC in the condition that selects rows

Displaying Calculated Values

You can calculate values to be displayed by including arithmetic expressions that operate on values from individual rows. You can perform arithmetic on any type of numeric value but not on character values.

Example

Using the data in the ODETAIL table, calculate the total price for the number of units of each part in an order. Select parts from order number 100210:

```
SELECT ORDERNUM, PARTNUM, QTY_ORDERED*UNIT_PRICE
FROM ODETAIL
WHERE ORDERNUM = 100210;
```

The selected rows are:

```
Order/Num   Part/Num     (EXPR)
----------  --------     ---------------------
    100210       244                10500.00
    100210      2001                 3300.00
    100210      2403                 3720.00
    100210      5100                 1500.00

--- 4 row(s) selected.
```

Tip

- If an item in the select list is an expression, the heading of the column is (EXPR). You can customize the name of the column in the select list by using the AS clause:

  ```
  QTY_ORDERED * UNIT_PRICE AS TOTAL_PRICE
  ```

  If you use this AS clause, TOTAL_PRICE is the heading for the calculated value instead of (EXPR).

- You can use these arithmetic operators in expressions:

+	Addition
–	Subtraction
*	Multiplication
/	Division
**	Exponentiation

- You can use parentheses to clarify the meaning of an expression:

  ```
  QTY_ORDERED * (UNIT_PRICE + 1.5)
  ```

- You can also use an expression as part of a condition in a WHERE clause:

  ```
  WHERE (QTY_ORDERED * UNIT_PRICE) < 2000
  ```

Displaying Descriptions of Columns

To determine the names of the columns in a table, the types of data, and the maximum number of characters allowed, use the INVOKE command. The INVOKE command displays the definition of the columns.

Example

Display the column definitions of the PARTS table:

```
INVOKE PARTS;
```

The displayed column definitions are:

```
-- Definition of table SAMDBCAT.SALES.PARTS
-- Definition current  Thu Jul 10 15:03:29 2003
   (
    PARTNUM        NUMERIC(4, 0) UNSIGNED NO DEFAULT
      HEADING 'Part/Num' NOT NULL NOT DROPPABLE
  , PARTDESC       CHAR(18) CHARACTER SET ISO88591 COLLATE
      DEFAULT NO DEFAULT
      HEADING 'Part Description' NOT NULL NOT DROPPABLE
  , PRICE          NUMERIC(8, 2) NO DEFAULT
      HEADING 'Price' NOT NULL NOT DROPPABLE
  , QTY_AVAILABLE  NUMERIC(5, 0) DEFAULT 0
      HEADING 'Qty/Avail' NOT NULL NOT DROPPABLE
   )
```

Tip

- The PARTDESC column contains character data. The maximum number of characters you can enter in the column is 18. You must enclose the characters in single quotation marks.
- The columns other than PARTDESC contain numeric data. PARTNUM can contain at most 4 digits and cannot have a plus or minus sign. PRICE can contain at most 8 digits, including 2 digits to the right of the decimal point. QTY_AVAILABLE can contain at most 5 digits.
- NO DEFAULT means an INSERT statement must specify a value for the column. DEFAULT 0 means that an INSERT statement can omit a value for the column because the system will assign the 0 (zero) as the default value.
- All of the columns have been defined with NOT NULL, which means that the columns cannot accept null values at any time. For a description of the INSERT statement, see Inserting a Row Into a Table on page 6-1.

Selecting Distinct Rows

In some cases, a value in the select list appears more than once in your result. For example, a sales representative typically has several orders in the ORDERS table. The keyword DISTINCT eliminates duplicates from your result.

Example

Determine which sales representatives have orders in the ORDERS table and display each identification number only once:

```
SELECT DISTINCT SALESREP FROM ORDERS;
```

The selected rows are:

```
SALESREP
--------
     220
     221
     222
     223
     226
     227
     229
     231
     568

--- 9 row(s) selected.
```

Displaying Information in an Ordered Sequence

To display the selected rows in a sorted order, include the ORDER BY clause in the SELECT statement. You can specify more than one column to determine the sequence of the rows.

Example

Display customer numbers, order numbers, and delivery dates arranged in ascending order by customer number. Select only orders of sales representatives identified by numbers less than 300:

```
SELECT CUSTNUM, ORDERNUM, DELIV_DATE
FROM ORDERS
WHERE SALESREP < 300
ORDER BY CUSTNUM;
```

Some selected rows are:

```
Cust/Num  ORDERNUM    DELIV_DATE
--------  ----------  ----------
      30      200378  2003-08-22
     111      200562  2003-10-12
     131      300756  2003-12-20
     156      700694  2004-01-14
     ...         ...         ...
    7562      100171  2004-02-03

--- 12 row(s) selected.
```

Example

Display customer numbers, order numbers, and delivery dates arranged in ascending order by customer number. Each customer's orders are also arranged in ascending order by the delivery date:

```
SELECT CUSTNUM, ORDERNUM, DELIV_DATE
FROM ORDERS
WHERE SALESREP < 300
ORDER BY CUSTNUM, DELIV_DATE;
```

Some selected rows are:

```
Cust/Num  ORDERNUM    DELIV_DATE
--------  ----------  ----------
      21      200320  2003-11-20
     123      300380  2003-12-12
     123      200490  2004-01-04
     143      700510  2004-01-12
     ...         ...         ...
    7777      100250  2004-02-02

--- 12 row(s) selected.
```

Tip

You can also arrange values in descending order by including the keyword DESC after the name of one or more columns:

```
ORDER BY CUSTNUM DESC, DELIV_DATE DESC;
```

3

Stating Conditions for Selecting Data

This section provides information about how to use predicates in a WHERE clause.

Using Predicates to Select Data

In some of the previous examples, one value is compared to another value by using a comparison operator: for example, the equal sign (=). A comparison operator is one type of SQL predicate.

Examples that illustrate predicates are:

Predicate	Example	Meaning
=	PARTNUM = 4130	Part number equal to 4130
<	ORDERNUM < 200000	Order number less than 200,000
<=	QTY_AVAILABLE <= 5	Quantity available less than or equal to 5
>	DELIV_DATE > DATE '2003-12-31'	Delivery date later than 2003-12-31
>=	ORDER_DATE >= DATE '2003-01-01'	Order date later than or equal to 2003-01-01
<>	PARTNUM <> 4130	Part number not equal to 4130
IS NULL	PARTDESC IS NULL	Part description is null
IS NOT NULL	PARTDESC IS NOT NULL	Part description is not null
BETWEEN	PARTNUM BETWEEN 3000 AND 4000	Part number is between 3000 and 4000 and includes 3000 and 4000
IN	PARTNUM IN (4130, 6603, 212)	Part number is one of 4130, 6603, or 212
LIKE	PARTDESC LIKE '%PRINTER%'	Part description has the text string PRINTER

Using the LIKE Predicate

Sometimes you want to select data that you are not able to specify completely. For example, suppose you want to know something about a particular printer, but you cannot remember the exact description of the printer.

Example

You do not know the exact name for a printer, but need to find its part number:

```
SELECT PARTNUM, PARTDESC
FROM PARTS
WHERE PARTDESC LIKE '%PRINTER%'
ORDER BY PARTNUM;
```

The selected rows are:

```
PARTNUM  PARTDESC
-------  ------------------
   2001  GRAPHIC PRINTER,M1
   2002  GRAPHIC PRINTER,M2
   2003  GRAPHIC PRINTER,M3
   2402  LASER PRINTER, T1
   2403  LASER PRINTER, T2
   2405  LASER PRINTER, T3
   3103  LASER PRINTER, X1
   6603  PRINTER CONTROLLER

--- 8 row(s) selected.
```

Tip

- A percent sign (%) indicates zero or more characters are acceptable. An underscore (_) indicates any single character is acceptable. For example, '_RINTER' locates 'PRINTER' but not 'LINE PRINTER CONT.' The special characters % and _ are called wild-card characters.
- If you are not sure whether a value appears in uppercase or lowercase letters, use the UPSHIFT function to convert lowercase letters in the part description to uppercase before making the comparison:

  ```
  SELECT PARTNUM, PARTDESC
  FROM PARTS
  WHERE UPSHIFT(PARTDESC) LIKE '%PRINTER%';
  ```

  If it exists in the database, this row is selected:

  ```
  8672  Laser printer
  ```

Specifying More Than One Condition

You can use the logical operators AND and OR to connect two conditions. Notice that the AND operator is more restrictive because both conditions must be true. The OR operator requires that only one condition be true.

Operator	Example	Meaning
AND	PARTDESC LIKE '%PRINTER%' AND PRICE < 500	If values in a row satisfy both of the conditions, the row appears in the result.
OR	PARTNUM < 3000 OR PARTNUM = 7102	If values in a row satisfy either of the conditions, the row appears in the result.

Using AND or OR

Suppose you want to specify more than one condition in the WHERE clause. For example, you might want to limit the selection of rows, depending on conditions, for two or more columns.

Example

Display rows satisfying two conditions. The part description is a printer, and the price is less than $500:

```
SELECT PARTNUM, PARTDESC, PRICE
FROM PARTS
WHERE PARTDESC LIKE '%PRINTER%' AND PRICE < 500;
```

The selected rows are:

```
PARTNUM  PARTDESC            PRICE
-------  ------------------  ------------
   2402  LASER PRINTER,T1          350.00
   6603  PRINTER CONTROLLER         45.00

--- 2 row(s) selected.
```

Example

Display rows where the part description is either a laser printer or a graphic printer, and the price is less than 4500:

```
SELECT PARTNUM, PARTDESC, PRICE
FROM PARTS
WHERE (PARTDESC LIKE '%LASER%'
OR PARTDESC LIKE '%GRAPHIC P%')
AND PRICE < 4500;
```

The selected rows are:

```
PARTNUM  PARTDESC            PRICE
-------  ------------------  ------------
   2001  GRAPHIC PRINTER,M1       1100.00
   2002  GRAPHIC PRINTER,M2       1500.00
   2003  GRAPHIC PRINTER,M3       2000.00
   3103  LASER PRINTER, X1        4200.00

--- 4 row(s) selected.
```

Tip

You can combine any number of conditions with AND and OR to express conditions. The sequence of evaluation is AND before OR unless you specify otherwise by using parentheses. To ensure a row is first compared to two conditions connected by OR, you must enclose the OR conditions in parentheses.

Specifying What Not to Select

Sometimes it is easier to specify what information you do not want.

Example

Display quantity available of all parts except parts numbered between 3000 and 5999:

```
SELECT PARTNUM, QTY_AVAILABLE
FROM PARTS
WHERE PARTNUM NOT BETWEEN 3000 AND 5999;
```

Some of the selected rows are:

```
PARTNUM  QTY_AVAILABLE
-------  -------------
    186           186
    212          3525
    244          4426
    ...           ...
   2405          2712
   6201          2306
    ...           ...
   7301          2332

--- 18 row(s) selected.
```

Tip

- If you want NOT to apply to an entire search condition, you must enclose the condition in parentheses:

  ```
  WHERE NOT(PARTNUM BETWEEN 3000 AND 5999 OR PARTNUM = 2001)
  ```

Rows with part numbers between 3000 and 5999 and the row with part number 2001 are not selected. In this example, AND is part of the BETWEEN predicate. It does not connect two search conditions.

- You can specify NOT BETWEEN, NOT IN, and NOT LIKE, but you cannot specify NOT with a comparison operator. For example, you must use <> to indicate not equal.

4

Displaying Information About Groups of Rows

This section provides information about aggregate functions and how to group rows.

Selecting Values by Using Aggregate Functions

In addition to displaying information from each row that satisfies conditions in a WHERE clause, you can combine a group of rows that have like values in the same column by using an aggregate function and displaying one row of information about the group.

Examples that illustrate aggregate functions are:

Aggregate Function	Example	Meaning
AVG	AVG(SALARY)	Average of salaries
COUNT	COUNT(DISTINCT CUSTNUM)	Number of distinct customers
COUNT(*)	COUNT(*)	Number of rows in a group
MAX	MAX(ORDER_DATE)	Latest order date
MIN	MIN(DELIV_DATE)	Earliest delivery date
SUM	SUM(QTY_ORDERED*UNIT_PRICE)	Total of quantity ordered times the unit price

Grouping and Ordering Rows

Sometimes you want to display information about ordered groups of rows. For example, you might want to display group information ordered by the result of an aggregate function.

Example

Determine the earliest delivery date of all orders from the same customer. Order the selected rows by that delivery date:

```
SELECT MIN(DELIV_DATE), CUSTNUM
FROM ORDERS
GROUP BY CUSTNUM
ORDER BY 1;
```

Some of the selected rows are:

```
(EXPR)       Cust/Num
-----------  --------
 2003-04-10      1234
 2003-06-15      7777
 2003-07-01       926
        ...       ...
 2003-12-15      5635

--- 12 row(s) selected.
```

Tip

- If an item in the select list is an expression, such as a function, the heading of the column is (EXPR). If you want to arrange the rows of a report by the value of an expression in the select list, you must refer to the expression as a number that indicates where the expression appears in the list. In this example, ORDER BY 1 refers to MIN(DELIV_DATE).
- When you group rows, each item you display must be either a column of the GROUP BY clause (a grouping column) or a result from a function applied to a column. In this example, CUSTNUM is the grouping column, and MIN is the function applied to a nongrouping column.

Example

Find the earliest delivery date for the complete set of customers. If you do not specify a GROUP BY clause, all rows belong to the same group (the entire table). In this case, you must also omit CUSTNUM from the select list because there is no single customer for the entire table:

```
SELECT MIN(DELIV_DATE)
FROM ORDERS;
```

The selected value is:

```
(EXPR)
-----------
 2003-01-10

--- 1 row(s) selected.
```

Example

Find out more about the order or orders with the earliest delivery date:

```
SELECT * FROM ORDERS
WHERE DELIV_DATE = DATE '2003-04-10';
```

```
The selected value is:

Order/Num    Order/Date   Deliv/Date   Sales/Rep  Cust/Num
----------   ----------   ----------   --------   --------
    100210   2003-04-10   2004-04-10        220       1234

--- 1 row(s) selected.
```

Counting Rows

Use the COUNT(*) function to count the rows in a group. Use the COUNT function with a selected column to count the values of that column in a group.

Example

Count the number of orders for each sales representative. Use COUNT(*) to specify that you want to count the number of rows in each group:

```
SELECT SALESREP, COUNT(*)
FROM ORDERS
GROUP BY SALESREP
ORDER BY SALESREP;
```

Some of the selected rows are:

```
Sales/Rep  (EXPR)
---------  ------------------
     220                   3
     ...                 ...
     226                   3
     ...                 ...
     568                   1

--- 9 row(s) selected.
```

Example

Count the number of customers who have one or more orders placed with each sales representative:

```
SELECT SALESREP, COUNT(DISTINCT CUSTNUM)
FROM ORDERS
GROUP BY SALESREP
ORDER BY 2 DESC;
```

Some of the selected rows are:

```
Sales/Rep  (EXPR)
---------  ------------------
     220                   3
     ...                 ...
     226                   2
     ...                 ...
     568                   1

--- 9 row(s) selected.
```

Tip

The keyword DISTINCT causes each unique customer number for a particular sales representative to be counted only once. Sales representative 226 has three orders, but two of the orders are from the same customer.

Computing Averages for Groups

For some queries, you might want to get information about one or two specific groups. The next example uses the ODETAIL table to illustrate this technique.

Example

Display part numbers for which the average quantity ordered is greater than 100. Specify the conditions for selecting the groups in the HAVING clause:

```
SELECT PARTNUM, AVG(QTY_ORDERED)
FROM ODETAIL
GROUP BY PARTNUM
HAVING AVG(QTY_ORDERED) > 100;
```

The selected row is:

```
Part/Num  (EXPR)
--------  ---------------
    4102              130

--- 1 row(s) selected.
```

Tip

A HAVING clause is similar to a WHERE clause, but the HAVING clause is applied to the result of the GROUP BY clause. A column that you specify in a condition of the HAVING clause is typically a grouping column.

To include a column that is not a grouping column, use the column as an argument of an aggregate function. In the preceding example, QTY_ORDERED is not a grouping column, but you can include it in the HAVING clause because it is the argument of the AVG function.

5

Selecting Data From More Than One Table

This section provides information about how to join tables and use correlation names.

Joining Tables

Some queries require information from more than one table. You can select data from two or more tables by effectively joining the tables. For example, the PARTS and ODETAIL tables contain related data. Each table has a PARTNUM column.

PARTS Table

For part 5100, the PARTS table has this row,

```
PARTNUM   PARTDESC                PRICE       QTY_AVAILABLE
-------   --------------------   ---------   -------------
   5100   MONITOR BW, TYPE 1        150.00            3237
```

ODETAIL Table

For part 5100, the ODETAIL table has these rows,

```
ORDERNUM   PARTNUM   UNIT_PRICE   QTY_ORDERED
--------   -------   ----------   -----------
 100210        5100      150.00            10
 300350        5100      150.00            12
 600480        5100      135.00            60
 800660        5100      150.00             5
```

Joined Tables

The PARTS table contains only one row with PARTNUM 5100. This row can be combined with each of the four rows in the ODETAIL table with PARTNUM 5100 to produce this joined table:

```
PARTNUM DESC PRICE QTY_AVAIL | ... PARTNUM UNIT_PRICE QTY_ORD
   5100 ...    ...      3237   ...    5100        ...      10
   5100 ...    ...      3237   ...    5100        ...       5
   5100 ...    ...      3237   ...    5100        ...      60
   5100 ...    ...      3237   ...    5100        ...      12
   ...  ...    ...       ...   ...     ...        ...     ...
```

The PARTS table contains the number of units of each part that are available. The ODETAIL table contains the number of units ordered for each part.

Qualifying Ambiguous Column Names

Because the PARTNUM column has the same name in both the PARTS and ODETAIL tables, always qualify PARTNUM with a table name or a correlation name. For example, PARTS.PARTNUM uses the table name.

Example

Compare the quantity available of part number 5100 with the quantity ordered. Specify in the WHERE clause that you want rows from the PARTS table joined to rows in the ODETAIL table that have the same part number value in the PARTNUM column:

```
SELECT PARTS.PARTNUM, QTY_AVAILABLE, QTY_ORDERED
FROM PARTS, ODETAIL
WHERE PARTS.PARTNUM = ODETAIL.PARTNUM
  AND PARTS.PARTNUM = 5100;
```

The selected rows are:

```
Part/Num  Qty/Avail     Qty/Ord
--------  ------------  -----------
   5100           3237           10
   5100           3237            5
   5100           3237           60
   5100           3237           12

--- 4 row(s) selected.
```

Tip

Only rows with PARTNUM 5100 are joined. The PARTS table contains only one row with PARTNUM 5100. This row is combined with each of the four rows in the ODETAIL table. The PARTNUM and QTY_AVAILABLE information is the same. You can improve this SELECT statement by using a GROUP BY clause and the SUM function.

Using Correlation Names

You can define explicit correlation names for the PARTS and ODETAIL tables. For example, use the letter P for PARTS and the letter O for ODETAIL. Using correlation names shortens the length of the text you type.

Example

Compute the sum of the quantity ordered for each part number in the PARTS table. Group by the columns in the PARTS table:

```
SELECT P.PARTNUM, QTY_AVAILABLE, SUM(QTY_ORDERED)
FROM PARTS P, ODETAIL O
WHERE P.PARTNUM = O.PARTNUM
GROUP BY P.PARTNUM, QTY_AVAILABLE;
```

Some of the selected rows are:

```
Part/Num  Qty/Avail     (EXPR)
--------  ------------  --------------------
    244           4426                    47
   2001           2100                   155
   2403           3312                    64
   5100           3237                    87
    ...            ...                   ...

--- 27 row(s) selected.
```

Tip

Each group consists of rows with equal values for both part number and quantity available.

Example

As a sales representative, you can verify the unit price you charged a particular customer for a particular part by combining data from the ORDERS and ODETAIL tables. These tables both contain an ORDERNUM column:

```
SELECT CUSTNUM, PARTNUM, UNIT_PRICE
FROM ORDERS ORD, ODETAIL ODE
WHERE ORD.ORDERNUM = ODE.ORDERNUM
  AND CUSTNUM = 5635 AND PARTNUM = 5103;
```

The selected row is:

```
Cust/Num  Part/Num  Unit/Price
--------  --------  ------------
    5635      5103        400.00

--- 1 row(s) selected.
```

6
Changing Information in a Table

This section provides information about how to insert, update, and delete table rows.

Inserting a Row Into a Table

To insert rows in a table, use the INSERT statement.

Example

In the PARTS table, insert a row that describes a data modem with part number 9999:

```
INSERT INTO PARTS (PARTNUM, PARTDESC, PRICE)
  VALUES (9999, 'DATA MODEM', 200.00);

--- 1 row(s) inserted.
```

Tip

The definition of the PARTS table specifies a default value of zero for the QTY_AVAILABLE column. If you do not know the quantity available when you insert the row, you do not have to provide a value for that column. SQL/MX provides a value of zero.

Example

Insert another row into PARTS. This time supply the quantity available:

```
INSERT INTO PARTS
  VALUES (9998, '300 BD DATA MODEM', 120.00, 3);

--- 1 row(s) inserted.
```

Tip

Because you are supplying a value for each column, you can omit the list of column names. In this form of the INSERT statement, you must specify the values in the order in which a SELECT * statement or an INVOKE command would display them.

Updating an Existing Row

To change values in one or more columns and one or more rows, use the UPDATE statement.

Example

In the PARTS table, you have inserted a row that describes a data modem with part number 9999. Suppose you determine that the quantity available of part number 9999 is 12 units. You also want to enter a more specific description of the data modem:

```
UPDATE PARTS
SET PARTDESC = '1200 BD DATA MODEM', QTY_AVAILABLE = 12
WHERE PARTNUM = 9999;

--- 1 row(s) updated.
```

Example

If you want to update all rows, omit the WHERE clause. Double the price of every part:

```
UPDATE PARTS SET PRICE = PRICE * 2;

--- 31 row(s) updated.
```

Example

If you actually changed your sample database by executing the previous UPDATE statement, execute this statement to return the PRICE column to its previous values:

```
UPDATE PARTS SET PRICE = PRICE * .5;

--- 31 row(s) updated.
```

Tip

- The value you specify for a column of the SET list can be an expression, but the expression cannot include any aggregate functions, such as AVG. The expression can refer to any column in the row you are updating.
- A table can have a primary key consisting of one or more columns that uniquely identify each row in the table. You cannot update the value of a column that is part of the primary key. Instead, you must delete the row with the old primary key and then insert the row with the new primary key.

Deleting Rows From a Table

The DELETE statement deletes entire rows from a table.

Example

Delete the two rows that you inserted in the previous examples. First, display the rows with part numbers 9998 and 9999:

```
SELECT * FROM PARTS
 WHERE PARTNUM IN (9998, 9999);

Part/Num  Part/Desc           Price         Qty/Avail
--------  ------------------  ------------  -----------
    9998  300 BD DATA MODEM         120.00            3
    9999  1200 BD DATA MODEM        200.00           12

--- 2 row(s) selected.
```

Then, using the same WHERE clause, enter:

```
DELETE FROM PARTS
WHERE PARTNUM IN (9998, 9999);

--- 2 row(s) deleted.
```

Tip

The WHERE clause specifies the conditions for selecting a row to be deleted. If you omit the WHERE clause, all rows of the table are deleted. To ensure you are deleting the correct rows, first display the rows with the WHERE condition you plan to use.

7

Using the Same SELECT Statement Repeatedly

This section provides information about how to prepare and execute statements and use parameter values.

Preparing to Execute a Statement Repeatedly

You can prepare a statement (assigning a name to it) and execute it repeatedly during your MXCI session. When you end your session, however, the prepared statement is no longer available.

Prepared statements are most useful if they contain parameters. A parameter is a name preceded by a question mark. You provide values for these parameters before you execute the statement by using the SET PARAM command.

Example

Suppose you have a stack of handwritten orders, and you want to verify that the information about certain parts is correct in the database. In this example, the statement is prepared and assigned the name `CKO`. The parameters are `?order` and `?part`:

```
PREPARE CKO FROM
SELECT * FROM ODETAIL
WHERE ORDERNUM = ?order AND PARTNUM = ?part;

--- SQL command prepared.
```

Providing the Parameter Values

You have prepared the statement `CKO` for execution. The parameters are `?order` and `?part`. You must provide the values for the parameters before execution.

Example

The first order on the stack is number 200300, and you want to know if the unit price is correct for part number 2002:

```
SET PARAM ?order 200300;
SET PARAM ?part 2002;

EXECUTE CKO;
```

The output of the EXECUTE statement is:

```
Order/Num    Part/Num  Unit/Price    Qty/Ord
---------    --------  ------------  ---------
   200300        2002       1400.00         10

--- 1 row(s) selected.
```

Tip

- Statement names and parameter names are not case-sensitive.
- The prepared statement CKO can be executed repeatedly within your MXCI session. To execute this statement with different values, use SET PARAM with different values before statement execution.

8 Protecting Database Integrity

This section provides information about how to begin and end a transaction.

Starting a Transaction

SQL/MX enables you to define the beginning of a transaction. A transaction can consist of multiple SQL statements. You must end your transaction either by rolling back or by committing the changes you have made.

Example

Define the beginning of a transaction:

```
BEGIN WORK;

--- SQL operation complete.
```

Example

Enter the statements that perform the transaction. For example, double the price of all parts with a current price less than $2000:

```
UPDATE PARTS
SET PRICE = PRICE * 2
WHERE PRICE < 2000;

--- 23 row(s) updated.
```

Tip

Defining transactions is advisable when you are performing several related operations. For example, suppose you are inserting data about an order in both the ORDER and ODETAIL tables. You must use several INSERT statements to enter all of the information.

To ensure that either all of the data is successfully inserted into the tables or none of the data is inserted, enter BEGIN WORK before the first INSERT statement. After you successfully insert all of the rows, enter the COMMIT WORK statement. If you encounter a problem, enter the ROLLBACK WORK statement.

Ending a Transaction

If a problem occurs during the transaction, you can roll back, or undo, the transaction to cancel the changes you have made up to that point. If no problems occur, you can commit the changes to the database.

Example

Suppose you realize that you did not want prices between $1000 and $2000 doubled. You can roll back all changes made since you entered BEGIN WORK by entering the ROLLBACK WORK statement:

```
ROLLBACK WORK;

--- SQL operation complete.
```

The database values are the same as they were before you entered the UPDATE statement.

Example

Now you can start another transaction and enter the correct version of the UPDATE statement. When you know the changes are correct, enter the COMMIT WORK statement to complete the transaction:

```
COMMIT WORK;

--- SQL operation complete.
```

Tip

- By default, SQL/MX automatically defines a transaction for SELECT, DELETE, UPDATE, and INSERT statements that you enter. This default protects the database if system failure or some other system problem occurs. If no problems occur, SQL/MX commits the changes to the database, and you cannot roll back the changes.
- Only audited tables are protected by transactions. By default, tables are audited, and you can protect your transactions on tables by using BEGIN WORK, COMMIT WORK, and ROLLBACK WORK.

9 Creating Database Objects

This section provides information about how to create and drop objects in your database.

Database objects are created by issuing the Data Definition Language (DDL) statements of SQL/MX. For more information on DDL statements, see the *SQL/MX Reference Manual*.

Starting MXCI

You can create database objects by using MXCI, the SQL/MX conversational interface. MXCI runs as an OSS process and must be started from within the OSS environment.

1. Log on to the server by using your user ID and password.
2. Start the OSS shell by entering the `osh` command at the TACL prompt.
3. Start MXCI by entering the `mxci` command at the TACL prompt:

```
>mxci

/G/SYSTEM/SYSTEM: mxci
Hewlett-Packard NonStop(TM) SQL/MX Conversational Interface
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LP.

>>
```

You have started an MXCI session.

Creating a Catalog

Before you can create an SQL/MX table, you must first create a catalog and a schema in which to store the definition of the table.

Example

Create a catalog named MYCAT on the current node and volume. At the MXCI prompt, enter:

```
CREATE CATALOG MYCAT;
--- SQL operation complete.

SET CATALOG MYCAT;
--- SQL operation complete.

CREATE SCHEMA MYSCH;
--- SQL operation complete.

SET SCHEMA MYSCH;
--- SQL operation complete.
```

Creating a Table

The minimum amount of information you must supply when creating a table includes:

- A table name
- The name and data type of each column
- The name of the catalog and schema that will contain the table definition

Example

Suppose you want to create a table to organize attendees of a conference into teams. The table contains four columns. To create this table in the catalog MYCAT, enter:

```
CREATE TABLE MYCAT.MYSCH.MYTABLE
(EMPNUM      NUMERIC (4)    UNSIGNED NO DEFAULT NOT NULL,
 FIRST_NAME  CHARACTER (15) NO DEFAULT NOT NULL,
 LAST_NAME   CHARACTER (20) NO DEFAULT NOT NULL,
 TEAMNUM     NUMERIC (4)    UNSIGNED NO DEFAULT NOT NULL,
 PRIMARY KEY (EMPNUM, TEAMNUM));


--- SQL operation complete.
```

Tip

- The table is created on the current default volume and subvolume. The table contains no data, you insert data into the table as a separate operation.
- The previous example uses the fully qualified table name with the catalog MYCAT and the schema MYSCH preceding the table name. The SET CATALOG sets the default logical catalog, and the SET SCHEMA statement sets the default logical schema. The default catalog and schema you specify remain in effect until the end of the session or until you execute another SET CATALOG or SCHEMA statement.

Creating a View

A view provides an alternate way of looking at data in one or more tables. A view does not store the data separately but retrieves it from the underlying tables. You must have SELECT privileges on the underlying tables

Create a view and then select data from the view by using a SELECT statement:

Example

Suppose you often want to know the names of department managers. You can create a view that includes this information. At the MXCI prompt, enter:

```
CREATE VIEW MYCAT.MYSCH.MGRLIST
  (FIRST_NAME, LAST_NAME, DEPTNAME)
   AS SELECT FIRST_NAME, LAST_NAME, DEPTNAME
      FROM MYCAT.PERSNL.EMPLOYEE, MYCAT.PERSNL.DEPT
      WHERE EMPLOYEE.EMPNUM = DEPT.MANAGER;


---SQL operation complete.
```

Now you can select from the view you created. At the MXCI prompt, enter:

```
SELECT FIRST_NAME, LAST_NAME FROM MGRLIST
WHERE DEPTNAME='PERSONNEL';
```

The selected row is:

```
FIRST_NAME       LAST_NAME
---------------  --------------------
ROBERT               WHITE

--- 1 row(s) selected.
```

Tip

- To define a view, specify a SELECT statement after the beginning CREATE VIEW MYVIEW AS. This SELECT statement is part of the definition. At any time, the view consists of the rows that would result if the SELECT statement were executed.
- This SELECT statement selects data from more than one table. The predicate EMPLOYEE.EMPNUM = DEPT.MANAGER joins the EMPLOYEE table and the DEPT table.

Dropping Objects

You might want to delete the objects you have created.

Example

To delete the view, at the MXCI prompt, enter:

```
DROP VIEW MYCAT.MYSCH.MYVIEW;
```

Example

To delete the table, at the MXCI prompt, enter:

```
DROP TABLE MYCAT.MYSCH.MYTABLE;
```

Example

To delete the schema, at the MXCI prompt, enter:

```
DROP SCHEMA MYCAT.MYSCH;
```

Example

To delete the catalog you have created, at the MXCI prompt, enter:

```
DROP CATALOG MYCAT;
```

Tip

- To drop a catalog, you must first drop all schemas in that catalog.
- To drop a schema, you must first drop all tables in that schema.
- To make sure you are dropping the correct view or table, use its fully qualified name, as shown in the previous examples.

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