ALTIBASE® HDB™ Tools & Utilities

# iSQL User's Manual

Release 6.3.1

April 17, 2015

ALTIBASE HDB Tools & Utilities iSQL User’s Manual
Release 6.3.1

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# Contents

# Preface

# About This Manual

This manual describes how to use `iSQL` to access a database.

## Intended Audience

The following ALTIBASE HDB users will find this manual useful:

- Database administrators
- Performance managers
- Database administrators
- Application developers
- Technical support workers

It is recommended that those reading this manual possess the following background knowledge:

- Basic knowledge in the use of computers, operating systems, and operating system utilities.
- Experience in using relational databases and an understanding of database concepts.
- Computer programming experience.
- Experience in database server, operating system or network administration.

## Software Environment

This manual has been prepared assuming that ALTIBASE HDB 6 is used as the database server.

## Organization

This manual is organized as follows:

- Chapter1: Using iSQL

  This chapter presents an overview of `iSQL` and explains the commands and how to use `iSQL`.

- Chapter2: Examples of iSQL in Use

  This chapter provides in-depth examples of each of the commands provided with `iSQL`.

## Documentation Conventions

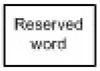
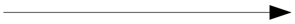
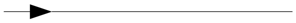
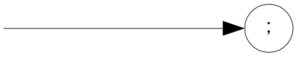
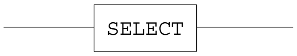
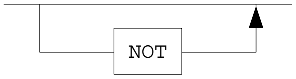
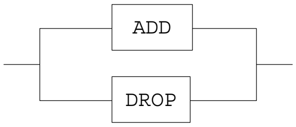
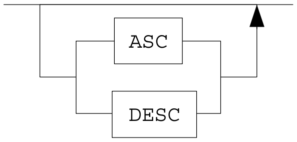
This section describes the conventions used in this manual. Understanding these conventions will make it easier to find information in this manual and other manuals in the series.

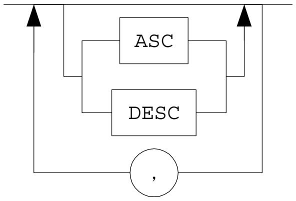
There are two sets of conventions:

- Syntax diagrams
- Sample code conventions

## Syntax Diagrams

This manual describes command syntax using diagrams composed of the following elements:

| Element | Meaning |
|---|---|
|  | The start of a command. If a syntactic element starts with an arrow, it is not a complete command. |
|  | The command continues to the next line. If a syntactic element ends with this symbol, it is not a complete command. |
|  | The command continues from the previous line. If a syntactic element starts with this symbol, it is not a complete command. |
|  | The end of a statement. |
|  | Indicates a mandatory element. |
|  | Indicates an optional element. |
|  | Indicates a mandatory element comprised of options. One, and only one, option must be specified. |
|  | Indicates an optional element comprised of options. |

| Element | Meaning |
|---|---|
|  | Indicates an optional element in which multiple elements may be specified. A comma must precede all but the first option. |

## Sample Code Conventions

The code examples explain SQL, stored procedures, `iSQL`, and other command line statements.

The following table describes the printing conventions used in the code examples.

| Rule | Meaning | Example |
|---|---|---|
| [ ] | Indicates an optional item. | `VARCHAR [(size)] [[FIXED \|] VARIABLE]` |
| { } | Indicates a mandatory field for which one or more items must be selected. | `{ ENABLE \| DISABLE \| COMPILE }` |
| \| | A delimiter between optional or mandatory arguments. | `{ ENABLE \| DISABLE \| COMPILE }`<br>`[ ENABLE \| DISABLE \| COMPILE ]` |
| .<br>.<br>. | Indicates that the previous argument is repeated, or that sample code has been omitted. | `iSQL> select e_lastname from employees;`<br>`E_LASTNAME`<br>`------------------------`<br>`Moon`<br>`Davenport`<br>`Kobain`<br>`.`<br>`.`<br>`.`<br>`20 rows selected.` |
| Other Symbols | Symbols other than those shown above are part of the actual code. | `EXEC :p1 := 1;`<br>`acc NUMBER(11,2);` |
| Italics | Statement elements in italics indicate variables and special values specified by the user. | `SELECT * FROM table_name;`<br>CONNECT *userID/password*; |
| Lower Case Characters | Indicate program elements set by the user, such as table names, column names, file names, etc. | `SELECT e_lastname FROM employees;` |

| Rule | Meaning | Example |
|---|---|---|
| Upper Case Characters | Keywords and all elements provided by the system appear in upper case. | `DESC SYSTEM_.SYS_INDICES_;` |

## Related Documents

For more detailed information, please refer to the following documents:

- ALTIBASE HDB Administrators' Manual
- ALTIBASE HDB Application Program Interface Users' Manual
- ALTIBASE HDB Error Message Reference
- ALTIBASE HDB Getting Started Guide
- ALTIBASE HDB Installation Guide
- ALTIBASE HDB iSQL Users' Manual
- ALTIBASE HDB ODBC Reference
- ALTIBASE HDB Precompiler Users' Manual
- ALTIBASE HDB Replication Manual
- ALTIBASE HDB Utilities Manual

## Online Manuals

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Please let us know what you like or dislike about our manuals. To help us with future versions of our manuals, please tell us about any corrections or classifications that you would find useful.

Include the following information :

- The name and version of the manual that you are using.
- Any comments that you have about the manual.
- Your name, address, and phone number.

When you need immediate assistance regarding technical issues, please contact Altibase's Customer Support site (http://support.altibase.com/).

Thank you. We appreciate your feedback and suggestions.

# 1 Using `iSQL`

## 1.1 `iSQL` Overview

`iSQL` is a user tool for accessing ALTIBASE HDB and retrieving and modifying stored data using SQL statements and a number of additional commands.

### 1.1.1 `iSQL` Main Functionality

**ALTIBASE HDB Startup and Shutdown**

`iSQL` allows you to perform database management tasks, such as starting up and shutting down the server, and execute SQL statements using the same command prompt.

**Database Connection & Disconnection**

After ALTIBASE HDB starts up, you can use various user names to connect to and disconnect from the database.

**Database Object Information Inquiry**

`iSQL` allows you to use SQL statements to query all database object information, and supports convenient commands for inquiring about main objects.

**Database Management via SQL Statements**

Because `iSQL` can be used to execute any kind of SQL statement, you can control transactions and alter databases quickly and conveniently.

**Functions to Improve User Convenience**

The above tasks can be easily and conveniently accomplished using the file management and editing functions, the ability to execute shell commands over `iSQL`, and the `HISTORY` function.

## 1.2 Setting Up `iSQL`

In order for `iSQL` to access a server, the following information is necessary.

- `ALTIBASE_HOME`
  A path to a server or client installation.
- `server_name`
  The name (or IP address) of a computer on which the ALTIBASE HDB server is running.
- `port_no`
  The port number to be used when connecting via TCP or IPC.
- `user_id`
  A user ID registered in the database.
- `password`
  The password corresponding to the user ID.
- `NLS_USE`
  The character set with which to display retrieved data to the user.

`ALTIBASE_HOME` can only be set using an environment variable, while the other settings may be made using command-line options. (For more information, please refer to 1.3 iSQL Command-line Options.)

The `ALTIBASE_HOME` environment variable must be set in order to use `iSQL`. In the case of Windows, this is set automatically when the server is installed, but, in the case of the client, must be set manually by the user. We strongly suggest that you verify that this setting has been properly made, as the application may not run properly if this setting is not made.

`port_no` and `NLS_USE` can be set using the environment variables or the server settings file (`altibase.properties`). If these settings are made via all three methods, they will take priority as follows, in descending order:

1. command-line options
2. environment variables (`ALTIBASE_PORT_NO, ALTIBASE_NLS_USE`)
3. server settings file (`altibase.properties`)

Therefore, when it is desired to connect using options other than those that have been previously set, the command-line options can be used, so that it is not necessary to change the settings in the server setting file or the environment variables.

If any options have not been set, when `iSQL` is executed for the first time, the user will be prompted to enter the corresponding variables. At this time, it is essential to enter values that are valid and follow the proper format, otherwise `iSQL` may not run properly.

However, if the `NLS_USE` option in particular has not been set, no command prompt will appear at the time of execution. Instead, US7ASCII will be used, and a connection attempt will be made. In this case, if the character set of the database is not US7ASCII, the application will not execute properly, or some of the user's data may become corrupted. Thus it is paramount that `NLS_USE` be set to a suitable value for the usage environment.

In order to ensure stable `iSQL` operation, we recommend that the following environment variables be set:

- `ALTIBASE_HOME`: The path to a server or client installation.
- `ALTIBASE_PORT_NO`: The port number to use to connect to the server.
- `ALTIBASE_NLS_USE`: The character set to use to display retrieved data to the user.
- `PATH`: The path containing the executable file, which must equal `$ALTIBASE_HOME/bin`.

# 1.3 `iSQL` Command-line Options

The ALTIBASE HDB server must be started before `iSQL` is executed. The following options are case-insensitive.

```
isql [-H]
    [-S server_name] [-U user_id] [-P password]
    [-PORT port_no]
    [-UNIXDOMAIN-FILEPATH filepath]
    [-IPC-FILEPATH filepath]
    [-SILENT]
    [-F infile_name] [-O outfile_name] [-NLS_USE]
    [-NLS_NCHAR_LITERAL_REPLACE 0|1]
    [-prefer_ipv6] [-TIME_ZONE timezone]
```

- `-S` *`server_name`*

  Specifies the name (or IP address) of a computer on which the ALTIBASE HDB server is running.

  If connection is attempted while the `ISQL_CONNECTION` environment variable is set to `IPC` or `UNIX`, and the remote server is specified for this option, `iSQL` ignores the `ISQL_CONNECTION` specification and connects to the remote server via TCP, and outputs a warning message that the `ISQL_CONNECTION` specification has been ignored. It can be a host name, an IPv4 address, or an IPv6 address. An IPv6 address must be enclosed by a left square bracket( [) and a right square bracket(] ).

  For example, in the case of localhost (meaning this computer), `localhost` can be specified as the host name, `127.0.0.1` as the IPv4 address, or `[::1]` as the IPv6 address. For more information about the IPv6 address notation, please refer to the *ALTIBASE HDB Administrator's Manual*.

- `-U` *`user_id`*

  Specifies a user ID registered in the database.

- `-P` *`password`*

  Specifies the password corresponding to the user ID.

- `-PORT` *`port_no`*

  Specifies the port number for connecting via TCP/IP or IPC. However, when connecting in a Unix environment via IPC, this option must not be specified. After a warning message is output, connection to the server is made. To connect via TCP, first set `ISQL_CONNECTION=TCP` on the client and then enter `PORT_NO`.

  To connect via IPC in a Windows environment, set the environment variable `ISQL_CONNECTION=IPC` and specify the port number using one of the following:

  — the `-PORT` option
  — the `ALTIBASE_IPC_PORT_NO` environment variable
  — the `IPC_PORT_NO` property in `altibase.properties`

  If the environment variable `ISQL_CONNECTION` is not set to IPC and the `-PORT` option is omitted, the port number will be checked for first in the environment variable

`ALTIBASE_PORT_NO` and then in the `PORT_NO` property in `altibase.properties`, and if it is not set in either of those places, a prompt to enter it will be raised.

- `-UNIXDOMAIN-FILEPATH` *`filepath`*

  When a server and client connect using a Unix domain socket in a Unix environment (`ISQL_CONNECTION=UNIX`), the connection will fail if the server and client have different values for ALTIBASE_HOME and also have different Unix domain socket paths. In this case, if the server and client use corresponding files (e.g. `ALTIBASE_HOME/trc/cm-unix`), Unix domain communication is possible.

- `-IPC-FILEPATH` *`filepath`*

  When the client and the server are to connect via IPC (`ISQL_CONNECTION=IPC`) in a Unix environment, if `ALTIBASE_HOME` is set differently on them, they will not be able to connect if they have different socket paths. In this case, Unix domain communication can be achived using the `ALTIBASE_HOME/trc/cm-ipc` file, and then information about shared memory can be retrieved. However, this option can be omitted if `ALTIBASE_IPC_FILEPATH` is set.

- `-F` *`infile_name`*

  Specifies a script file to be executed immediately after `iSQL` is launched.

- `-O` *`outfile_name`*

  Specifies a file in which to store the results of the executed `iSQL` commands. This file will be created in the current directory. If the file already exists, it will be overwritten.

- `-H`

  Outputs help information for `iSQL` execution.

- `-SILENT`

  This option turns on silent mode. If silent mode is on, noncritical messages, such as the copyright notice, etc. will not be displayed.

- `-NLS_USE`

  Specifies the character set with which to display data to the user. The following character sets may be specified:

  — US7ASCII
  — KO16KSC5601
  — MS949
  — BIG5
  — GB231280
  — UTF8
  — SHIFTJIS
  — EUCJP

  If omitted, the environment variable `ALTIBASE_NLS_USE` or `altibase.properties` will be used, in descending order of preference, and if it is still not specified, the basic character set (US7ASCII) will be used.

- `-NLS_NCHAR_LITERAL_REPLACE`

  — `0`: Convert all strings to the database character set without checking for the "N" character.

  — `1`: Do not convert strings that are preceded by the "N" character to the database character set.

- `-prefer_ipv6`

  This option determines the IP address to be connected first when a host name is given for the `-s` option.
  If this option is specified and a host name is given for the `-s` option, this means that resolving the host name to the IPv6 address is preferred.
  If this option is omitted, `iSQL` connects to the IPv4 address by default.
  If it fails to connect to the preferred IP version address, an attempt is made to connect using the other IP version address.
  For example, when `localhost` is given for the `-s` option and this option is specified, `iSQL` first tries to connect to the `[::1]` IPv6 address. If this attempt fails, `iSQL` proceeds to connect to the `127.0.0.1` IPv4 address.

- `-TIME_ZONE timezone`

  This option sets the time zone of the client. If `DB_TZ` is specified for this option, the time zone is defaulted to that of the database server. Time zone names like Asia/Seoul, abbreviations such as KST, and UTC offset values as +09:00 are valid for specification.
  If this option is omitted, the time zone set for the `ALTIBASE_TIME_ZONE` environment variable is defaulted to the time zone of the client; on omission of the environment variable, the time zone is defaulted to that of the database server.

If any of the `-S`, `-U`, or `-P` option is missing from the above command, the user will be prompted to input the option value.

## 1.4 `iSQL` Commands

When `iSQL` is started, an `iSQL` command prompt will appear, and when `iSQL` commands are entered, the results of execution will be displayed. The `iSQL` commands are described individually in the following table.

| Category | Type | Command | Description |
|---|---|---|---|
| `iSQL` Startup and Shutdown | Startup | `$ iSQL [option]` | If you execute this command in a shell, `iSQL` will start up. For information about the available options, please refer to 1.3 iSQL Command-line Options. |
| | Prompt | `iSQL>` | Type a command at the `iSQL` prompt and press the ENTER key. |
| | Shutdown | `EXIT`<br>`QUIT` | Used to shut down `iSQL`. |
| ALTIBASE HDB Startup and Shutdown | ALTIBASE HDB Startup | `STARTUP` | Use the `PRE-PROCESS`, `PROCESS`, `CONTROL`, `META`, or `SERVICE` option to start ALTIBASE HDB up to the corresponding stage. |
| | ALTIBASE HDB Shutdown | `SHUTDOWN` | Use one of the `NORMAL`, `IMMEDIATE`, or `ABORT` options to shut down ALTIBASE HDB. |
| Database Connection and Disconnection | Access the Server as Another User | `CONNECT [`*`logon`*`] [nls] [AS sysdba];`<br>where *`logon`* has the syntax:<br>*`user1 [/pass1]`*<br>where *`nls`* has the syntax:<br>`NLS=`*`character_set`* | This command allows access to the database as *`user1`* with password *`pass1`* after having already accessed the database as another user in `iSQL`. If `CONNECT` is successful, the information related to the previous session is cleared.The `AS` clause allows the user `SYS` to access the server in `sysdba` manager mode. Only one user is allowed to connect as `sysdba` at a time.<br>The *`nls`* option specifies the character set. For detailed information about character sets, please refer to1.3 iSQL Command-line Options: `-NLS_USE` option. |
| | Terminate a Connection | `DISCONNECT;` | Ends the current session and terminates the connection with the server. |

| Category | Type | Command | Description |
|---|---|---|---|
| Database Object Information Inquiry | Display Performance View List | `SELECT * FROM V$TAB;` | Displays the list of all of the performance views provided by the system. This command is available only in `iSQL`. |
| | Display Table List | `SELECT * FROM TAB;` | Displays the list of currently created tables. This command is only available in `iSQL`. |
| | Display Table Structure | `DESC samp;` | Lists the column definitions for the table *samp* |
| | Display Sequence Information | `SELECT * FROM V$SEQ;` | If you accessed the server with the `SYS` account, information about all sequences is displayed. If you accessed the server as another user, only the information about the sequences generated by that user will be displayed. This command is available only in `iSQL`. |
| Transaction Control | Setting Transaction Mode | `AUTOCOMMIT ON;`<br>`AUTOCOMMIT OFF;` | Determines whether to commit commands automatically at the time that they are executed.<br>Default: `ON` |
| | Other SET Functions | `SET PLANCOMMIT ON;`<br>`SET PLANCOMMIT OFF;` | Determines whether to automatically commit commands such as `DESC`, `SELECT * FROM TAB`, or `SELECT * FROM` *`seq_name`* when `EXPLAIN PLAN` is `ON` (or `ONLY`) and `AUTOCOMMIT` is `OFF`.<br>Default: `OFF` |

| Category | Type | Command | Description |
|---|---|---|---|
| File Management | Output Data to a File | `SPOOL file_name;` | Starts writing the results shown on the screen to the file *file_name*. |
| | | `SPOOL OFF;` | Stops writing the results shown on the screen to the file *file_name*. |
| | SQL Script Execution | `START file_name;` | Reads a script file and executes the SQL statements in sequence. |
| | | `@ file_name;` | Performs a function similar to that of startup when executed via an `iSQL` prompt. |
| | | `@@ file_name;` | When used in a script, this command executes the file *file_name* in the same directory as the calling script. |
| | Save SQL Statement to File | `SAVE abc.sql;` | Saves the last of the commands currently in the `iSQL` buffer to a file. |
| | Load SQL Statement | `LOAD abc.sql;` | Loads the first of the commands saved in a file at the end of the command buffer. |
| | Save DML Statements to File | `SET QUERLOGGING ON;`<br>`SET QUERYLOGGIN OFF;` | This writes executed DML statements, such as `INSERT`, `UPDATE`, `DELETE`, `MODE` in `$ALTIBASE_HOME/trc/isql_query.log`. |
| | Edit Query Statements | `ED` | For creating and editing temporary files. |
| | | `ED` *`file_name`*`[.sql]` | For editing existing files or creating new files. |
| | | `2ED` or `2 ED` | Edits query command number 2 in the history list. |

| Category | Type | Command | Description |
|---|---|---|---|
| Control Output Option | Format SELECT Result Column | `SET LINESIZE 100;` | Sets the length of a display line for outputting the result of a `SELECT` query. Must be between 10 and 32767 inclusive.<br>Default: `80` |
| | Format SELECT Result Column of Type CLOB | `SET LOBSIZE 10;` | Sets the number of characters to display when a CLOB column is output.<br>Default : `80` |
| | | `SET LOBOFFSET 3;` | Sets the number of characters by which to offset the display when a CLOB column is output.<br>Default : `0` |
| | Output SELECT Result Count | `SET FEED[BACK] ON;`<br>`SET FEED[BACK] n;` | Determines whether to output the number of rows in a query result. |
| | Format Rows of SELECT Result | `SET PAGESIZE 10;` | Sets how many records of a `SELECT` query result are output at one time. When set to `0`, all resultant records are output.<br>Default: `0` |
| | Show/Hide SELECT Result Header | `SET HEADING ON;`<br>`SET HEADING OFF;` | Sets whether to output the header of a `SELECT` result<br>Default: `ON` |
| | Set SELECT Result Output Size | `SET COLSIZE N;` | Sets the number of characters to output when CHAR or VARCHAR type columns are output as a `SELECT` query result. |
| | | `SET NUM[WIDTH] N;` | Sets the number of characters to output when data of NUMERIC, DECIMAL, NUMBER, FLOAT type columns are output as a `SELECT` query result.<br>Default : `11` |
| | Show SQL Statement Execution Time | `SET TIMING ON;`<br>`SET TIMING OFF;` | Sets whether to output the amount of time taken to execute a SQL command.<br>Default: `OFF` |
| | Set the SQL Statement Execution Time Units for Output | `SET TIMESCALE SEC;`<br>`SET TIMESCALE MILSEC;`<br>`SET TIME MICSEC;`<br>`SET TIMESCALE NANSEC;` | Sets the unit of time for executing SQL statements as seconds, milliseconds, microseconds or nanoseconds. |
| | Show/Hide CHECK Constraint Information | `SET CHKCONSTRAINTS ON;`<br>`SET CHKCONSTRAINTS OFF;` | Sets whether to output CHECK constraint output including information when displaying the table structure (using `DESC`).<br>Default: `OFF` |

| Category | Type | Command | Description |
|---|---|---|---|
| Control Output Option | Show/Hide Script Execution Result | `SET TERM ON;`<br>`SET TERM OFF;` | Determines whether to display the results of execution of a script file on the screen.<br>Default: `ON` |
| | Output Execution Plan Tree | `ALTER SESSION SET EXPLAIN PLAN=ON;`<br>`ALTER SESSION SET EXPLAIN PLAN=ONLY;`<br>`ALTER SESSION SET EXPLAIN PLAN=OFF;` | Determines whether to output an execution plan for a `SELECT` statement.<br>Default: `OFF` |
| | SELECT Result Output Direction | `SET VERTICAL ON;`<br>`SET VERTICAL OFF;` | Displays `SELECT` results vertically when set to `ON`.<br>Default: `OFF` |
| | Show Value of `iSQL` Display Settings | `SHOW LINESIZE` | Displays the current `LINESIZE` value. |
| | | `SHOW COLSIZE` | Displays the current `COLSIZE` value. |
| | | `SHOW LOBOFFSET` | Displays the current `LOBOFFSET` value. |
| | | `SHOW LOBSIZE` | Displays the current `LOBSIZE` value. |
| | | `SHOW PAGESIZE` | Displays the current `PAGESIZE` value. |
| | | `SHOW PLANCOMMIT` | Shows whether `PLANCOMMIT` is `ON` or `OFF`. |
| | | `SHOW QUERYLOGGING` | Shows whether DML statements wil be written to `ALTIBASE_HOME/trc/isql_query.log` when executed. |
| | | `SHOW FEEDBACK` | Shows the current `FEEDBACK` value. |
| | | `SHOW HEADING` | Shows the current `HEADING` setting. |
| | | `SHOW TERM` | Shows the current `TERM` setting. |
| | | `SHOW TIMING` | Shows the current `TIMING` setting. |
| | | `SHOW TIMESCALE` | This shows the current time units for the execution of SQL statements. |
| | | `SHOW USER` | Shows the current user. |
| | | `SHOW CHKCONSTRAINTS` | Shows whether the current check constraint is set or not. |
| | | `SHOW FOREIGNKEYS` | Shows the current foreign key display setting. |
| | | `SHOW VERTICALL` | Shows whether the results of a `SELECT` query will be output vertically. |
| | | `SHOW ALL` | Shows the set values of the display settings for the current session. |

| Category | Type | Command | Description |
|---|---|---|---|
| Variable and Prepared SQL Statements | Variable Declaration | `VAR p1 INTEGER;` | Declares the variable *p1* as integer type. |
| | | `VARIABLE p2 CHAR(10);` | Declares the variable *p2* as CHAR type. |
| | Assign Values to Variables | `EXECUTE :p1:=100;` | Assigns the value *100* to variable *p1*. |
| | | `EXEC :p2:='abc';` | Assigns the text *'abc'* to variable *p2*. |
| | Variable Display | `PRINT VAR[IABLE];` | Shows the currently declared variables. |
| | | `PRINT p1;` | Shows the type and value of variable *p1*. |
| | Prepared SQL Statement Execution | `PREPARE SQL statement;` | Separates the processes of query optimization and execution, and executes the query as a prepared SQL statement. In `iSQL`, the default execution method for executing SQL statements is the Direct Execution method, in which optimization and execution are performed at once. There is no difference between the two execution methods in `iSQL` in terms of the results obtained, however, prepared SQL statements can be used to bind variables to values and execute SQL statements based thereon. |
| Functions for User Convenience | History List Display | `HISTORY;`<br>`H;` | Shows a list of the commands currently saved in the `iSQL` buffer. |
| | Repeat Execution | `/` | Repeats execution of the command currently in the `iSQL` buffer. The most recently executed command will be executed again. |
| | | `2/` | Executes the second command in a list output using the `HISTORY` command. |
| | Shell Command Execution | `! shell command!` | A shell command that follows an exclamation point will be immediately executed from within `iSQL`. |
| | Comment | `/*comment*/`<br>`--comment` | Indicate a multiple-line comment and a single-line comment, respectively. |
| | Help | `HELP;`<br>`HELP INDEX;`<br>`HELP EXIT;` | Provides information about how to use help, outputs a list of commands, and describes the `EXIT` command, respectively. |

# 1.5 `iSQL` Environment Variables

## 1.5.1 `ALTIBASE_HOME`

Sets the directory in which the package is installed.

In the case of MS Windows, this is set automatically when the server is installed, however, when the client is installed, this is not automatically set due to the danger of a conflict with the environment variables for the server. When installing the client, the user must manually set this directory.

This environmental variable must be set in order to use `iSQL`.

```
Ex)
Windows (Server): 'set ALTIBASE_HOME=C:/Program Files/Altibase/
Altibase5_Server/altibase_home',

Windows (Client): 'set ALTIBASE_HOME=C:/Program Files/Altibase/
Altibase5_Client/altibase_home_client')
```

## 1.5.2 `ALTIBASE_PORT_NO`

This is the port number of the server to connect to. This can be specified either by using the `-PORT` option or in `altibase.properties`.

If no designated port number can be found (in descending order of precedence) in the `-PORT` option, in the environment variable `ALTIBASE_PORT_NO`, or in `altibase.properties`, a prompt to enter the port number will appear.

## 1.5.3 `ALTIBASE_NLS_USE`

This is the character set used to display retrieved results to the user.

- US7ASCII
- KO16KSC5601
- MS949
- BIG5
- GB231280
- UTF8
- SHIFTJIS
- EUCJP

This can be set either using the `-NLS_USE` option or in `altibase.properties`.

If `NLS_USE` is not specified using the `-NLS_USE` option, the environment variable `ALTIBASE_NLS_USE`, or `altibase.properties` (in descending order of precedence), US7ASCII is used as the default character set.

### 1.5.4 ALTIBASE_NLS_NCHAR_LITERAL_REPLACE

By default, `iSQL` converts an entire query string to the database character set before sending the data to the database. This behavior can be prevented for a given string literal by setting the `ALTIBASE_NLS_NCHAR_LITERAL_REPLACE` property to `1` and placing the `"N"` character in front of the string literal.

A property setting of `1` instructs `iSQL` to search for the `"N"` character in front of every string literal. If the `"N"` character is found, `iSQL` sends the string to the database without converting it to the database character set. This is useful when it is desired to use NCHAR type data that is encoded differently from the database character set.

- `0`: Convert all strings to the database character set without checking for the `"N"` character.
- `1`: Do not convert strings that are preceded by the `"N"` character to the database character set.

*Note: Setting this variable to 1 can be expensive in terms of usage of client resources.*

### 1.5.5 ISQL_CONNECTION

When ALTIBASE HDB is used in a client-server arrangement, the user can set environment variables to select the client-server protocol that is suitable for the operating environment. ALTIBASE HDB supports the TCP/IP, IPC, and Unix domain socket protocols. The default protocol for communication with ALTIBASE HDB servers is TCP/IP. Note that when using the IPC protocol the value of ALTIBASE HDB properties related to the IPC channel (`IPC_CHANNEL_COUNT`) must be considered.

The following example shows how to set the environment variable when using the IPC protocol:

```
CSH: setenv ISQL_CONNECTION IPC
SH: ISQL_CONNECTION=IPC; export ISQL_CONNECTION
```

*Note: If the remote server is specified for the `-s` option and `iSQL` is executed, a warning message that the `ISQL_CONNECTION` setting has been ignored is output and `iSQL` connects to the remote server, regardless of the value set to the `ISQL_CONNECTION` environment variable.*

### 1.5.6 ISQL_BUFFER_SIZE

The size of the buffer in which to store queries can be set using this environment variable.

```
Ex)
```

```
CSH: setenv ISQL_BUFFER_SIZE 128000
SH: ISQL_BUFFER_SIZE = 128000; export ISQL_BUFFER_SIZE
```

### 1.5.7 ALTIBASE_DATE_FORMAT

When retrieving Date type data using a `SELECT` statement, the environment variable `ALTIBASE_DATE_FORMAT` can be used to change the default date format, which is YYYY/MM/DD HH:MI:SS, to some other date format.

```
Ex) For Born, Korn, or Bash Shell
export ALTIBASE_DATE_FORMAT='DD-MON-YYYY'
```

### 1.5.8 ISQL_EDITOR

This environment variable can be used to change the default editor (Windows: notepad, the others: /bin/vi ).

```
Ex)
CSH: setenv ISQL_EDITOR /usr/bin/ed
SH: ISQL_EDITOR=/usr/bin/ed; export ISQL_EDITOR
```

### 1.5.9 ALTIBASE_IPC_FILEPATH

In a Unix environment, if a client and the server have different values for `ALTIBASE_HOME`, they will not be able to connect via IPC if they have different Unix domain socket paths. In this case, in order to be able to connect via IPC, it will be necessary to set the `ALTIBASE_IPC_FILEPATH` environment variable or the `-IPC-FILEPATH` `iSQL` option to the `$ALTIBASE_HOME/trc/cm-ipc` file used by the server.

### 1.5.10 ALTIBASE_TIME_ZONE

This environment variable sets the time zone of the client. If `DB_TZ` is specified for this option, the time zone is defaulted to that of the database server.

This environment variable can be set with time zone names like Asia/Seoul, abbreviations such as KST and UTC offset values as +09:00 are valid for specification.

# 1.6 Personalizing `iSQL`

`iSQL` users can customize their `iSQL` environment and use the same settings for each session. For example, using the OS file, the user can specify a desired output format so that each query result displays the current time whenever query results are output. These files can be categorized into the following two types.

## 1.6.1 `glogin.sql`

For initialization tasks that must be conducted when `iSQL` is started, `iSQL` supports the creation of a global script file, `glogin.sql`, by the DB administrator. `iSQL` executes this script whenever any user executes `iSQL` or attempts to connect to ALTIBASE HDB for the first time. The global file allows the DB administrator to make site-specific `iSQL` environment settings for all users. The global script file is located in `$ALTIBASE_HOME/conf`.

## 1.6.2 `login.sql`

`iSQL` also supports the `login.sql` file, which is executed after `glogin.sql`. If both the `glogin.sql` file and the `login.sql` file exist, `login.sql` is executed after `glogin.sql` during `iSQL` startup, so the commands in `login.sql` will take precedence.

If several people share one Unix account, it will be impossible for them to personalize the `glogin.sql` file. In this case, individual users may add SQL commands, stored procedures, or `iSQL` commands to their respective `login.sql` files in their personal work directories. When a user starts up `iSQL`, `iSQL` automatically searches the current directory for the `login.sql` file and executes the commands in it.

The `login.sql` file cannot modify initial `iSQL` settings or individual session actions.

## 1.6.3 Editing the `LOGIN` File

The user may change the `LOGIN` file, like any other script. The following is an example of *user1* creating a `LOGIN` file that turns off autocommit mode and executes SQL statements:

```
$ vi glogin.sql
AUTOCOMMIT ON
SET HEADING OFF
SELECT sysdate FROM dual;

$ vi login.sql
AUTOCOMMIT OFF
SET HEADING ON
DROP TABLE savept;
CREATE TABLE savept(num INTEGER);
INSERT INTO savept VALUES(1);
SAVEPOINT sp1;
INSERT INTO savept VALUES(2);
SELECT * FROM savept;
ROLLBACK TO SAVEPOINT sp1;
SELECT * FROM savept;
COMMIT;

$ isql
```

```
-----------------------------------------------
 Altibase Client Query utility.
 Release Version 6.3.1
 Copyright 2015, Altibase Corporation or its subsidiaries.
 All Rights Reserved.
-----------------------------------------------
Write Server Name (default:127.0.0.1) :
Write UserID : user1
Write Password :
ISQL_CONNECTION = TCP, SERVER = 127.0.0.1, PORT_NO = 20300
Set autocommit on success.     -> Executing glogin.sql first

28-DEC-2004                    -> Heading off
1 row selected.
Set autocommit off success.    -> Execute login.sql in the current work directory of the user
                                  after glogin.sql is executed.
Drop success.
Create success.
1 row inserted.
Savepoint success.             -> It is executable only when autocommit mode is off
1 row inserted.
NUM                            -> Heading on
--------------
1
2
2 rows selected.
Rollback success.
NUM
--------------
1
1 row selected.
Commit success.
```

## 1.6.4 Notes

For security reasons, the `CONNECT` command which inputs both the user name and password cannot be used with the `LOGIN` file. If the `CONNECT` command is included in the `LOGIN` file, the following warning message is output and the command is not executed.

```
WARNING: CONNECT command in glogin.sql file ignored
```

# 2 Examples of `iSQL` in Use

This chapter describes several examples of the use of `iSQL` to manipulate databases.

# 2.1 Logging In to iSQL

To use `iSQL`, users must first be logged in. Connection information may be input directly via a command line, or via the `iSQL` input prompt.

```
isql -U userID -P password [-SYSDBA]
```

or

```
isql [-SYSDBA]
```

Additional information necessary for connection with the server is the server name (`-S`), user ID (`-U`), and password (`-P`). The user ID and password are case-insensitive.

In order for the user `SYS` to use `iSQL` as an administrator, the `SYSDBA` option is used. The `SYSDBA` option can be used for remote access.

## 2.1.1 Login Restrictions

- Only one user is permitted to connect in `SYSDBA` mode at one time. Two or more users cannot connect in `SYSDBA` mode at the same time.
- You can access the database remotely in `SYSDBA` mode, but can't start up the database.

For detailed information about system privileges, please refer to the *ALTIBASE HDB SQL Reference*. For detailed information about errors that may arise during `iSQL` execution, please refer to the *ALTIBASE HDB Error Message Reference*.

```
$ isql -S 127.0.0.1 -U sys -P manager [-SYSDBA]
```

or

```
$ isql [-sysdba]
-----------------------------------------------
 Altibase Client Query utility.
 Release Version 6.3.1
 Copyright 2015, Altibase Corporation or its subsidiaries.
 All Rights Reserved.
-----------------------------------------------
Write Server Name (default:127.0.0.1) :
Write UserID : sys
Write Password : manager    -> The password on the screen is not displayed.
ISQL_CONNECTION = UNIX, SERVER = 127.0.0.1, PORT_NO = 20300
iSQL(sysdba)>               -> iSQL is connected to the server, and SQL, iSQL, and PSM commands
can be input and executed here.
```

# 2.2 Starting Up and Shutting Down ALTIBASE HDB

`iSQL` can be used to start up and shut down ALTIBASE HDB.

## 2.2.1 Starting Up ALTIBASE HDB

To start up ALTIBASE HDB, `iSQL` must first be launched with the `-sysdba` option, in the same way as when a database is created.

*Note: ALTIBASE HDB startup commands can be executed only with the UNIX account with which ALTIBASE HDB (including `iSQL`) was installed.*

The following is an example of the use of `iSQL` to start up ALTIBASE HDB. For more information about starting up ALTIBASE HDB, please refer to *Chapter 4: Startup and Shutdown* in the *ALTIBASE HDB Administrators' Manual*.

```
$ isql -s 127.0.0.1 -u sys -p manager -sysdba
-----------------------------------------------
 Altibase Client Query utility.
 Release Version 6.3.1.
 Copyright 2015, Altibase Corporation or its subsidiaries.
 All Rights Reserved.
-----------------------------------------------
ISQL_CONNECTION = UNIX, SERVER = 127.0.0.1, PORT_NO = 20300
[ERR-910FB : Connected to idle instance]

iSQL(sysdba)> startup service
Connecting to the DB server... Connected.


TRANSITION TO PHASE : PROCESS


TRANSITION TO PHASE : CONTROL


TRANSITION TO PHASE : META
  [SM] Recovery Phase - 1 : Preparing Database
                          : Dynamic Memory Version => Parallel Loading
  [SM] Recovery Phase - 2 : Loading Database
  [SM] Recovery Phase - 3 : Skipping Recovery & Starting Threads...
                            Refining Disk Table
  [SM] Refine Memory Table :
............................................................................
....................... [SUCCESS]
  [SM] Rebuilding Indices [Total Count:101]
............................................................................
........................ [SUCCESS]
TRANSITION TO PHASE : SERVICE
  [CM] Listener started : TCP on port 20300
  [CM] Listener started : UNIX
  [RP] Initialization : [PASS]
--- STARTUP Process SUCCESS ---
Command execute success.
```

## 2.2.2 Shutting Down ALTIBASE HDB

Use the `SHUTDOWN` command to shut down a running ALTIBASE HDB server.

The following is an example of the use of `iSQL` to shut down ALTIBASE HDB. For more information about shutting down ALTIBASE HDB, please refer to *Chapter 4: Startup and Shutdown* in the *ALTIBASE HDB Administrators' Manual*.

```
iSQL(sysdba)> shutdown normal
Ok..Shutdown Proceeding....


TRANSITION TO PHASE : Shutdown Altibase
  [RP] Finalization : PASS
shutdown normal success.
```

# 2.3 Connecting and Disconnecting

## 2.3.1 Connecting to a Database

The `CONNECT` command is used to connect to ALTIBASE HDB with a specified user ID. If the first connection attempt fails, the `CONNECT` command does not prompt again for the user ID or password.

`CONNECT [`*`logon`*`] [`*`nls`*`] [AS SYSDBA];`

where *`logon`* has the syntax:

*`userID`*`[/`*`password`*`]`

and *`nls`* has the syntax:

`NLS=`*`character_set`*

### 2.3.1.1 `userID/password`

The user ID and password with which to establish a connection to ALTIBASE HDB.

### 2.3.1.2 `NLS=character_set`

The `NLS` option specifies the character set.

```
iSQL> CONNECT sys/manager NLS=US7ASCII
Connect success.
```

### 2.3.1.3 `AS SYSDBA`

The `AS` clause permits the user `SYS` to access the server in `sysdba` manager mode.

If `CONNECT` is successful, the current session is terminated, and a connection is established to the server using the specified user ID and password and the information in `altibase.properties`. Accordingly, the session information is cleared before connecting.

For instance, if autocommit mode is set to `TRUE` in `altibase.properties` and autocommit mode is changed to `FALSE` in `iSQL`, when the `CONNECT` statement is executed, autocommit mode will be changed to `TRUE`, because of the value in `altibase.properties`.

If `CONNECT` fails, the previous session is terminated and the connection with the server is closed. In other words, the result of all SQL statements executed thereafter will be a "`Not connected`" message. Execute "`CONNECT user ID/password [AS SYSDBA]`" to attempt to re-establish a connection with the server.

```
$ isql
-----------------------------------------------
 Altibase Client Query utility.
 Release Version 6.3.1.
 Copyright 2015, Altibase Corporation or its subsidiaries.
 All Rights Reserved.
-----------------------------------------------
Write Server Name (default:127.0.0.1) :
```

```
Write UserID : SYS
Write Password :
ISQL_CONNECTION = TCP, SERVER = 127.0.0.1, PORT_NO = 20300

iSQL> SHOW USER;
User : SYS

iSQL> CREATE USER altiadmin IDENTIFIED BY alti1234;
Create success.

iSQL> CONNECT altiadmin/alti1234;
Connect success.

iSQL> SHOW USER;
User : ALTIADMIN

iSQL> CREATE TABLE altitbl(i1 INTEGER, i2 CHAR(5));
Create success.

iSQL> SELECT * FROM tab;
TABLE NAME                               TYPE
---------------------------------------------
ALTITBL                                  TABLE
CLEAR_DP                                 SYNONYM
DUAL                                     SYNONYM
EXPORT_PARTITION_TO_FILE                 SYNONYM
EXPORT_TO_FILE                           SYNONYM
EXPORT_USER_TABLES                       SYNONYM
FCLOSE                                   SYNONYM
FCLOSE_ALL                               SYNONYM
FCOPY                                    SYNONYM
FFLUSH                                   SYNONYM
FOPEN                                    SYNONYM
FREMOVE                                  SYNONYM
FRENAME                                  SYNONYM
GET_LINE                                 SYNONYM
IMPORT_FROM_FILE                         SYNONYM
IS_OPEN                                  SYNONYM
NEW_LINE                                 SYNONYM
PRINT                                    SYNONYM
PRINTLN                                  SYNONYM
PUT                                      SYNONYM
PUT_LINE                                 SYNONYM
RAISE_APPLICATION_ERROR                  SYNONYM
REGISTER                                 SYNONYM
REMOVE                                   SYNONYM
REMOVEALL                                SYNONYM
REMOVE_DP                                SYNONYM
REMOVE_XID                               SYNONYM
RESUME_DP                                SYNONYM
SET_DEFAULTS                             SYNONYM
SIGNAL                                   SYNONYM
SLEEP                                    SYNONYM
WAITANY                                  SYNONYM
WAITONE                                  SYNONYM
33 rows selected.

iSQL> CONNECT sys/manager;
Connect success.

iSQL> SHOW USER;
User : SYS

iSQL> CREATE TABLE systbl(i1 INTEGER, i2 CHAR(5));
Create success.
```

```
iSQL> SELECT * FROM tab;
USER NAME     TABLE NAME                      TYPE
--------------------------------------------------
SYSTEM_       STO_COLUMNS_                    SYSTEM TABLE
SYSTEM_       STO_DATUMS_                     SYSTEM TABLE
SYSTEM_       STO_ELLIPSOIDS_                 SYSTEM TABLE
SYSTEM_       STO_GEOCCS_                     SYSTEM TABLE
SYSTEM_       STO_GEOGCS_                     SYSTEM TABLE
SYSTEM_       STO_PRIMEMS_                    SYSTEM TABLE
SYSTEM_       STO_PROJCS_                     SYSTEM TABLE
SYSTEM_       STO_PROJECTIONS_                SYSTEM TABLE
SYSTEM_       STO_SRS_                        SYSTEM TABLE
SYSTEM_       STO_USER_COLUMNS_               SYSTEM TABLE
SYSTEM_       SYS_COLUMNS_                    SYSTEM TABLE
SYSTEM_       SYS_COMMENTS_                   SYSTEM TABLE
SYSTEM_       SYS_CONSTRAINTS_                SYSTEM TABLE
SYSTEM_       SYS_CONSTRAINT_COLUMNS_         SYSTEM TABLE
SYSTEM_       SYS_DATABASE_                   SYSTEM TABLE
SYSTEM_       SYS_DATABASE_LINKS_             SYSTEM TABLE
SYSTEM_       SYS_DATA_PORTS_                 SYSTEM TABLE
SYSTEM_       SYS_DIRECTORIES_                SYSTEM TABLE
SYSTEM_       SYS_DN_USERS_                   SYSTEM TABLE
SYSTEM_       SYS_DUMMY_                      SYSTEM TABLE
SYSTEM_       SYS_ENCRYPTED_COLUMNS_          SYSTEM TABLE
SYSTEM_       SYS_GRANT_OBJECT_               SYSTEM TABLE
SYSTEM_       SYS_GRANT_SYSTEM_               SYSTEM TABLE
SYSTEM_       SYS_INDEX_COLUMNS_              SYSTEM TABLE
SYSTEM_       SYS_INDEX_PARTITIONS_           SYSTEM TABLE
SYSTEM_       SYS_INDICES_                    SYSTEM TABLE
SYSTEM_       SYS_LOBS_                       SYSTEM TABLE
SYSTEM_       SYS_PART_INDICES_               SYSTEM TABLE
SYSTEM_       SYS_PART_KEY_COLUMNS_           SYSTEM TABLE
SYSTEM_       SYS_PART_LOBS_                  SYSTEM TABLE
SYSTEM_       SYS_PART_TABLES_                SYSTEM TABLE
SYSTEM_       SYS_PRIVILEGES_                 SYSTEM TABLE
SYSTEM_       SYS_PROCEDURES_                 SYSTEM TABLE
SYSTEM_       SYS_PROC_PARAS_                 SYSTEM TABLE
SYSTEM_       SYS_PROC_PARSE_                 SYSTEM TABLE
SYSTEM_       SYS_PROC_RELATED_               SYSTEM TABLE
SYSTEM_       SYS_REPLICATIONS_               SYSTEM TABLE
SYSTEM_       SYS_REPL_HOSTS_                 SYSTEM TABLE
SYSTEM_       SYS_REPL_ITEMS_                 SYSTEM TABLE
SYSTEM_       SYS_REPL_OFFLINE_DIR_           SYSTEM TABLE
SYSTEM_       SYS_REPL_OLD_COLUMNS_           SYSTEM TABLE
SYSTEM_       SYS_REPL_OLD_INDEX_COLUMNS_     SYSTEM TABLE
SYSTEM_       SYS_REPL_OLD_INDICES_           SYSTEM TABLE
SYSTEM_       SYS_REPL_OLD_ITEMS_             SYSTEM TABLE
SYSTEM_       SYS_REPL_RECOVERY_INFOS_        SYSTEM TABLE
SYSTEM_       SYS_SECURITY_                   SYSTEM TABLE
SYSTEM_       SYS_SYNONYMS_                   SYSTEM TABLE
SYSTEM_       SYS_TABLES_                     SYSTEM TABLE
SYSTEM_       SYS_TABLE_PARTITIONS_           SYSTEM TABLE
SYSTEM_       SYS_TBS_USERS_                  SYSTEM TABLE
SYSTEM_       SYS_TRIGGERS_                   SYSTEM TABLE
SYSTEM_       SYS_TRIGGER_DML_TABLES_         SYSTEM TABLE
SYSTEM_       SYS_TRIGGER_STRINGS_            SYSTEM TABLE
SYSTEM_       SYS_TRIGGER_UPDATE_COLUMNS_     SYSTEM TABLE
SYSTEM_       SYS_USERS_                      SYSTEM TABLE
SYSTEM_       SYS_VIEWS_                      SYSTEM TABLE
SYSTEM_       SYS_VIEW_PARSE_                 SYSTEM TABLE
SYSTEM_       SYS_VIEW_RELATED_               SYSTEM TABLE
SYSTEM_       SYS_XA_HEURISTIC_TRANS_         SYSTEM TABLE
ALTIADMIN     ALTITBL                         TABLE
SYS           SYSTBL                          TABLE
```

```
                CLEAR_DP                        SYNONYM
                DUAL                            SYNONYM
                EXPORT_PARTITION_TO_FILE        SYNONYM
                EXPORT_TO_FILE                  SYNONYM
                EXPORT_USER_TABLES              SYNONYM
                FCLOSE                          SYNONYM
                FCLOSE_ALL                      SYNONYM
                FCOPY                           SYNONYM
                FFLUSH                          SYNONYM
                FOPEN                           SYNONYM
                FREMOVE                         SYNONYM
                FRENAME                         SYNONYM
                GET_LINE                        SYNONYM
                IMPORT_FROM_FILE                SYNONYM
                IS_OPEN                         SYNONYM
                NEW_LINE                        SYNONYM
                PRINT                           SYNONYM
                PRINTLN                         SYNONYM
                PUT                             SYNONYM
                PUT_LINE                        SYNONYM
                RAISE_APPLICATION_ERROR         SYNONYM
                REGISTER                        SYNONYM
                REMOVE                          SYNONYM
                REMOVEALL                       SYNONYM
                REMOVE_DP                       SYNONYM
                REMOVE_XID                      SYNONYM
                RESUME_DP                       SYNONYM
                SET_DEFAULTS                    SYNONYM
                SIGNAL                          SYNONYM
                SLEEP                           SYNONYM
                WAITANY                         SYNONYM
                WAITONE                         SYNONYM
93 rows selected.
```

### 2.3.2 Disconnecting from a Database

`DISCONNECT` is used to terminate the current session and disconnect from the server. The result of all subsequently executed SQL statements will be a "`Not connected`" message, and "`CONNECT user ID/password`" must be executed in order to connect to the server again.

```
DISCONNECT;
```

```
iSQL> INSERT INTO systbl VALUES(1, 'A1');
1 row inserted.
iSQL> INSERT INTO systbl VALUES(2, 'A2');
1 row inserted.
iSQL> SELECT * FROM systbl;
I1          I2
----------------------
1           A1
2           A2
2 rows selected.
iSQL> DISCONNECT;
Disconnect success.
iSQL> INSERT INTO systbl VALUES(3, 'A3');
[ERR-91020 : No Connection State]
iSQL> SELECT * FROM systbl;
[ERR-91020 : No Connection State]
iSQL> CONNECT sys/manager;
Connect success.
```

# 2.4 Retrieving Information Related to the Database and Database Objects

## 2.4.1 Performance Views

A performance view is a type of data dictionary table capable of inquiring about the server status and database information. The following `SELECT` statement can be used to view the list of performance views provided by ALTIBASE HDB:

```
iSQL> SELECT * FROM v$tab;
TABLE NAME                                TYPE
----------------------------------------------
V$ALLCOLUMN                               PERFORMANCE VIEW
V$ARCHIVE                                 PERFORMANCE VIEW
V$BUFFPAGEINFO                            PERFORMANCE VIEW
V$BUFFPOOL_STAT                           PERFORMANCE VIEW
V$CATALOG                                 PERFORMANCE VIEW
V$DATABASE                                PERFORMANCE VIEW
V$DATAFILES                               PERFORMANCE VIEW
V$DATATYPE                                PERFORMANCE VIEW
V$DBA_2PC_PENDING                         PERFORMANCE VIEW
V$DBLINK_REMOTE_STATEMENT_INFO            PERFORMANCE VIEW
V$DBLINK_REMOTE_TRANSACTION_INFO          PERFORMANCE VIEW
V$DBLINK_TRANSACTION_INFO                 PERFORMANCE VIEW
V$DB_FREEPAGELISTS                        PERFORMANCE VIEW
V$DB_PROTOCOL                             PERFORMANCE VIEW
V$DIRECT_PATH_INSERT                      PERFORMANCE VIEW
V$DISKTBL_INFO                            PERFORMANCE VIEW
V$DISK_BTREE_HEADER                       PERFORMANCE VIEW
V$DISK_RTREE_HEADER                       PERFORMANCE VIEW
V$EVENT_NAME                              PERFORMANCE VIEW
V$FILESTAT                                PERFORMANCE VIEW
V$FLUSHER                                 PERFORMANCE VIEW
V$FLUSHINFO                               PERFORMANCE VIEW
.
.
```

For the complete list of the performance views provided with ALTIBASE HDB and the meanings of the columns, please refer to *Chapter 3: Data Dictionary* in the *ALTIBASE HDB General Reference*. Data in a particular performance view can be queried in the same way as an ordinary table using a `SELECT` statement, and using joins, etc., results can be output in various forms.

## 2.4.2 Viewing the List of Tables

Information about all of the tables that exist in the database can be retrieved using the following `SELECT` statement. The `SYS_TABLES_` meta table is an internal system table that contains information about the database catalog provided by ALTIBASE HDB.

```
iSQL> SELECT * FROM system_.sys_tables_;
.
.
iSQL> SELECT * FROM tab;      -> This command is available in iSQL only.
USER NAME     TABLE NAME                        TYPE
----------------------------------------------------
.
.
```

## 2.4.3 Viewing a Table Structure

The following command is used to retrieve information on user-created tables:

```
DESC table_name;

CREATE TABLE departments (
DNO            SMALLINT     PRIMARY KEY,
DNAME          CHAR(30)     NOT NULL,
DEP_LOCATION   CHAR(9),
MGR_NO         INTEGER );

iSQL> DESC departments; -> table_name: The name of a table whose information (table structure)
                                        you want to know.
[ TABLESPACE : SYS_TBS_MEM_DATA ]
[ ATTRIBUTE ]
-----------------------------------------------------------
NAME                  TYPE                        IS NULL
-----------------------------------------------------------
DNO                   SMALLINT        FIXED       NOT NULL
DNAME                 CHAR(30)        FIXED       NOT NULL
DEP_LOCATION          CHAR(9)         FIXED
MGR_NO                INTEGER         FIXED
[ INDEX ]
-----------------------------------------------------------
NAME                  TYPE     IS UNIQUE     COLUMN
-----------------------------------------------------------
__SYS_IDX_ID_122      BTREE    UNIQUE        DNO ASC
[ PRIMARY KEY ]
-----------------------------------------------------------
DNO
```

## 2.4.4 Viewing Sequence Information

The following commands are used to obtain information on all sequences that exist in the database:

```
SELECT * FROM seq;

iSQL> CONNECT sys/manager;
Connect success.
iSQL> CREATE USER user1 IDENTIFIED BY user1;
Create success.
iSQL> CONNECT user1/user1;
Connect success.
iSQL> CREATE SEQUENCE seq1 MAXVALUE 100 CYCLE;
Create success.
iSQL> CREATE SEQUENCE seq2;
Create success.
iSQL> CONNECT sys/manager;
Connect success.
iSQL> CREATE SEQUENCE seq2 START WITH 20 INCREMENT BY 30;
Create success.
iSQL> CREATE SEQUENCE seq3 CACHE 40;
Create success.
iSQL> SELECT * FROM seq;        -> When accessing the database using the SYS account, information
                                   of all sequences will be displayed.
USER_NAME
--------------------------------------------
SEQUENCE_NAME                                CURRENT_VALUE
--------------------------------------------------------------------
INCREMENT_BY           MIN_VALUE              MAX_VALUE              CYCLE
```

```
----------------------------------------------------------------------------
CACHE_SIZE
-------------------------
SYS
SEQ2
30                     1                      9223372036854775806    NO
20
SYS
SEQ3
1                      1                      9223372036854775806    NO
40
USER1
SEQ1
1                      1                      100                    YES
20
USER1
SEQ2
1                      1                      9223372036854775806    NO
20
4 rows selected.
iSQL> CONNECT user1/user1;
Connect success.
iSQL> SELECT * FROM seq;     -> Information of all sequences created by user1 will be displayed.
SEQUENCE_NAME                             CURRENT_VALUE
--------------------------------------------------------------------
INCREMENT_BY           MIN_VALUE              MAX_VALUE              CYCLE
----------------------------------------------------------------------------
CACHE_SIZE
-------------------------
SEQ1
1                      1                      100                    YES
20
SEQ2
1                      1                      9223372036854775806    NO
20
2 rows selected.
```

# 2.5 Controlling Transactions

## 2.5.1 Defining Transaction Modes

`AUTOCOMMIT` determines whether to automatically commit the results of a command at the time of execution.

```
iSQL> AUTOCOMMIT OFF; -> Commands are not automatically committed before being manually
                         committed by the user.
Set autocommit off success.

iSQL> AUTOCOMMIT ON; -> Commands are automatically committed at the time of execution.
Set autocommit on success.
```

## 2.5.2 `PLANCOMMIT`

```
SET PLANCOMMIT [ON/OFF];
```

When `EXPLAIN PLAN` has been set to `ON` or `ONLY`, there is the possibility that the `iSQL` commands `DESC`, `SELECT * FROM TAB`, `SELECT * FROM SEQ` will be committed, even if `AUTOCOMMIT` has been set to `OFF`. This setting determines whether to commit them automatically.

This setting has been provided to overcome the misunderstanding where the user believes that such a command has not been prepared, but the system prepares the command in order to generate the execution plan. The command would then be committed, without the user knowing it, when a `COMMIT` command is executed later. When this value is `OFF` (which is the default) in a session for which `EXPLAIN PLAN` is `ON` (or `ONLY`) and `AUTOCOMMIT` is `OFF`, ALTIBASE HDB does not auto-commit the above commands (`DESC`, `SELECT * FROM TAB`, `SELECT * FROM SEQ`). When this value is `ON`, `iSQL` issues a special `COMMIT` command to commit these commands.

# 2.6 File Management

## 2.6.1 Saving Results

`iSQL` enables results returned through `iSQL` to be saved in a designated file. In the following example, results are stored in the designated file, `book.txt`, using the `SPOOL` command.

To cancel this command, use the `SPOOL OFF` command.

```
iSQL> SPOOL book.txt
Spool start. [book.txt] -> All subsequently executed commands and their results will be written to
                           book.txt. The file is created in the current directory.

iSQL> SPOOL OFF
Spool Stop -> From this point on, no more commands or results will be saved in the file.
```

## 2.6.2 Running Scripts

### 2.6.2.1 @ Command

```
@ file_name[.sql]
```

or

```
START file_name[.sql]
```

*`file_name[.sql]`*: The script file to be executed. If the filename extension is omitted, `iSQL` assumes the default command file extension (`.sql`).

When this command is executed, , `iSQL` executes all of the commands in the specified script file in sequence.

The `@` command performs the same function as `START`.

- An `EXIT` or `QUIT` command in the script file terminates `iSQL`.
- The script file may include general SQL statements, `iSQL` commands, references to stored procedures, etc.

The following is an example in which the `schema.sql` script, which can be found in the `$ALTIBASE_HOME/sample/APRE/schema` directory, which is the current directory, is executed.

```
iSQL> START schema.sql -> The SQL statements in the file are executed.
```

or

```
iSQL> @schema.sql
```

When specifying a script file, you can use a question mark (“?”) to indicate the ALTIBASE HDB home directory (`$ALTIBASE_HOME`) of the user account. The following is an example in which the `schema.sql` script, which can be found in the `$ALTIBASE_HOME/sample/APRE/schema` directory, is executed regardless of which directory is the current directory.

```
iSQL> @?/sample/APRE/schema/schema.sql
```

The question mark ("`?`") can also be used with the following `iSQL` commands:

`EDIT`, `SAVE`, `LOAD`, `SPOOL`, `START`

The `--` or `/**/` characters can be used to insert comments in script files. `--` means that everything that follows until the end of the line will be handled as a comment, whereas comments that span several lines are placed between `/*` and `*/`.

#### 2.6.2.2 @@ Command

`@@ file_name[.sql]`

`file_name[.sql]`: This indicates the embedded script to be executed. If the extension is omitted, `iSQL` assumes the default command file extension(`.sql`).

Executes the specified script. The functionality of the `@@` command is similar to that of the `@` command.

This command searches for script files in the same path as the script currently being executed, and is thus useful for executing embedded scripts.

The `@@` command can be used for the following purposes:

- If a script file that contains the text `@@file_name.sql` is executed, `iSQL` looks for the file specified by `file_name.sql`, and executes its contents in sequence.

  `file_name.sql` must be located in the same directory as the script file that called it. If no such file exists, `iSQL` raises an error.
- If a user inputs `@@file_name.sql` at the `iSQL` prompt, the result will be the same as when using `iSQL` to execute `@file_name.sql`.
- The script typically may include SQL statements, `iSQL` commands, or stored procedures.
- An `EXIT` or `QUIT` command in the script terminates `iSQL`.

The following is an example of the execution of `a.sql`, in which `schema.sql` is referenced, from the `$ALTIBASE_HOME` directory. In order for this example to be executed without error, `a.sql` must exist in the `$ALTIBASE_HOME/sample/APRE/schema` directory alongside `schema.sql`.

```
iSQL> @sample/APRE/schema/a.sql
```

```
$ cat a.sql
@@schema.sql
```

*Note: The following chapter provides examples of editing the results of a query in an `iSQL` environment based on the tables created by execution of the above script.*

### 2.6.3 Saving SQL Statements

Of the commands currently in the `iSQL` buffer, the `SAVE` command saves the most recently executed one in a file.

This file will be created in the current directory.

```
iSQL> SELECT * FROM book;
iSQL> SAVE book.sql ->'SELECT * FROM book;' is saved in the file book.sql.
Save completed.
```

## 2.6.4 Loading SQL Statements

This function loads the first command in the specified file to the last position in the `iSQL` buffer.

```
iSQL> LOAD book.sql
iSQL> SELECT * FROM book;
Load completed.

iSQL> / -> The results of execution of SELECT * FROM book; can be seen.
```

## 2.6.5 Saving DML Statements

Executed DML statements such as `INSERT`, `UPDATE`, `DELETE`, `MOVE` are saved in `$ALTIBASE_HOME/trc/isql_query.log`.

Specify `SET QUERYLOGGING ON` to use this functionality and `OFF` to disable it.

```
iSQL> SET QUERYLOGGING ON; -> From this point on, all executed DML statements will be saved in
                              $ALTIBASE_HOME/trc/isql_query.log.
iSQL> CREATE TABLE t1 ( I1 INTEGER );
Create success.
iSQL> INSERT INTO t1 VALUES ( 1 );
1 row inserted.
iSQL> UPDATE t1 SET i1 = 2;
1 row updated.
iSQL> SELECT * FROM t1;
I1
--------------
2
1 row selected.
iSQL> DELETE FROM t1;
1 row deleted.
iSQL> DROP TABLE t1;
Drop success.
iSQL> EXIT

$ cat $ALTIBASE_HOME/trc/isql_query.log -> All queries executed since SET QUERYLOGGING
                                           ON was executed can be observed.
[2009/09/16 10:36:14] [127.0.0.1:20300 SYS] INSERT INTO t1 VALUES ( 1 )
[2009/09/16 10:36:25] [127.0.0.1:20300 SYS] UPDATE t1 SET i1 = 2
[2009/09/16 10:36:31] [127.0.0.1:20300 SYS] DELETE FROM t1
```

## 2.6.6 Editing Query Statements

### 2.6.6.1 Editing the Most Recent Query Statement

The command `ed` is provided for creating and editing files in `iSQL`.

If you execute `ed` without parameters, a temporary file named `iSQL.buf` containing the most recently executed query statements will be created, and the following screen will be visible. (To save space, only a few of the blank lines that would be displayed on the screen are shown here.)

```
iSQL> SELECT sysdate FROM dual;
SYSDATE
---------------
01-JAN-2000
1 row selected.

iSQL> ED
SELECT sysdate FROM dual;
~
~
~
"iSQL.buf" 1L, 26C
```

### 2.6.6.2 Editing Existing Files

If you want to edit an existing file, type the file name in `iSQL` as a parameter when launching the text editor using the `ED` command. When the screen is initialized, blank lines will be displayed as ~ (tilde) characters.

```
iSQL> ED myquery.sql
"myquery.sql"
INSERT INTO employees(ENO, E_FIRSTNAME, E_LASTNAME, GENDER) VALUES(21, 'Shi-
loh', 'Reynolds', 'F');
INSERT INTO employees(ENO, E_FIRSTNAME, E_LASTNAME, GENDER, JOIN_DATE) VAL-
UES(22, 'Joshua', 'Baldwin', 'M', TO_DATE('2001-11-19 00:00:00', 'YYYY-MM-DD
HH:MI:SS'));
~
~"myquery.sql"
```

### 2.6.6.3 Editing Query Statements in History Lists

You can use the number in the history list to edit previously executed commands. In detail, the query statements are stored in the temporary file `iSQL.buf` in association with numbers, and can be edited with reference to them. The edited query will be stored again as the most recent record in the history list, and can be executed by entering the '/' (re-execute) character.

```
iSQL> H
1 : SELECT * FROM customers;
2 : SELECT * FROM employees;

iSQL> 2ed
```

or

```
iSQL> 2 ed
SELECT * FROM employees;
~
~
"iSQL.buf"
```

*Note: The command-line parameter 2, which is the name of the file to be edited (`iSQL> 2 ed`), must be distinguished from the number indicating the line in the file to edit.*

After editing (*employees* was replaced with *orders*)

```
iSQL> h -> The history list currently in the iSQL buffer
1 : SELECT * FROM customers;
2 : SELECT * FROM employees;
```

```
3 : SELECT * FROM orders; -> The query statement edited using the 2 ed command will be saved as
                             the last command in the history list.

iSQL> / -> The most recently executed command will be executed.
ONO                  ORDER_DATE   ENO         CNO
------------------------------------------------------------------------
GNO         QTY         ARRIVAL_DATE PROCESSING
------------------------------------------------------
11290007             29-NOV-2010  12          7111111431202
A111100002  70          02-DEC-2010  C
11290011             29-NOV-2010  12          7610011000001
E111100001  1000        05-DEC-2010  D
11290100             29-NOV-2010  19          7001011001001
E111100001  500         07-DEC-2010  D
12100277             10-DEC-2010  19          7610121220475
.
.
12310012             31-DEC-2010  19          7308281201145
C111100001  250         03-JAN-2011  O
30 rows selected.
```

# 2.7 Formatting `SELECT` Query Results

The results of a `SELECT` query can be formatted as desired by the user.

## 2.7.1 `SET LINESIZE`

`SET LINESIZE` sets the size (number of characters) of one line to be displayed when the results of a `SELECT` statement are output. It must be between 10 and 32767.

```
iSQL> set linesize 70;
iSQL> select * from employees;
ENO         E_LASTNAME            E_FIRSTNAME
------------------------------------------------------------
EMP_JOB          EMP_TEL          DNO         SALARY    GENDER
---------------------------------------------------------------------
BIRTH   JOIN_DATE    STATUS
---------------------------------
1           Moon                  Chan-seung
CEO              01195662365      3002                    M
                     R
2           Davenport             Susan
designer         0113654540                   1500        F
721219  18-NOV-2009  H
.
.
20 rows selected.
```

## 2.7.2 `SET LOBSIZE`

`SET LOBSIZE` specifies the number of characters to display when a CLOB column is queried using a `SELECT` statement.

In order to query CLOB column data using a `SELECT` statement, the transaction mode must first be set to `AUTOCOMMIT OFF`.

```
iSQL> CREATE TABLE c1(I1 INTEGER, I2 CLOB);
INSERT INTO c1 VALUES(1, 'A123456789');
INSERT INTO c1 VALUES(2, 'A1234');
INSERT INTO c1 VALUES(3, 'A12345');
INSERT INTO c1 VALUES(4, 'A1234567890123');

iSQL> AUTOCOMMIT OFF   -> This sets the transaction mode to OFF so that a CLOB column can be queried.
Set autocommit off success.

iSQL> SELECT * FROM c1;
I1        I2

----------------------------------------------------------------------------
--------------------
1         A123456789

2         A1234

3         A12345

4         A1234567890123

4 rows selected.
```

```
iSQL> SET LOBSIZE 10; -> This specifies the number of characters to display on the screen when
                         querying a CLOB column using a SELECT statement.

iSQL> SELECT * FROM c1;
I1          I2
--------------------------
1           A123456789
2           A1234
3           A12345
4           A123456789
4 rows selected.
```

## 2.7.3 SET LOBOFFSET

`SET LOBOFFSET` specifies the starting location from which to display CLOB data when a CLOB column is queried using a `SELECT` statement.

In order to query CLOB column data using a `SELECT` statement, the transaction mode must first be set to `AUTOCOMMIT OFF`.

```
iSQL> CREATE TABLE c1(I1 INTEGER, I2 CLOB);
INSERT INTO c1 VALUES(1, 'A123456789');
INSERT INTO c1 VALUES(2, 'A1234');
INSERT INTO c1 VALUES(3, 'A12345');
INSERT INTO c1 VALUES(4, 'A1234567890123');

iSQL> AUTOCOMMIT OFF
Set autocommit off success.

iSQL> SET LOBOFFSET 4; -> This specifies the starting location of data to be shown on the screen
                          when querying a CLOB column using a SELECT statement.

iSQL> SELECT * FROM c1;
I1          I2
--------------------------
1           456789
2           4
3           45
4           4567890123
4 rows selected.
```

## 2.7.4 SET FEEDBACK

`SET FEEDBACK` outputs the number of records found when the results of a `SELECT` statement are output.

```
SET FEEDBACK ON|OFF|n;
```

`ON`: Output the number of resultant records after execution of a `SELECT` statement.
`OFF`: Do not output the number of resultant records after execution of a `SELECT` statement.
`n`: Output the number of resultant records when the number is n or greater.

```
iSQL> set feedback on;
iSQL> select * from employees where eno < 3;
ENO         E_LASTNAME            E_FIRSTNAME
------------------------------------------------------------
EMP_JOB          EMP_TEL          DNO          SALARY    GENDER
```

```
---------------------------------------------------------------------
BIRTH   JOIN_DATE    STATUS
---------------------------------
1           Moon                  Chan-seung
CEO              01195662365      3002                    M
                     R
2           Davenport             Susan
designer        0113654540                    1500        F
721219  18-NOV-2009  H
2 rows selected.
```

## 2.7.5 SET PAGESIZE

`SET PAGESIZE` specifies the number of resultant rows to display at one time.

```
iSQL> SET PAGESIZE 2; -> Show results in groups comprising two rows each.
iSQL> select eno, e_firstname, e_lastname from employees;
ENO         E_FIRSTNAME           E_LASTNAME
------------------------------------------------------------
1           Chan-seung            Moon
2           Susan                 Davenport
ENO         E_FIRSTNAME           E_LASTNAME
------------------------------------------------------------
3           Ken                   Kobain
4           Aaron                 Foster
ENO         E_FIRSTNAME           E_LASTNAME
------------------------------------------------------------
5           Farhad                Ghorbani
6           Ryu                   Momoi
.
.
.
20 rows selected.
```

```
iSQL> SET PAGESIZE 0; -> Show all of the results on one page.
iSQL> select eno, e_firstname, e_lastname from employees;
ENO         E_FIRSTNAME           E_LASTNAME
------------------------------------------------------------
1           Chan-seung            Moon
2           Susan                 Davenport
3           Ken                   Kobain
4           Aaron                 Foster
5           Farhad                Ghorbani
6           Ryu                   Momoi
.
.
.
20 rows selected.
```

## 2.7.6 SET HEADING

`SET HEADING` sets whether to output the header with a `SELECT` result.

```
iSQL> SET HEADING OFF; -> Header is not displayed with the result.
iSQL> select eno, e_firstname, e_lastname from employees;

1           Chan-seung            Moon
2           Susan                 Davenport
3           Ken                   Kobain
4           Aaron                 Foster
```

```
5           Farhad                Ghorbani
6           Ryu                   Momoi
.
.
.
20 rows selected.

iSQL> SET HEADING ON; -> Outputs header in result.
iSQL> select eno, e_firstname, e_lastname from employees;
ENO         E_FIRSTNAME           E_LASTNAME
------------------------------------------------------------
1           Chan-seung            Moon
2           Susan                 Davenport
3           Ken                   Kobain
4           Aaron                 Foster
5           Farhad                Ghorbani
6           Ryu                   Momoi
.
.
.
20 rows selected.
```

## 2.7.7 SET COLSIZE

When the results of a `SELECT` statement are output, `SET COLSIZE` sets the number of characters from a column of type CHAR or VARCHAR to display so that columns containing long lines of text can be easily viewed.

In the following example, the number of characters of a column of type CHAR or VARCHAR is set to 7:

```
iSQL> CREATE TABLE location(
ID        INTEGER,
NAME      CHAR(20),
ADDRESS   VARCHAR(500),
PHONE     CHAR(20));
Create success.
iSQL> INSERT INTO location VALUES(1, 'ALTIBASE', '10Fl., Daerungpost-tower
II, Guro-dong, Guro-qu, Seoul 152-790. Korea', '82-2-2082-1000');
1 row inserted.

iSQL> SET COLSIZE 7;
iSQL> SELECT id, name, address, phone FROM location;
ID          NAME     ADDRESS  PHONE
--------------------------------------------
1           ALTIBAS  10Fl.,   82-2-20
            E        Daerung  82-1000
                     post-to
                     wer II,
                      Guro-d
                     ong, Gu
                     ro-qu,
                     Seoul 1
                     52-790.
                      Korea
1 row selected.
```

## 2.7.8 SET NUM[WIDTH]

`SET NUM[WIDTH]` sets the number of characters to display for data of NUMERIC, DECIMAL, NUMBER and FLOAT columns in `SELECT` result sets. Data with many significant digits can be made more legible by setting this value high.

The following example sets `NUMWIDTH` to 30, and then queries NUMERIC, DECIMAL, NUMBER and FLOAT columns.

```
iSQL> CREATE TABLE t1
(
c_numeric NUMERIC(38, 0),
c_decimal DECIMAL(38, 0),
c_number NUMBER(38, 0),
c_float FLOAT(38)
);
Create success.
iSQL> INSERT INTO t1 VALUES(12345678901234567890, 12345678901234567890,
12345678901234567890, 12345678901234567890);
1 row inserted.

iSQL> SET NUMWIDTH 30
iSQL> SELECT c_numeric, c_decimal, c_number, c_float FROM t1;
C_NUMERIC C_DECIMAL
-----------------------------------------------------------------
C_NUMBER C_FLOAT
-----------------------------------------------------------------
12345678901234567890 12345678901234567890
12345678901234567890 12345678901234567890
1 row selected.
```

# 2.8 Setting Output Options

## 2.8.1 Getting the Elapsed Time

This function displays the time it took to execute the SQL statement.

```
iSQL> SET TIMING ON; -> Output the execution time in the last line after the command is executed.
iSQL> select eno, e_firstname, e_lastname from employees;
ENO         E_FIRSTNAME           E_LASTNAME
------------------------------------------------------------
1           Chan-seung            Moon
2           Susan                 Davenport
3           Ken                   Kobain
4           Aaron                 Foster
5           Farhad                Ghorbani
6           Ryu                   Momoi
.
.
.
20 rows selected.
elapsed time : 0.01
iSQL> SET TIMING OFF; -> Execution time is not displayed.
```

## 2.8.2 Setting Execution Time Units for Output

This function sets the units with which to output SQL statement execution time. Can be set to the following units:

- Seconds
- Milliseconds
- Microseconds
- Nanoseconds

```
iSQL> SET TIMING ON
iSQL> SET TIMESCALE SEC;
iSQL> select eno, e_firstname, e_lastname from employees;
ENO         E_FIRSTNAME           E_LASTNAME
------------------------------------------------------------
1           Chan-seung            Moon
2           Susan                 Davenport
3           Ken                   Kobain
4           Aaron                 Foster
5           Farhad                Ghorbani
6           Ryu                   Momoi
.
.
.
20 rows selected.
elapsed time : 0.00

iSQL> SET TIMESCALE MILSEC;
iSQL> select eno, e_firstname, e_lastname from employees;
ENO         E_FIRSTNAME           E_LASTNAME
------------------------------------------------------------
1           Chan-seung            Moon
```

```
2           Susan                 Davenport
3           Ken                   Kobain
4           Aaron                 Foster
5           Farhad                Ghorbani
6           Ryu                   Momoi
.
.
.
20 rows selected.
elapsed time : 0.72

iSQL> SET TIMESCALE MICSEC;
iSQL> select eno, e_firstname, e_lastname from employees;
ENO         E_FIRSTNAME           E_LASTNAME
------------------------------------------------------------
1           Chan-seung            Moon
2           Susan                 Davenport
3           Ken                   Kobain
4           Aaron                 Foster
5           Farhad                Ghorbani
6           Ryu                   Momoi
.
.
.
20 rows selected.
elapsed time : 966.00

iSQL> SET TIMESCALE NANSEC;
iSQL> select eno, e_firstname, e_lastname from employees;
ENO         E_FIRSTNAME           E_LASTNAME
------------------------------------------------------------
1           Chan-seung            Moon
2           Susan                 Davenport
3           Ken                   Kobain
4           Aaron                 Foster
5           Farhad                Ghorbani
6           Ryu                   Momoi
.
.
.
20 rows selected.
elapsed time : 681000.00
```

## 2.8.3 Describing Foreign Key Information

This function displays information on foreign keys when the `DESC` command is used to view the table structure.

```
iSQL> SET FOREIGNKEYS ON; -> The foreign key information will be output.
iSQL> DESC bikes_ive_seen;
[ TABLESPACE : SYS_TBS_MEM_DATA ]
[ ATTRIBUTE ]
----------------------------------------------------------------------------
NAME                                     TYPE                        IS NULL
----------------------------------------------------------------------------
MID                                      SMALLINT        FIXED
YEAR                                     SMALLINT        FIXED       NOT NULL
USED                                     BIT(1)          FIXED       NOT NULL
SOLD                                     BIT(1)          FIXED
KMS                                      INTEGER         FIXED
SAW_WHERE                                VARCHAR(20)     FIXED
ITEM_ID                                  INTEGER         FIXED       NOT NULL
```

```
COMMENT                                  VARCHAR(100)    FIXED
PRICE                                    INTEGER         FIXED       NOT NULL
DATE_SEEN                                DATE            FIXED
[ INDEX ]
----------------------------------------------------------------------------
NAME                                     TYPE     IS UNIQUE     COLUMN
----------------------------------------------------------------------------
__SYS_IDX_ID_143                         BTREE    UNIQUE        ITEM_ID ASC
[ PRIMARY KEY ]
----------------------------------------------------------------------------
ITEM_ID

[ FOREIGN KEYS ]
----------------------------------------------------------------------------
* MODEL_ID                              * __SYS_IDX_ID_142
( MID )                           --->  SYS.CANDIDATE_MODELS ( MID )
iSQL> SET FOREIGNKEYS OFF; -> The foreign key information will not be output.
iSQL> DESC bikes_ive_seen;
[ TABLESPACE : SYS_TBS_MEM_DATA ]
[ ATTRIBUTE ]
----------------------------------------------------------------------------
NAME                                     TYPE                           IS NULL
----------------------------------------------------------------------------
MID                                      SMALLINT        FIXED
YEAR                                     SMALLINT        FIXED       NOT NULL
USED                                     BIT(1)          FIXED       NOT NULL
SOLD                                     BIT(1)          FIXED
KMS                                      INTEGER         FIXED
SAW_WHERE                                VARCHAR(20)     FIXED
ITEM_ID                                  INTEGER         FIXED       NOT NULL
COMMENT                                  VARCHAR(100)    FIXED
PRICE                                    INTEGER         FIXED       NOT NULL
DATE_SEEN                                DATE            FIXED
[ INDEX ]
----------------------------------------------------------------------------
NAME                                     TYPE     IS UNIQUE     COLUMN
----------------------------------------------------------------------------
__SYS_IDX_ID_143                         BTREE    UNIQUE        ITEM_ID ASC
[ PRIMARY KEY ]
----------------------------------------------------------------------------
ITEM_ID
iSQL>
```

## 2.8.4 Describing CHECK Constraints Information

This function displays information on CHECK constraints when the `DESC` command is used to view the table structure.

```
iSQL> SET CHKCONSTRAINTS ON;          -> Check constraint information is output.
iSQL> DESC employees;
[ TABLESPACE : SYS_TBS_MEM_DATA ]
[ ATTRIBUTE ]
----------------------------------------------------------------------------
--
NAME                                     TYPE                           IS NULL
----------------------------------------------------------------------------
--
ENO                                      INTEGER         FIXED       NOT NULL
E_LASTNAME                               CHAR(20)        FIXED       NOT NULL
E_FIRSTNAME                              CHAR(20)        FIXED       NOT NULL
EMP_JOB                                  VARCHAR(15)     FIXED
EMP_TEL                                  CHAR(15)        FIXED
```

```
DNO                                      SMALLINT        FIXED
SALARY                                   NUMERIC(10, 2)  FIXED
GENDER                                   CHAR(1)         FIXED
BIRTH                                    CHAR(6)         FIXED
JOIN_DATE                                DATE            FIXED
STATUS                                   CHAR(1)         FIXED
[ INDEX ]
----------------------------------------------------------------------------
--
NAME                                     TYPE     IS UNIQUE     COLUMN
----------------------------------------------------------------------------
--
__SYS_IDX_ID_238                         BTREE    UNIQUE        ENO ASC
EMP_IDX1                                 BTREE                  DNO ASC
[ PRIMARY KEY ]
----------------------------------------------------------------------------
--
ENO

[ CHECK CONSTRAINTS ]
----------------------------------------------------------------------------
--
NAME      : EMP_CHECK_SEX1
CONDITION : GENDER in ('M', 'F')

iSQL> SET CHKCONSTRAINTS OFF;       -> Check constraint information is not output.
iSQL> DESC employees;
[ TABLESPACE : SYS_TBS_MEM_DATA ]
[ ATTRIBUTE ]
----------------------------------------------------------------------------
--
NAME                                     TYPE                        IS NULL
----------------------------------------------------------------------------
--
ENO                                      INTEGER         FIXED       NOT NULL
E_LASTNAME                               CHAR(20)        FIXED       NOT NULL
E_FIRSTNAME                              CHAR(20)        FIXED       NOT NULL
EMP_JOB                                  VARCHAR(15)     FIXED
EMP_TEL                                  CHAR(15)        FIXED
DNO                                      SMALLINT        FIXED
SALARY                                   NUMERIC(10, 2)  FIXED
GENDER                                   CHAR(1)         FIXED
BIRTH                                    CHAR(6)         FIXED
JOIN_DATE                                DATE            FIXED
STATUS                                   CHAR(1)         FIXED
[ INDEX ]
----------------------------------------------------------------------------
--
NAME                                     TYPE     IS UNIQUE     COLUMN
----------------------------------------------------------------------------
--
__SYS_IDX_ID_238                         BTREE    UNIQUE        ENO ASC
EMP_IDX1                                 BTREE                  DNO ASC
[ PRIMARY KEY ]
----------------------------------------------------------------------------
--
ENO
```

### 2.8.5 Outputting Script Execution Results

Commands can be used to control the output of created results.

When set to `OFF`, this function prevents the result of a script command executed in `iSQL` from being displayed on the screen.

However, even if it is set `OFF`, the results of queries that are directly entered (e.g. `iSQL> SELECT * FROM t1;`) will still be displayed on the screen; the `OFF` setting only prevents script execution results (e.g.: `iSQL> @.sql`) from being displayed.

```
iSQL> SET TERM OFF;
iSQL> SET TIMING ON; -> The execution time is not output to the screen.
iSQL> @schema.sql -> The script execution results are not output.
iSQL> select eno, e_firstname, e_lastname from employees;
 -> The results of directly input queries will be output.
ENO         E_FIRSTNAME           E_LASTNAME
------------------------------------------------------------
1           Chan-seung            Moon
2           Susan                 Davenport
3           Ken                   Kobain
4           Aaron                 Foster
5           Farhad                Ghorbani
6           Ryu                   Momoi
.
.
.
20 rows selected.
elapsed time : 0.00

iSQL> SET TERM ON; -> Script execution results will be output.
iSQL> @schema.sql
iSQL> ALTER SESSION SET AUTOCOMMIT = TRUE; -> Start of results.
Alter success.
iSQL> DROP TABLE ORDERS;
Drop success.
elapsed time : 0.00
iSQL> DROP TABLE EMPLOYEES;
Drop success.
elapsed time : 0.00
.
.
.
iSQL> CREATE INDEX ODR_IDX3 ON ORDERS (GNO ASC);
Create success.
elapsed time : 0.00 -> End of results.
```

## 2.8.6 Outputting an Execution Plan

In `iSQL`, an execution plan can be output to fine-tune SQL statements. Using an execution plan, DML statements such as `SELECT`, `INSERT`, `UPDATE`, and `DELETE` can be checked.

In order to accomplish this, the following command must be executed before a statement such as a `SELECT` statement is executed.

```
ALTER SESSION SET EXPLAIN PLAN = option
```

This option can be set to `ON`, `OFF`, or `ONLY`. The default is `OFF`.

- `ON`: After the `SELECT` statement is executed, the execution plan information is displayed along with the resultant records.
- `ONLY`: The `SELECT` statement is prepared but not executed, and only the execution plan information is output.This can be used to check the execution plan for a `SELECT` statement

that involves host variable binding, or to quickly check the execution plan for queries that take a long time to execute.

- `OFF`: After the `SELECT` statement is executed, only the resultant records are displayed.

The following command is used to obtain detailed information about how conditions included in `WHERE` clauses written by the user will be executed:

```
ALTER SYSTEM SET TRCLOG_DETAIL_PREDICATE = 1
```

If this property is set to `1`, signifying "`ON`", as in the above statement, the execution plan's `WHERE` clause conditions, including `FIXED KEY RANGE`, `VARIABLE KEY RANGE`, and `FILTER` are classified and displayed in detail. Therefore, if the `WHERE` clause is complicated, you can check which predicates will be executed by scanning the sorted indexes. However, this information may not be output if queries are changed to optimize them in some way.

The following example shows the output when the given SQL statement is executed:

- When `TRCLOG_DETAIL_PREDICATE` has been set to `1` (`ON`), and `EXPLAIN PLAN=ON`, the following is output in addition to the results.

```
iSQL> ALTER SYSTEM SET TRCLOG_DETAIL_PREDICATE = 1;
Alter success.
iSQL> ALTER SESSION SET EXPLAIN PLAN = ON;
Alter success.
iSQL> select eno, e_lastname, e_firstname from employees where eno = 1;
ENO         E_LASTNAME           E_FIRSTNAME
------------------------------------------------------------
1           Moon                 Chan-seung
1 row selected.
------------------------------------------------------------
PROJECT ( COLUMN_COUNT: 3, TUPLE_SIZE: 48 )
 SCAN ( TABLE: EMPLOYEES, INDEX: __SYS_IDX_ID_164, ACCESS: 1, SELF_ID: 2
)
  [ FIXED KEY ]
  AND
   OR
    ENO = 1
------------------------------------------------------------

iSQL>
```

- When `TRCLOG_DETAIL_PREDICATE` is not set to `1`, and `EXPLAIN PLAN=ON`, the following is output in addition to the results.

```
iSQL> ALTER SYSTEM SET TRCLOG_DETAIL_PREDICATE = 0;
Alter success.
iSQL> ALTER SESSION SET EXPLAIN PLAN = ON;
Alter success.
iSQL> select eno, e_lastname, e_firstname from employees where eno = 1;
ENO         E_LASTNAME           E_FIRSTNAME
------------------------------------------------------------
1           Moon                 Chan-seung
1 row selected.
------------------------------------------------------------
PROJECT ( COLUMN_COUNT: 3, TUPLE_SIZE: 48 )
 SCAN ( TABLE: EMPLOYEES, INDEX: __SYS_IDX_ID_164, ACCESS: 1, SELF_ID: 2
------------------------------------------------------------

iSQL>
```

- When `TRCLOG_DETAIL_PREDICATE` is not set to `1`, and `EXPLAIN PLAN=ONLY`, only the following is output.

```
iSQL> ALTER SYSTEM SET TRCLOG_DETAIL_PREDICATE = 0;
Alter success.
iSQL> ALTER SESSION SET EXPLAIN PLAN = ONLY;
Alter success.
iSQL> select eno, e_lastname, e_firstname from employees where eno = 1;
ENO         E_LASTNAME            E_FIRSTNAME
------------------------------------------------------------
No rows selected.
------------------------------------------------------------
PROJECT ( COLUMN_COUNT: 3, TUPLE_SIZE: 48 )
 SCAN ( TABLE: EMPLOYEES, INDEX: __SYS_IDX_ID_164, ACCESS: 1, SELF_ID: 2
------------------------------------------------------------

iSQL>
```

If `EXPLAIN PLAN=ONLY`, because only an execution plan is created and the query is not executed, values that would be determined after actual execution are indicated using question marks ("`??`"), like an `ACCESS` clause.

## 2.8.7 Setting Result Output Orientation

When querying data using a `SELECT` statement in `iSQL`, the results can be displayed either horizontally or vertically.

This function is suitable for outputting results that comprise a small number of rows and many columns.

If such a result set is output horizontally, as is usually the case, it is difficult to compare columns and check the values. However, it is easy to see when output vertically.

```
iSQL> SET VERTICAL ON; --> This sets the print direction vertically.
iSQL> SELECT * FROM employees WHERE eno = 2;
ENO         : 2
E_LASTNAME  : Davenport
E_FIRSTNAME : Susan
EMP_JOB     : designer
EMP_TEL     : 0113654540
DNO         :
SALARY      : 1500
GENDER      : F
BIRTH       : 721219
JOIN_DATE   : 18-NOV-2009
STATUS      : H

1 row selected.
```

# 2.9 Viewing `iSQL` Display Settings

The following is an example of viewing the values of the `iSQL` environment variables for the current session:

```
iSQL> SHOW USER -> This is the current user.
User : SYS

iSQL> SHOW COLSIZE
ColSize  : 0

iSQL> SHOW LOBOFFSET
LobOffset: 0

iSQL> SHOW LINESIZE
LineSize : 80

iSQL> SHOW LOBSIZE
LobSize  : 80

iSQL> SHOW NUMWIDTH
NumWidth : 11

iSQL> SHOW PAGESIZE
PageSize : 0

iSQL> SHOW TIMESCALE
TimeScale : Second

iSQL> SHOW HEADING
Heading : On

iSQL> SHOW TIMING
Timing : Off

iSQL> SHOW VERTICAL
Vertical  : Off

iSQL> SHOW CHKCONSTRAINTS
ChkConstraints : Off

iSQL> SHOW FOREIGNKEYS
ForeignKeys : Off

iSQL> SHOW PLANCOMMIT
PlanCommit : Off

iSQL> SHOW QUERYLOGGING
QueryLogging : Off

iSQL> SHOW TERM
Term : On

iSQL> SHOW FEEDBACK
Feedback : 1

iSQL> SHOW ALL
User      : SYS
ColSize   : 0
LobOffset : 0
LineSize  : 80
LobSize   : 80
NumWidth  : 11
```

```
PageSize  : 0
TimeScale : Second
Heading   : On
Timing    : Off
Vertical  : Off
ChkConstraints : Off
ForeignKeys : Off
PlanCommit : Off
QueryLogging : Off
Term : On
Feedback : 1
```

# 2.10 Host Variables

Host variables are first declared and then used. Host variables are useful when executing procedures or functions.

## 2.10.1 Declaring a Host Variable

### 2.10.1.1 Syntax

```
VAR[IABLE] var_name[INPUT|OUTPUT|INOUTPUT] var_type
```

On omission of `INPUT` or `OUTPUT` specification, the default value is `INPUT`.

### 2.10.1.2 Types

The following types can be used when declaring variables:

```
INTEGER, BYTE(n), NIBBLE(n),
NUMBER, NUMBER(n), NUMBER(n,m),
NUMERIC, NUMERIC(n), NUMERIC(n,m),
CHAR(n), VARCHAR(n), NCHAR(n), NVARCHAR(n), DATE
DECIMAL, DECIMAL(n), DECIMAL(n,m),
FLOAT, FLOAT(n), DOUBLE, REAL
BIGINT, SMALLINT
```

### 2.10.1.3 Example

The following examples demonstrate how to declare variables:

```
iSQL> VAR p1 INTEGER
iSQL> VAR p2 CHAR(10)
iSQL> VAR v_double DOUBLE
iSQL> VAR v_real REAL
```

## 2.10.2 Assigning a Value to a Host Variable

### 2.10.2.1 Syntax

```
EXEC[UTE] :var_name := value;
```

### 2.10.2.2 Example

The following example shows how to assign a value to a variable:

```
iSQL> EXECUTE :p1 := 100;
Execute success.
iSQL> EXEC :p2 := 'abc';
Execute success.
```

## 2.10.3 Viewing Host Variables

### 2.10.3.1 Syntax

`PRINT VAR[IABLE]`

-> Shows all declared variables.

`PRINT var_name`

-> Shows the type and value of the variable *`var_name`*.

### 2.10.3.2 Example

The following shows the values of all declared variables:

```
iSQL> PRINT VAR
[ HOST VARIABLE ]
-------------------------------------------------------
NAME                    TYPE                    VALUE
-------------------------------------------------------
P1                      INTEGER                 100
P2                      CHAR(10)                abc
V_REAL                  REAL
V_DOUBLE                DOUBLE

iSQL> PRINT p2 -> Outputs only variable p2 information.
NAME                    TYPE                    VALUE
-------------------------------------------------------
P2                      CHAR(10)                abc
```

# 2.11 Executing Prepared SQL Statements

## 2.11.1 Prepared SQL versus Dynamic SQL Statements

SQL statements executed in `iSQL` are usually executed according to the so-called “direct execution” method.

In direct execution, syntax analysis, validity testing, optimization, and execution of a query are all performed at once. However, in prepared execution, only the syntax analysis, validity testing, and optimization of the query are performed to set up an execution plan for the query, which is then executed when requested by the client. When creating an application that uses ODBC, the prepared execution method is typically used, and is more advantageous in terms of speed when a SQL statement is to be repeatedly executed using host variable binding.

In `iSQL`, the difference between these two methods lies only in whether variables are used or not; there is no advantage in terms of speed.

## 2.11.2 Prepared SQL Statements

### 2.11.2.1 Syntax

```
PREPARE SQL_statement
```

### 2.11.2.2 Example

The following is an example of the use of the `PREPARE` command to execute a SQL statement:

```
iSQL> VAR t1 INTEGER;
iSQL> EXEC :t1 := 3;
Execute success.
iSQL> PREPARE SELECT eno, e_firstname, e_lastname, gender
 FROM employees
 WHERE eno=:t1;
ENO
    : 3
E_FIRSTNAME : Ken
E_LASTNAME  : Kobain
GENDER      : M

1 row selected.
```

# 2.12 Creating, Executing, and Dropping Stored Procedures

## 2.12.1 Creating Procedures

Support is provided for the creation and execution of stored procedures. A stored procedure must end with the following:

```
END;
/
```

Successful creation of the procedures can be confirmed by checking the `sys_procedures_` meta table.

## 2.12.2 Executing Procedures

Procedures are executed in order to execute multiple queries at one time. If the procedure to be executed has parameters, as many variables as there are parameters must be declared before the procedure is executed.

### 2.12.2.1 Example 1

In the following example, a procedure named *emp_proc*, which executes an `INSERT` statement using `IN` parameters, is created:

```
iSQL> CREATE OR REPLACE PROCEDURE emp_proc(p1 IN INTEGER, p2 IN CHAR(20), p3 
IN CHAR(20), p4 IN CHAR(1))
 AS
 BEGIN
 INSERT INTO employees(eno, e_firstname, e_lastname, gender)
 VALUES(p1, p2, p3, p4);
 END;
 /
Create success.
iSQL> SELECT * FROM system_.sys_procedures_ order by created desc limit 1;
USER_ID     PROC_OID
------------------------------------
PROC_NAME                                 OBJECT_TYPE STATUS
----------------------------------------------------------------------
PARA_NUM    RETURN_DATA_TYPE RETURN_LANG_ID RETURN_SIZE
-------------------------------------------------------------
RETURN_PRECISION RETURN_SCALE PARSE_NO    PARSE_LEN   CREATED
-------------------------------------------------------------------------
LAST_DDL_TIME
----------------
2           3208680
EMP_PROC                                  0           0
4
                        2           192         29-FEB-2012
29-FEB-2012
1 row selected.
```

*emp_proc*, which was created above, is executed:

```
iSQL> VAR eno INTEGER
iSQL> VAR first_name CHAR(20)
iSQL> VAR last_name CHAR(20)
iSQL> VAR gender CHAR(1)
iSQL> EXECUTE :eno := 21;
Execute success.
iSQL> EXECUTE :first_name := 'Joel';
Execute success.
iSQL> EXECUTE :last_name := 'Johnson';
Execute success.
iSQL> EXECUTE :gender := 'M';
Execute success.
iSQL> EXECUTE emp_proc(:eno, :first_name, :last_name, :gender);
Execute success.
iSQL> SELECT eno, e_firstname, e_lastname, gender FROM employees WHERE eno = 
21;
ENO         E_FIRSTNAME           E_LASTNAME          GENDER
-----------------------------------------------------------------
21          Joel                  Johnson               M
1 row selected.
```

### 2.12.2.2 Example 2

In the following example, a procedure called *outProc*, which executes a `SELECT` statement, is created:

```
iSQL> CREATE TABLE outTbl(i1 INTEGER, i2 INTEGER);
Create success.
iSQL> INSERT INTO outTbl VALUES(1,1);
1 row inserted.
iSQL> /
1 row inserted.
iSQL> /
1 row inserted.
iSQL> /
1 row inserted.
iSQL> /
1 row inserted.
iSQL> SELECT * FROM outTbl;
I1          I2
---------------------------
1           1
1           1
1           1
1           1
1           1
5 rows selected.
iSQL> CREATE OR REPLACE PROCEDURE outProc(a1 OUT INTEGER, a2 IN OUT INTEGER)
AS
BEGIN
 SELECT COUNT(*) INTO a1 FROM outTbl WHERE i2 = a2;
END;
/
Create success.
```

In the following example, *outProc* is executed:

```
iSQL> VAR t3 INTEGER
iSQL> VAR t4 INTEGER
iSQL> EXEC :t4 := 1;
Execute success.
iSQL> EXEC outProc (:t3, :t4);
Execute success.
```

```
iSQL> PRINT t3;
NAME                 TYPE                 VALUE
------------------------------------------------------
T3                   INTEGER              5
```

### 2.12.2.3 Example 3

In the following example, the procedure *outProc1* is created:

```
iSQL> CREATE OR REPLACE PROCEDURE outProc1( p1 INTEGER, p2 IN OUT INTEGER, p3
OUT INTEGER)
AS
BEGIN
 p2 := p1;
 p3 := p1 + 100;
END;
/
Create success.

iSQL> VAR v1 INTEGER
iSQL> VAR v2 INTEGER
iSQL> VAR v3 INTEGER
iSQL> EXEC :v1 := 3;
Execute success.
iSQL> EXEC outProc1(:v1, :v2, :v3);
Execute success.

iSQL> PRINT VAR;
[ HOST VARIABLE ]
-------------------------------------------------------
NAME                 TYPE                 VALUE
-------------------------------------------------------
.
.
V1                   INTEGER              3
V2                   INTEGER              3
V3                   INTEGER              103
.
.
```

### 2.12.2.4 Example 4

In the following example, a procedure called *inoutProc1*, which executes a `SELECT` statement, is created:

```
iSQL> CREATE TABLE inoutTbl(i1 INTEGER);
Create success.
iSQL> INSERT INTO inoutTbl VALUES(1);
1 row inserted.
iSQL> /
1 row inserted.
iSQL> /
1 row inserted.
iSQL> SELECT * FROM inoutTbl;
I1
--------------
1
1
1
3 rows selected.
iSQL> CREATE OR REPLACE PROCEDURE inoutProc (a1 IN OUT INTEGER)
```

```
AS
BEGIN
 SELECT COUNT(*) INTO a1 FROM inoutTbl WHERE i1 = a1;
END;
/
Create success.

iSQL> VAR t3 INTEGER
iSQL> EXEC :t3 := 1;
Execute success.
iSQL> EXEC inoutProc(:t3);
Execute success.

iSQL> PRINT t3;
NAME                 TYPE                 VALUE
-------------------------------------------------------
T3                   INTEGER              3
```

### 2.12.2.5 Example 5

In the following example, the procedure *inoutProc1* is created:

```
iSQL> CREATE OR REPLACE PROCEDURE inoutProc1( p1 INTEGER, p2 IN OUT INTEGER,
p3 OUT INTEGER)
AS
BEGIN
 p2 := p1 + p2;
 p3 := p1 + 100;
END;
/
Create success.
```

In the following example, the procedure *inoutProc1* is executed:

```
iSQL> VAR v1 INTEGER
iSQL> VAR v2 INTEGER
iSQL> VAR v3 INTEGER
iSQL> EXEC :v1 := 3;
Execute success.

iSQL> EXEC :v2 := 5;
Execute success.

iSQL> EXEC inoutProc1(:v1, :v2, :v3);
Execute success.

iSQL> PRINT VAR;
[ HOST VARIABLE ]
-------------------------------------------------------
NAME                 TYPE                 VALUE
-------------------------------------------------------
.
.
V1                   INTEGER              3
V2                   INTEGER              8
V3                   INTEGER              103
.
.
```

### 2.12.3 Dropping Procedures

The `DROP` command is used to drop (delete) procedures.

In the following example, the procedure *emp_proc* is deleted:

```
iSQL> DROP PROCEDURE emp_proc;
Drop success.
```

# 2.13 Creating, Executing, and Dropping Functions

## 2.13.1 Creating Functions

A function is provided to create functions. When creating a function, you must end with the following syntax, and the return type must be defined.

```
END;
/
```

Successful creation of the function can be confirmed by checking the `sys_procedures_` meta table.

In the following example, the function *emp_func*, which executes an `UPDATE` statement and a `SELECT` statement, is created:

```
iSQL> CREATE OR REPLACE FUNCTION emp_func(f1 IN INTEGER)
RETURN NUMBER
AS
 f2 NUMBER;
BEGIN
 UPDATE employees SET salary = 1000000 WHERE eno = f1;
 SELECT salary INTO f2 FROM employees WHERE eno = f1;
 RETURN f2;
END;
/
Create success.

iSQL> SELECT * FROM system_.sys_procedures_;
USER_ID     PROC_OID               PROC_NAME
----------------------------------------------------------------------------
---
OBJECT_TYPE STATUS      PARA_NUM    RETURN_DATA_TYPE RETURN_LANG_ID
--------------------------------------------------------------------------
RETURN_SIZE RETURN_PRECISION RETURN_SCALE PARSE_NO    PARSE_LEN
------------------------------------------------------------------------
CREATED      LAST_DDL_TIME
------------------------------
.
.
.
2           3300024              INOUTPROC1
0           0           3
                                    2           132
15-SEP-2010  15-SEP-2010
2           3302344              EMP_FUNC
1           0           1           6           30000
23          38          0           3           209
15-SEP-2010  15-SEP-2010
36 rows selected.
```

## 2.13.2 Executing Functions

Functions can be executed to simultaneously execute multiple queries. If the function to be executed has parameters, as many variables as there are functions must be declared before the function is executed. Additionally, a variable for saving the result of the function must also be defined.

The following is an example of executing the function *emp_func*:

```
iSQL> VAR eno INTEGER
iSQL> VAR ret NUMBER
iSQL> EXEC :eno := 11;
Execute success.
iSQL> EXEC :ret := emp_func(:eno);
Execute success.

iSQL> SELECT eno, salary FROM employees WHERE eno = 11;
ENO         SALARY
---------------------------
11          1000000
1 row selected.
```

## 2.13.3 Dropping Functions

The `DROP FUNCTION` statement is used to drop functions.

In the following example, the function *emp_func* is deleted:

```
iSQL> DROP FUNCTION emp_func;
Drop success.
```

# 2.14 Convenient User Functions

## 2.14.1 History

A list of all previously executed commands can be displayed using the `HISTORY` command. The number corresponding to a previously executed command can be used to easily execute that command again.

```
iSQL> HISTORY;  -> View history list.
```

or

```
iSQL> H;
1 : SELECT * FROM tab;
2 : SELECT * FROM v$tab;

iSQL> / -> Re-execute the most recent command (HISTORY;)
iSQL> 2/ -> Execute command number 2 in history list (SELECT * FROM book;)
```

## 2.14.2 Shell Commands

The exclamation point ("`!`") is a convenient function that allows direct execution of most shell commands from within iSQL.

```
iSQL> !ls -al
total 3417
-rw-r----- 1 wlgml337 section 1198 Nov 1 13:30 .aliases
-rw------- 1 wlgml337 section 5353 Oct 18 21:17 .bash_history
-rw-r----- 1 wlgml337 section 1436 Nov 2 15:42 .bashrc
-rw-r----- 1 wlgml337 section 1549 Dec 13 17:36 .profile
drwxr-x--- 2 wlgml337 section 512 Nov 2 02:00 TEMP
drwxr-xr-x 2 root root 512 Oct 16 11:29 TT_DB
-rw------- 1 wlgml337 section 3446548 Dec 18 13:19 core
drwxr-x--- 2 wlgml337 section 512 Nov 11 16:33 cron
drwxr-x--- 2 wlgml337 section 512 Nov 15 10:52 test
drwxr-xr-x 6 wlgml337 section 512 Nov 11 11:45 work
```

## 2.14.3 Getting Help

Help is available for the commands provided with `iSQL`. The `HELP` command without parameters outputs information about how to use help. For help on specific commands, enter `HELP` followed by the name of the command for which help is desired.

```
iSQL> HELP;
Use 'help [command]'
Enter 'help index' for a list of command

iSQL> HELP INDEX;
@            EDIT          QUIT
/            EXIT          ROLLBACK
ALTER        HEADING       SAVE
AUTOCOMMIT   H[ISTORY]     SELECT
COMMIT       INSERT        SPOOL
CREATE       LINESIZE      START
DELETE       LOAD          TIMING
DESC         LOBOFFSET     UPDATE
```

```
DROP          LOBSIZE       VAR[IABLE]
EXECUTE       MOVE          TERM
EXPLAINPLAN   NUMWIDTH      VERTICAL
ECHO          PAGESIZE

iSQL> HELP EXIT;
exit;
or
quit; - exit iSQL
```

# 2.15 Using National Character Sets

When using NCHAR and NVARCHAR type character constants, if the following environment variable settings are set, there will be no concerns over possible data loss.

- The `ALTIBASE_NLS_NCHAR_LITERAL_REPLACE` environment variable must be set to `1`.

```
$ export ALTIBASE_NLS_NCHAR_LITERAL_REPLACE=1
```

- In order to use NCHAR type data that are encoded differently from the database character set, enter the character "`N`" in front of the string.

```
iSQL> CREATE TABLE t1 (c1 NVARCHAR(10));
Create success.

iSQL> INSERT INTO t1 VALUES (N'AB가나');
1 row inserted.

iSQL> SELECT * FROM t1;
C1
------------------------
AB가나
1 row selected.
```

# Index