System i

Database Administration

Version 5 Release 4

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Note

Before using this information and the product it supports, read the information in “Notices,” on page 9.

Ninth Edition (February 2006)

This edition applies to version 5, release 4, modification 0 of IBM i5/OS (product number 5722-SS1) and to all subsequent releases and modifications until otherwise indicated in new editions. This version does not run on all reduced instruction set computer (RISC) models nor does it run on CISC models.

Contents

Administration

DB2 Universal Database™ for iSeries™ (DB2® UDB for iSeries) provides multiple database administration functions.

You can also explore other database information using the main navigation tree or Database information finder.

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Database administration

DB2 UDB for iSeries provides various methods for setting up and managing databases.

Altering and managing database objects

DB2 UDB for iSeries provides both Structured Query Language (SQL) and system methods for altering and managing database objects.

Several methods are available for working with database objects. You can use the iSeries Navigator interface, SQL methods, or the traditional file interface. The following table shows the available options for each task. Click the appropriate **X** for more information about performing the task.

The iSeries Navigator tasks are documented in the online help. For more information about accessing iSeries Navigator objects and using online help, see iSeries Navigator database tasks.

Task	iSeries Navigator	SQL	Traditional file interface
Adding a column to a table	X	X	X
Adding or altering an identity column	X	X	
Altering a sequence	X	X	
Changing a table (file) definition	X	X	X

Task	iSeries Navigator	SQL	Traditional file interface
Changing the schema (library) list	X		X
Copying a table (file)	X		X
Copying column definitions	X		
Displaying contents of tables and views (files)	X	X	X
Displaying locked rows (records)	X		X
Displaying table (file) attributes (catalog)	X	X	X
Dropping database objects	X	X	X
Editing table (file) data	X	X	X
Moving a table (file)	X		X
Reorganizing a table (physical file)	X		X

Related reference

Terminology: SQL versus traditional file access

Creating database objects

The first step in developing your database is to create the objects that hold your data. You can create tables, views, and indexes with SQL. You can also create physical and logical files using the traditional file interface.

You can create objects using iSeries Navigator, SQL, or the traditional file interface. The following table shows the available options for each task. Click the appropriate **X** for more information about performing the task.

The iSeries Navigator tasks are documented in the online help. For more information about accessing iSeries Navigator objects and using online help, see iSeries Navigator database tasks.

Task	iSeries Navigator	SQL	Traditional file interface
Creating a map of database object relationships	X		
Creating an alias	X	X	X
Creating an index or access path	X	X	X
Creating an object using Run SQL Scripts	X		
Creating a package	X	X	X
Creating a schema (library)	X	X	
Creating a sequence	X	X	
Creating a stored procedure	X	X	
Creating a table (physical file)	X	X	X
Creating a user-defined function	X	X	

Task	iSeries Navigator	SQL	Traditional file interface
Creating a user-defined type	X	X	
Creating a view (logical file)	X	X	X
Generating SQL for database objects	X		

Related reference

Terminology: SQL versus traditional file access

Ensuring data integrity

DB2 UDB for iSeries provides several integrity measures, such as constraints, trigger programs, and commitment control.

Protecting your database against inadvertent insertions, deletions, and updates is accomplished using commitment control, constraints, and triggers. Constraints basically govern how data values can change, while triggers are automatic actions that start, or *trigger*, an event, such as an update of a specific table.

Related concepts

Commitment control

"Working with triggers and constraints" on page 4
You can use triggers or constraints to manage data in your database tables.

Importing and exporting data between systems

Importing data is the process of retrieving data from external sources, while *exporting data* is the process of extracting data from DB2 UDB for iSeries and copying data to another system.

Importing data into DB2 UDB for iSeries can be a one-time event or it can be an ongoing task, like weekly updates for business reporting purposes. These types of data moves are typically accomplished through import, export, or load functions.

Related concepts

Copying a file

Copying files

Copying source file data

Moving a file

Query Management Programming PDF

Related tasks

Loading and unloading data from systems other than System i

Working with multiple databases

The system provides a system database (identified as *SYSBAS*) and the ability to work with one or more user databases.

User databases are implemented through the use of independent disk pools, which are set up in the disk management function of iSeries Navigator. After an independent disk pool is set up, it appears as another database in the Databases folder of iSeries Navigator.

When you expand a system in iSeries Navigator and then expand Databases, a list of databases that you can work with is shown. To establish a connection to a database, expand the database that you want to work with.

Related concepts

Disk management

Working with triggers and constraints

You can use triggers or constraints to manage data in your database tables.

A *trigger* is a type of stored procedure program that is automatically called whenever a specified action is performed on a specific table. Triggers are useful for keeping audit trails, detecting exceptional conditions, maintaining relationships in the database, and running applications and operations that coincide with the change operation.

A *constraint* is a restriction or limitation that you place on your database. Constraints are implemented at the table level. You can use constraints to create referential integrity in your database.

You can work with triggers and constraints using iSeries Navigator, SQL, or the traditional file interface. The following table shows the available options for each task. Click the appropriate **X** for more information about performing the task.

The iSeries Navigator tasks are also documented in the online help. For more information about accessing iSeries Navigator objects and using online help, see iSeries Navigator database tasks.

Task	iSeries Navigator	SQL	Traditional file interface
Adding an external trigger	X		X
Adding an SQL trigger	X	X	
Creating a check constraint	X	X	X
Creating a key constraint	X	X	X
Creating a referential constraint	X	X	X
Enabling and disabling a referential constraint	X		X
Enabling and disabling a trigger	X		X
Managing check pending constraints	X		
Removing a check constraint	X	X	X
Removing a key constraint	X	X	X
Removing a referential constraint	X	X	X
Removing a trigger	X	X	X
Writing an external trigger program	X		X
Writing an SQL trigger program	X	X	

Writing DB2 programs

DB2 UDB for iSeries provides various methods for writing applications that access or update data.

You can write embedded SQL programs, external functions, trigger programs, external procedures, and DB2 UDB CLI applications.

Related concepts

Embedded SQL programming

Writing UDFs as external functions

Creating trigger programs

Defining an external procedure

Writing a DB2 UDB CLI application

Database backup and recovery

Backing up your data regularly is important in the event that you need data recovery. Use these topics for the methods of backing up and recovering your data.

Saving your data can be time-consuming and requires discipline. However, it is crucial that you back up your data because you never know when you might need a recovery.

Distributed database administration

DB2 UDB for iSeries allows you to work with databases that are distributed across several systems.

Related concepts

Distributed database programming

Queries and reports

You can use SQL, the Open Query File (OPNQRYF) command, the Create Query (QQQQRY) API, Open Database Connectivity (ODBC), or the IBM® Query for iSeries licensed program to create and run queries.

One of the most common tasks that you perform with your database is to retrieve information. The system provides several methods to create and run queries and reports.

You can use an SQL statement to retrieve information. This SQL statement is called a *query*. The query searches the tables stored in your database to find the answer to the question that you posed with your SQL statement. The answer is expressed as a set of rows, which is referred to as the result set. After a query has been run, you can also create a report to display the data provided in your result set.

In addition to using SQL, you can use other functions and products to create and run queries and reports. See the following manuals for detailed information.

- Query for iSeries Use
- DB2 Universal Database for iSeries Query Management Programming
- DB2 Universal Database for iSeries Query Manager Use

In addition, the iSeries Navigator interface provides SQL Assist, which can be used to create SQL statements. SQL Assist can help you build SQL SELECT, INSERT, UPDATE, and DELETE statements.

Related concepts

Building SQL statements with SQL Assist

SQL programming

V5R3 changes to Query for iSeries

In V5R3, the *Query for iSeries Use* manual was not updated, but numerous functional updates were made to the Query for iSeries licensed program.

Here is a summary of these updates:

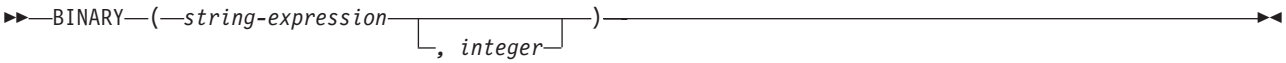
- Support for BINARY, VARBINARY, BLOB, CLOB, DBCLOB, and ROWID data types.
- Support for larger numeric and decimal numbers, plus support for large numeric literals.
- The BINARY, VARBINARY, HEX, and LENGTH built-in functions were added. They are described in this topic.
- The VARCHAR function now supports conversion from CLOB to VARCHAR.
- The VARGRAPHIC function now supports conversion from CLOB to DBCS graphic, CLOB to UCS2 graphic, DBCLOB to DBCS graphic, and DBCLOB to UCS2 graphic.

A binary constant is used for comparing a literal with a binary field (BINARY, VARBINARY, or BLOB). Binary constants are represented with an X followed by a sequence of characters that starts and ends with a string delimiter. The characters between the string delimiters must be an even number of hexadecimal digits. A hexadecimal digit is a digit or any of the letters A through F (uppercase and lowercase), as shown in the following example:

```
Field     Test  Value
binarycol eq    X'12AF'
```

BINARY built-in function for Query

The BINARY function returns a BINARY representation of a string of any type. The form is:



The result of the function is a fixed-length binary string. If the first argument can be null, the result can be null; if the first argument is null, the result is the null value.

The first argument must be a string-expression whose value must be a built-in character string, graphic string, binary string, or row ID data type.

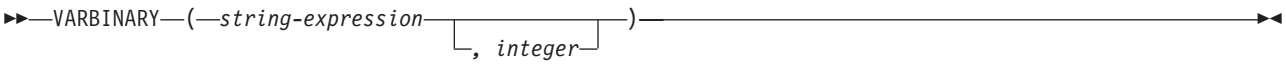
The second argument specifies the length attribute for the resulting binary string. The value must be between 1 and 32766. If the second argument is not specified, the following rules apply:

- If the string-expression is the empty string constant, the length attribute of the result is 1.
- Otherwise, the length attribute of the result is the same as the length attribute of the first argument, unless the argument is a graphic string. In this case, the length attribute of the result is twice the length attribute of the argument.

The actual length is the same as the length attribute of the result. If the length of the string-expression is less than the length of the result, the result is padded with hexadecimal zeros up to the length of the result. If the length of the string-expression is greater than the length attribute of the result, truncation is performed.

VARBINARY built-in function for Query

The VARBINARY function returns a VARBINARY representation of a string of any type. The form is:



The result of the function is VARBINARY. If the first argument can be null, the result can be null; if the first argument is null, the result is the null value.

The first argument is a string-expression whose value can be a character string, graphic string, binary string, or row ID.

The second argument specifies the length attribute for the resulting binary string. The value must be between 1 and 32740 (32739 if nullable). If the second argument is not specified, the following rules apply:

- If the string-expression is the empty string constant, the length attribute of the result is 1.
- Otherwise, the length attribute of the result is the same as the length attribute of the first argument, unless the argument is a graphic string. In this case, the length attribute of the result is twice the length attribute of the argument.

The actual length is the same as the length attribute of the result. If the length of the string-expression is less than the length of the result, the result is padded with hexadecimal zeros up to the length of the result. If the length of the string-expression is greater than the length attribute of the result, truncation is performed.

HEX built-in function for Query

The HEX function returns a hexadecimal representation of a value. The form is:

The argument can be of any built-in data type. The result of the function is a character string. If the argument can be null, the result can be null; if the argument is null, the result is the null value.

The result is a string of hexadecimal digits. The first two digits represent the first byte of the argument, the next two digits represent the second byte of the argument, and so forth. If the argument is a datetime value, the result is the hexadecimal representation of the internal form of the argument.

The length attribute of the result is twice the storage length attribute of the argument. The length attribute of the result cannot be greater than 32766 for fixed-length results or greater than 32740 for varying-length results. If the argument is a varying-length string, the result is a varying-length string. Otherwise, the result is a fixed-length string.

The coded character set identifier (CCSID) of the string is the default single-byte character set (CCSID) on the current system.

LENGTH built-in function for Query

The LENGTH function returns the length of a value. The form is:

The argument must be an expression that returns a value of any built-in data type. The result of the function is a large integer. If the argument can be null, the result can be null; if the argument is null, the result is the null value.

The result is the length of the argument. The length of strings includes blanks. The length of a varying-length string is the actual length, not the length attribute. The length of a graphic string is the number of double-byte characters (the number of bytes divided by 2). The length of all other values is the number of bytes used to represent the value:

- 2 for small integer
- 4 for large integer

- 8 for big integer
- The integral part of (p/2)+1 for packed decimal numbers with precision p
- p for zoned decimal numbers with precision p
- 4 for single-precision float
- 8 for double-precision float
- The length of the string for strings
- 3 for time
- 4 for date
- 10 for timestamp
- 26 for row ID

Security

Authorizing users to data at the system and data levels allows you to control access to your database.

Securing your database requires you to establish ownership and public authority to objects and specific authority to your applications.

Related concepts

Security

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