IBM i
7.2

Database
Database trouble shooting

IBM

Note

Before using this information and the product it supports, read the information in "Notices" on page 13.

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Contents

Database troubleshooting

Here are the solutions to common questions and problems for Db2® for i.

Note: By using the code examples, you agree to the terms of the "Code license and disclaimer information" on page 11.

PDF file for Database troubleshooting

You can view and print a PDF file of this information.

To view or download the PDF version of this document, select Database troubleshooting.

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1. Right-click the PDF link in your browser.
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3. Navigate to the directory in which you want to save the PDF.
4. Click **Save**.

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Before you call service

Before you call service, follow this checklist. The checklist includes instructions for solving the most common problems with your Db2 for i database.

Proceed through the checklist until you reach a solution or determine that you need to call service. In the event that you need to call service, the checklist can help gather the information that a service person needs.

1. Check the online help and documentation in the IBM® i Information Center.
2. Search for a possible match to your problem from Software Knowledge Base.

   The Software Knowledge Base contains information about known problems and answers to frequently asked customer questions.
3. Determine if there is a program temporary fix (PTF), also called a fix, related to your problem.

   Check Fixes and see PTF Cover Letters for a list of cover letters sorted by release, by date, or by fix number.

   A PTF cover letter provides information about the specific PTF, releases affected, prerequisite and corequisite PTFs, and so on. If you find the PTF that you need, you can obtain it by following the instructions on the Ordering PTFs Web page. You can order PTFs over the Internet, on Media, through Program Services, or using telephone Voice Support.
4. Debug your program and determine if the problem is in the software supplied by companies other than IBM.

   If you suspect that the problem is within the non-IBM software, contact the software vendor directly.
5. Find the most recent available level of the database fix pack on the Preventative Service Planning - PSP Web page.

6. Check the level of your database fix pack (also known as a PTF group) using the Work with PTF Groups (WRKPTFGRP) command WRKPTFGRP SF99*v0r*, where *v* is the version and *r* is the release.
   - If the PTF group is not found and your problem is urgent, proceed to the next step.
   - If the PTF group is not found and your problem is not urgent, order the appropriate PTF group on the Preventative Service Planning - PSP Web page.
   - If the PTF group is found and it is at the current level, proceed to the next step.
   - If the PTF group is found but it is not at the current level and your problem is urgent, proceed to the next step.
   - If the PTF group is found but it is not at the current level and your problem is not urgent, order the appropriate PTF group on the Preventative Service Planning - PSP Web page.
7. If you are unable to solve the problem in the previous steps, contact service.

   You can report your problem online on the Software Service Request Web page. Be prepared to give the following information:
   - PTF level
   - Job log with details. To obtain this, run the query in DEBUG mode and check JOBLOG. Also save the system settings, SQL packages, and DB monitor data.
   - Details on the action that caused the problem.
   - Resources and work management:
     - QQRYDEGREE and CHGQRYA
     - Memory and MAX ACTIVE settings
     - List of other jobs and programs that are running
   - File statistics:
     - Size of objects
     - Number of rows
     - Number of indexes
   - History of the problem:
     - Performance of application or query before the problem occurred
     - Reproducibility of problem
     - Fixes applied
     - Last upgrade
   - Details about how the problem impacts your business

IBM i database frequently asked questions

For answers to your Db2 for i and Structured Query Language (SQL) questions, check this database FAQ.

Db2 for i fundamentals

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8. How do I administer Db2 for i?

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Db2 for i fundamentals

1. What is Db2 for i?

   Db2 for i is the relational database manager that is fully integrated into the IBM i product. Because it is integrated, Db2 for i is easy to use and manage. Db2 for i also provides many functions, such as triggers, stored procedures, and dynamic bitmapped indexing, that serve a wide variety of application types. These applications range from traditional host-based applications to client/server solutions to business intelligence applications.

   As an interface to Db2 for i, the IBM DB2 Query Manager and SQL Development Kit for i licensed program adds an interactive query and report writing interface, as well as precompilers and tools, to help you write SQL application programs in high-level programming languages. Conforming to the industry standard SQL, the SQL implementation for the IBM i operating system allows you to define, manipulate, query, and control access to your data. It works equally well with IBM i files and SQL tables.

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2. **Is Db2 for i part of the DB2 family?**

   Yes. Db2 for i is a product of the DB2 family, which also includes DB2 for z/OS® and DB2 for Linux®, UNIX, and Windows.

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3. **How does Db2 for i relate to other DB2 products?**

   Each product of the DB2 family has its own unique code base, functions, and SQL syntax. However, there is technology sharing across the DB2 products. To learn about the relationships between the DB2 products, see the following information:

   - Selected common SQL features for developers of portable DB2 applications contains information about the SQL features available across the DB2 products.

   - Db2 for i Porting Information provides guides to help you move data between DB2 products. The porting guides also provide a brief history of the DB2 family.

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4. **What level of Db2 for i do I have?**

   If you are using a IBM i product, you have Db2 for i. The level of Db2 for i is based on the IBM i operating system and is independent of the DB2 versioning scheme. Because Db2 for i is included with the IBM i operating system, the version, release, and modification level of Db2 for i is the same as that of your operating system. This is typically expressed as VxRyMz, where x is the version, y is the release, and z is the modification. If you do not know the version, release, and modification of your operating system, follow these steps:

   a. From System i® Navigator, right-click your system.

   b. Select **Properties**.

   c. If it is not already selected, click the **General** tab.

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5. **Does the system provide any sample databases?**

   Yes. You can find the sample tables and the system-provided stored procedure to create them in the Db2 for i sample tables of the SQL programming topic collection.

6. **How do I install Db2 for i?**

   You do not need to install Db2 for i. It is included with the IBM i operating system release.

7. **How do I authorize users to Db2 for i?**

   DB2 object access can be controlled by using the SQL GRANT and REVOKE statements, along with IBM i security interfaces. See Securing database files in the Database programming topic collection. System i Navigator can also be used to authorize users. For more information, see Authorizing a user or group using System i Navigator.

8. **How do I administer Db2 for i?**

   You can administer Db2 for i using System i Navigator. Within System i Navigator, there is a tool for working with databases. You can work either from a traditional tree view of your database or from a visual representation of the database objects called *Database Navigator*. For details about using Database Navigator, see Mapping your database.

Database resources in the IBM i Information Center

1. **Where are the DB2 manuals located?**

   You can find database manuals by following the PDFs link in the information center navigation tree under the Database category.

2. **I'm having trouble printing a PDF. What should I do?**

   It is suggested that you save PDF files on your workstation for viewing and printing. To save a PDF, follow these steps:

   a. Right-click the PDF link in your browser.
   b. Click the option that saves the PDF locally.
   c. Navigate to the directory in which you want to save the PDF.
   d. Click **Save**.

3. **What other resources exist to help me use the information center?**

   See Information center frequently asked questions. This FAQ contains tips for easily using the information center.

Data sharing and database migration

1. **How do I move data between DB2 and other systems?**

   You can use the Copy From Import File (CPYFRMIMPF) and Copy To Import File (CPYTOIMPF) commands to import (load) or export (unload) data between systems. See Importing and exporting data between systems for instructions.

2. **How do I migrate existing databases to Db2 for i?**

   IBM provides several guides to help you move data into Db2 for i from other databases, such as Oracle and SQL Server. For these guides, see Db2 for i Porting Information.

3. **Can I store XML data in Db2 for i?**

   Yes. See the XML Extender Administration and Programming manual for tutorials on how to set up a database using provided sample data, how to map SQL data to an XML document, how to store XML documents in the database, and how to search and extract data from the XML documents.

4. **Can I connect from my IBM i platform to a DB2 database that is on a platform other than IBM i?**

   Yes. You can learn more in User FAQs of the Distributed database programming topic collection.

Query for IBM i

1. **How can I find all the queries that accessed a specific file?**

   You can follow these steps to produce a report of all the queries containing the file name:

   a. Copy the code in "Example: Finding the queries that accessed a specific file" on page 10, replacing &LIBRARY and &FILE with your library and file names.

   b. Create the command FFINQ using the Create Command (CRTCMD) command.

   c. Specify GETQRYPRM as the program to process the command.

2. **Does IBM provide any graphical query interfaces for the system?**

   Yes. The graphical query interface software provided for the system includes the DB2 Query Management Facility.

SQL-based queries

1. **How can I join two members of the same table?**

   You can join two members of the same table by creating an alias for one of the members and joining them using the alias. To create an alias using SQL, see Creating and using ALIAS names or Creating database objects.

2. **How can I run SQL statements from a text file?**

   You can run SQL statements from a text file using the Run SQL Statements (RUNSQLSTM) command. Or, you can use Run SQL Scripts from System i Navigator to run a text file on your PC or in the integrated file system. See Querying your database by running SQL scripts.

3. **How can I write an SQL query that lists a set of detail records with a total at the bottom?**

   You can use a UNION operation to append the total as a row at the end of the list of items, as illustrated in the following example:

   ```
   SELECT 'ITEM' AS ROWTYPE, PARTID, PRICE
       FROM PART
   UNION
   SELECT 'TOTAL' AS ROWTYPE, 0 AS PARTID, SUM( PRICE ) AS PRICE
       FROM PART
   ORDER BY ROWTYPE, PARTID
   ```

   To make sure that the total row is at the end of the result set, you must include the Order By clause.

4. **How can I select rows based on the current date in numeric or character fields?**

   The SQL `CurDate` function returns a date value, which cannot be directly compared to a number or an unformatted character value. You must do some conversion before the comparison. Use SQL functions to get the year, month, and day of the date as integers, and then create a numeric date in the form YYYYMMDD. See the code in "Example: Selecting records based on the current date" on page 10.

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5. **Can I create an alias on a system for a table, view, or physical file that is on another system?**

   No. When you create an alias, make sure that the table, view, or physical file for which you create it is on the current system. For more information, see CREATE ALIAS, with some syntax examples.

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6. **When the first member of a multimember database file has the same name as the file, it is the only member of the file that you can access using SQL. How can I access another member using SQL?**

   You can create an alias to point at the first member that you want to access.

   Example 2: Create an alias named SALES_JANUARY on the JANUARY member of the SALES table. The sales table has 12 members (one for each month of the year).

   ```
   CREATE ALIAS SALES_JANUARY
      FOR SALES(JANUARY)
   ```

   For the complete example in the SQL reference topic collection, see CREATE ALIAS.

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SQL messages

1. **When are SQL messages displayed?**

   SQL messages are displayed when Db2 for i returns an error code to the application that uses it. The message text is displayed or logged at run time.

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2. **What does the SQL0901 message mean?**

   SQL0901: An SQL system error has occurred. This is the general message for all errors. For more information about SQL0901, see SQL messages and codes.

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3. **Where can I find a listing of SQL messages and codes?**

   You can find a complete list of SQL messages and codes in SQL messages and codes. Or use SQL message finder.

   An application can also send the SQL message corresponding to any SQLCODE to the job log by specifying the message ID and the replacement text on the CL commands Retrieve Message (RTVMSG), Send Program Message (SNDPGMMSG), and Send User Message (SNDUSRMSG).

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SQL packages

1. **What are SQL packages?**

   SQL packages are permanent objects that are used to store information related to prepared SQL statements. They are used by Open Database Connectivity (ODBC) when the Extended Dynamic box is checked on a data source. They are also used by applications that use an API.

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2. **What are the advantages of using SQL packages?**

Because SQL packages are a shared resource, when a statement is prepared, the information is available to all the users of the package. This saves processing time, especially in a situation when many users are using the same or similar statements. Because SQL packages are permanent, this information is also saved across job initiation and end, and is also saved across system restarting. In fact, SQL packages can be saved and restored on other systems. By comparison, dynamic SQL requires that each user go through the preparatory processing for a particular statement, and this must be done every time the user starts the application.

SQL packages also allow the system to accumulate statistical information about the SQL statements that result in better decisions about how long to keep cursors open internally and how to best process the data needed for the query. This information is shared across users and retained for future use. In the case of dynamic SQL, this information must be gathered by every job and every user.

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3. **What data is stored in an SQL package?**

The SQL package contains all the necessary information to run the prepared statement. This includes registry of the statement name, the statement text, the internal parse tree for the statement, definitions of all the tables and fields involved in the statement, and the query access plan needed to access the tables at run time.

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4. **How can I tell what statements are in an SQL package**?

Use the Print SQL Information (PRTSQLINF) command to produce a formatted report that shows the SQL statement and information about the access plan used to access the data.

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5. **How can I tell if the SQL package is being used?**

Use the Print SQL Information (PRTSQLINF) command to produce a formatted report that shows the SQL statement and information about the access plan used to access the data. Use the database monitor to log information about SQL processing on the system. It includes the name of the package in the SQL summary records. The following statement shows the package, the SQL operation, and the statement text:

```
SELECT qqc103, qqc21, qq1000 from <db monitor file>
```

For ODBC, you can also look in the job log for the message `Extended Dynamic has been disabled` to determine if ODBC was unable to use an SQL package.

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For more SQL package FAQs, see the DB2 Universal Database for iSeries Frequently Asked Questions: Improving Performance with SQL Packages Web site.

Stored procedures

1. **How can I view the contents of a result set and the output parameters from a stored procedure call?**

Use Run SQL Scripts to run the procedure in System i Navigator. First, open the Run SQL Scripts window. Then, call the stored procedure using the CALL statement, pass the parameters to the statement, and run the procedure. The parameters are returned to the Result Set tab, and the output parameters are returned to the Messages tab.

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2. **Can existing RPG or COBOL programs be used as stored procedures?**

Yes. Db2 for i supports external stored procedures, which allows existing high-level programs to be called as stored procedures. The CREATE PROCEDURE statement is used to register these programs as stored procedures.

3. **I create a procedure that contains SQL statements that reference user-defined functions. Before calling the procedure, I run a SET PATH statement so the functions are found. Why aren't the functions found when I call the procedure?**

The SET PATH statement must be run before the CREATE PROCEDURE statement. The path for static statements in a precompiled program is determined when the program is created. In the case of CREATE PROCEDURE, an SQL C program is created. Dynamic statements in the procedure use the current path, but the static statements in the procedure use the path that was used at the time of creation. This is also true for the CREATE FUNCTION statement.

4. **How do I find out if a stored procedure exists, in what library it exists, and what the attributes of the stored procedure are?**

To see the stored procedures on the system, you need to query the SYSPROCS catalog view. For example:

```
SELECT * from sysprocs where routine_name = 'MYPROC' and routine_schema = 'MYLIB'
```

This checks to see if there is a stored procedure named *myproc* in *mylib*. If you do not know the library, do not include the *routine_schema* part of the search condition in the query. See IBM i catalog tables and views for the definition of all the columns for the SYSPROCS catalog. You might also be interested in the SYSPARMS catalog, which contains the parameter definitions for a procedure.

Triggers

1. **What is a trigger?**

A trigger is a set of actions that are run automatically when a specified change or read operation is performed on a specified table or on a specified physical database file. For more information, see Triggering automatic events in your database.

Beginning in V5R1, you can also use SQL triggers. The SQL CREATE TRIGGER statement provides a way for the database management system to actively control, monitor, and manage a group of tables whenever an insert, an update, or a delete operation is performed. The statements specified in the SQL trigger are run each time an SQL insert, update, or delete operation is performed. An SQL trigger can call stored procedures or user-defined functions to perform additional processing when the trigger is run. For more information, see SQL triggers.

2. **Why does my trigger program not work after upgrading the IBM i operating system?**

The offset of your record might have changed. For several releases in the past, the offset did not change. It did, however, change for V5R1 and might change in subsequent releases. The easiest solution is to always code your trigger programs to use the offsets and lengths passed in the trigger buffer. For a summary of fields in the trigger buffer, see Trigger buffer field descriptions.

3. **Can an SQL trigger access the trigger buffer?**

The body of an SQL trigger can use the REFERENCING NEW ROW and REFERENCING OLD ROW clauses to reference the fields in the before and after record images that are stored in the trigger buffer. However, an SQL trigger program cannot reference the trigger buffer directly, nor can it reference the other information in the buffer. For example, the trigger time and trigger event are not available to an SQL trigger.

Example: Finding the queries that accessed a specific file

This example illustrates how to retrieve queries that accessed a specified file.

Note: By using the code examples, you agree to the terms of the "Code license and disclaimer information" on page 11.

```
GETQRY
              PGM          PARM(&LIBRARY &FILE)
              DCL          VAR(&LIBRARY) TYPE(*CHAR) LEN(10)
              DCL          VAR(&FILE) TYPE(*CHAR) LEN(10)
              DCLF         FILE(QTEMP/QRYOBJS)
              DLTF         FILE(QTEMP/QRYOBJS)
              MONMSG       CPF0000
              DLTF         FILE(QTEMP/&LIBRARY)
              MONMSG       CPF0000
 CRTSRCPF    FILE(QTEMP/&LIBRARY)
  DSPOBJD    OBJ(&LIBRARY/*ALL) OBJTYPE(*QRYDFN) +
                         DETAIL(*FULL) OUTPUT(*OUTFILE) +
                          OUTFILE(QTEMP/QRYOBJS)
   BEGIN:    RCVF      /* GET QUERY NAME AND LIBRARY NAME */
                    /* IF END OF FILE REACHED, EXIT LOOP        */
              MONMSG     CPF0864   EXEC(GOTO EOF)
 RTVQMQRY    QMQRY(&OLDBNM/&ODOBNM) +
                                  SRCFILE(QTEMP/&LIBRARY) ALWQRYDFN(*ONLY)
          GOTO         CMDLBL(BEGIN)
 EOF:     FNDSTRPDM   STRING(&FILE) FILE(QTEMP/&LIBRARY)
 MBR(*ALL)  OPTION(*NONE) PRTMBRLIST(*YES)
              ENDPGM
```

Note: To create an output file in QTEMP, use the Display Object Description (DSPOBJD) command. While in programming development manager (PDM), press CMD18 to change defaults, and change the Compile in Batch option to N. Compile GETQRY. Then set the compile option default back to Y.

```
GETQRYPRM
              PGM          PARM(&LIBRARY &FILE)
              DCL          VAR(&LIBRARY) TYPE(*CHAR) LEN(10)
              DCL          VAR(&FILE) TYPE(*CHAR) LEN(10)
              SBMJOB       CMD(CALL PGM(GETQRY) PARM(&LIBRARY &FILE))
              ENDPGM
```

Compile program GETQRYPRM.

Example: Selecting records based on the current date

This example illustrates how to select records based on the current date in the numeric or character field.

Note: By using the code examples, you agree to the terms of the "Code license and disclaimer information" on page 11.

```
Create Table TestDate (
  PKCol    Int             Primary Key,
  DecDate  Decimal( 9,0 ),
  CharDate Char( 8 ) )

Insert Into TestDate Values ( 1, 20010711, '20010711' )
```

Use this SQL statement to compare against the numeric field:

```
Select  *
  From  TestDate
  Where DecDate =
        100 * ( 100 * Year( CurDate() ) + Month( CurDate() ) ) +
        Day( CurDate() )
```

Using a Cast expression, you can convert this 8-digit number to a character value, as in the following example:

```
Select  *
  From  TestDate
  Where CharDate = Cast(
```

```
        100 * ( 100 * Year( CurDate() ) + Month( CurDate() ) ) +
        Day( CurDate() ) As Char( 8 ) )
```

Use care when converting a Month() or Day() return value to a character with `Cast`. If you do not explicitly handle values less than 10, there might be spaces instead of zeros in the result.

Monitoring database file errors

During database file processing, you must monitor error messages so as to correct errors early.

One or more of the following events occur when error conditions are detected:

- Messages can be sent to the program message queue for the program processing the file.
- An inquiry message can be sent to the system operator message queue.
- File errors and diagnostic information can appear to your program as return codes and status information in the file feedback area.

Related concepts

Monitoring database file errors in a program

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