DB2 Connect: Get the most from new features in DB2 Cancun 10.5.0.4

Reap the business benefits

Pallavi Priyadarshini (pallavipr@in.ibm.com)
Architect, IBM Data Server Driver for JDBC and SQLJ
IBM

Iti Rawat (itirawat@in.ibm.com)
DB2 Connect QA Manager
IBM

Rajendra Kamath (rajkamat@in.ibm.com)
Engineering Manager
IBM

Shilu Mathai (shmathai@in.ibm.com)
Senior Technical Lead
IBM

DB2® Connect in DB2 Cancun Release 10.5.0.4 includes many rich features. Get a high-level overview of the key features across the various client drivers for DB2, including Java™ driver and non-Java drivers (CLI and .NET). Learn about the practical application of the new DB2 Connect features that provide big returns. Key features can help alleviate several business problems. The information in this tutorial will be useful when deciding on release upgrades.

Overview

DB2 Connect in DB2 Cancun Release 10.5.0.4 is an assortment of rich features. Get a cohesive picture of the new features by tying them into the following broad themes to which they are geared:

- Improvements in high availability
- Performance
- Serviceability

Download a trial of DB2 and other information management products.
• Simplification of licensing and configuration
• New application API support

Explore the connections between the new technical features and the business needs that they address. The DB2 Connect technical features are organized into high-level business oriented themes that provide value to customers.

High availability

This section covers the DB2 Connect features for higher availability of applications.

Alternate group failover for DB2 pureScale in Java driver

The DB2 Linux®, UNIX®, and Windows® (LUW) server is expanding High Availability Disaster Recovery (HADR) support to allow primary pureScale® clusters with multiple standby clusters. When multiple standbys are used, the driver must have the capability to switch between pureScale clusters for failover. This capability is commonly called alternate group failover.

With alternate group failover, customers can configure the driver to use the primary cluster’s address as the primary group to connect to and specify standbys as alternate groups. If the cluster changes role from primary cluster to standby or vice versa, the driver will retry the connection to the new primary cluster. This feature allows customers to move an application workload to an alternative DB2 pureScale cluster when the primary DB2 pureScale cluster is not available, leading to overall higher availability.

Seamless failover for standalone PREPARE and DESCRIBE statements in Java driver

This feature enables seamless failover for Java applications when PREPARE and DESCRIBE are independent flows to the server (for example, when deferPrepares is false). The Java driver currently only allows seamless failover when both PREPARE and DESCRIBE calls are delayed until execute (deferPrepares is true) and the usual criteria for seamless failover is met. For example, if the operation is the first operation in a new unit of work it would qualify for seamless failover.

Seamless failover has become an important aspect of application high availability because most applications run against a cluster with more than one database server. This feature improves availability for applications with independent PREPAREs and DESCRIBEs by extending support for seamless failover for both deferPrepares ON and OFF.

Seamless failover for read-only transactions in non-Java drivers

Currently, the driver will seamlessly fail over from one member to another if the failed statement is the first statement in the transaction. For read-only transactions, this is not an ideal way to gain high availability. With seamless failover for read-only transactions, if the transaction up to the point of failure of the SQL is read-only, the failed SQL statement is allowed to seamlessly failover to another member. This will ensure high availability of the application.
Warning for failover during connect in non-Java drivers

With the warning for failover during connect in non-Java drivers, you can now know if the current connection has failed on a member during the new connection time. A warning will be issued at the time of connection. You can use this warning message for preventive maintenance. Previously, this feature was available only during execution time. You can set it by using the same SQL_ATTR_REPORT_SEAMLESSFAILOVER_WARNING attribute as for execution time.

Support for timeout for chained statements in .NET driver

When chaining of SQL statements is in place, you would not expect the entire chain to complete in the timeout set for a single execute. With this new feature, it is now possible to set the command timeout for the entire chain while using chaining of SQL statements with the new BatchCommandTimeout property. This property will give users finer control on command timeout to be set before calling EndChain.

Application performance

This section highlights the DB2 Connect features that improve performance of applications.

Support for bulk/array INSERT, UPDATE, or DELETE in embedded SQL

DB2 ESQL now supports array input for INSERT, UPDATE, or DELETE statements. This feature enables efficient use of network bandwidth and improves application performance. Application development is also easier because users do not have to code for inserting individual elements.

Chaining support for MERGE statements and smart RETRY in CLI driver

The CLI driver now converts chaining into an array of fixed sizes for MERGE statements, which results in application performance gain due to reduction in number of network trips. Furthermore, to increase the efficiency of a MERGE statement, the driver will transparently retry it in case of failure due to duplicate rows. This also eliminates the need for additional application logic to retry for duplicate rows during MERGE statement execution.

Getting up and running

This section covers the features introduced for ease of installation.

Pre-validate connection through ODBC driver manager in CLI driver

The -connect option in the db2cli validate tool helps users pre-validate their client configuration, setup, and connection before they start using it for their applications. Users can leverage a new command-line option provided in this tool to validate the connections through ODBC driver manager. This feature eliminates the manual work of individually verifying each DSN connection via the ODBC Administrator graphical user interface and lets users get up and running quickly.

Validate setup and installation on Windows for non-Java drivers

The IBM Data Server (DS) Driver package contains many drivers such as PHP, Python, Ruby, etc. To verify if the DS Driver installation and setup are correct for the drivers to work properly while
connecting, the DB2 Cancun Release 10.5.0.4 provides step-by-step instructions to validate the setup of the drivers. This helps eliminate application setup issues later.

Serviceability and usability

This section discusses the features that help ease problem determination.

Support for larger client information fields in type 2 z/OS Java driver

Client information fields are made available by DB2 for applications to supply additional information to DB2. DB2 can use this information for monitoring, workload management, end-user identification, and so forth. There are many monitoring and auditing tools to return these values to the user. DB2 imposed length limits on the client information fields and the same limits existed in the equivalent client APIs. DB2 11 increased the length of client information fields to allow applications to pass long names.

With the enhanced Java type 2 z/OS driver, local applications on DB2 for z/OS are able to send in longer values. Extending the length of these fields in type 2 z/OS gives more flexibility for applications to use client information values that are more meaningful.

API to retrieve configuration parameters in CLI driver

CLI allows various parameters to be set at different levels (in connection string, in db2dsdriver.cfg, and in db2cli.ini), and the precedence order from higher to lower is connection string, db2cli.ini, and db2dsdriver.cfg for each keyword. If the parameter is set at multiple places, it is difficult for the user to figure out the effective value of the parameter and there is confusion about the true behavior of the application.

The SQLGetInfo() API is now enhanced to programmatically return the effective value of CLI keywords provided in different configuration files. You can also leverage this capability in problem determination and resolution.

Capture statements handle information in CLI trace

The new -dumpstmt option is available with the db2trc utility. With this, db2trc will dump all the information about allocated statement handles at once. Users will gain insight on pre-allocated statement handles, such as the sql statement, prepared on those handles.

Generate CLI trace per thread

Currently, the db2trace with the -cli option generates a CLI trace capturing information for all threads in one single file. For quicker problem determination, the -cli option is enhanced to allow directory paths to be provided as an option, which would result in capturing the trace for each thread in a separate file in the given directory.

Ability to restrict users to read-only operations in CLI driver

In enterprise application environments, there is a need to restrict certain applications and users to a read-only database connection. To support this, the SQL_ATTR_READ_ONLY_CONNECTION attribute
and DSDriver.cfg keyword `ReadOnlyConnection` were added. They will return a connection instance that allows read-only connection. Any attempts for non read-only operations with this connection instance would return an error.

**Licensing**

This section discusses the features for simplification of licensing-related functions.

**Method to return client-side temporary license expiry for Java driver**

DB2 Connect products include the `db2jcc_license_cisuz.jar` license file that permits Java client connections to DB2 for z/OS and DB2 for i. Currently, there is no way to extract the expiration date and license type (temporary or permanent) of the client-side license file for Java applications. The situation can arise where customers might not notice that the client-side license expired, which can lead to application downtime.

The new feature supports a Java API and a command-line argument to extract expiration date and license type of the JCC license file. In cases where the customers are running with a temporary trial license, this feature allows them to identify that the license is temporary and take proactive steps to prevent license expiration (which could lead to connections getting refused).

**Method to return DB2 Connect version of client-side temporary license for Java driver**

Currently, while using client-side license, there is no way on the client to retrieve the version of DB2 Connect that corresponds to the client-side license. It is difficult for customers to correlate between the client-side license and the version of DB2 Connect that they are using. The new feature adds support for a new Java API and command-line argument to return the DB2 Connect version, helping customers more easily resolve license-related issues.

**Get DB2 Connect version information with db2connectactivate utility**

Many customers have bought into the value of server-based licensing provided by the DB2 Connect Unlimited Edition license for DB2 for z/OS and DB2 for i. By using the `db2connectactivate` utility to install and uninstall a license stored procedure on the server, customers can use the DB2 Connect Unlimited Edition license type. With this feature, the `db2connectactivate` utility is more user friendly when upgrading, downgrading, or replacing the license on the DB2 server.

The enhanced utility provides information on the release of DB2 Connect being installed and the release of license already installed on the server (in case it is not a fresh installation). Customers will have more clarity on whether an existing license is already on the server, the version they are upgrading from, and the version they are upgrading to. Customers will also be able to figure out a downgrade scenario and make informed decisions about whether to downgrade the license.

**Show currently active DB2 Connect license and enforce server-side licensing**

DB2 Connect (DB2 for z/OS and DB2 for i data servers) has client- and server-based licensing. The `db2cli validate` utility has been enhanced with the `displaylic` option that enables users to
quickly determine the type of license that is currently operational. Because a server-based DB2 Connect license is recommended for easier maintainability, the \texttt{useserverlic} option was also added to the \texttt{db2cli validate} utility. This option bypasses the client-side license and forces the invocation of the server-side license. With these options, users can validate their existing licensing and plan for migrating to server-based DB2 Connect licensing.

**New workload and application API**

This section covers the features that support a new generation of workloads using new application APIs.

**Support for result set as JSON in Java driver**

JavaScript Object Notation (JSON) is emerging as the default data transfer mechanism for web and mobile applications. With the growing adoption of JSON for Representational State Transfer (REST)-based web applications, there are several applications that need to access relational data stored in DB2 as JSON. In the absence of any standard support, different applications developed custom code to convert relational result sets into JSON data. This led to a proliferation of inconsistent conversion logic across many applications.

The Java driver has provided the ResultSet API to convert JDBC ResultSet into JSON so applications do not need to worry about this logic in their layer. Now, applications simply need to invoke the API to convert either individual rows of ResultSet into JSON or an entire ResultSet into JSON. This will help customers easily develop more use cases where relational data is consumed as JSON.

**CODEUNITS32 support for DB2 LUW in CLI and .Net driver**

Database columns that hold character data have historically been defined as columns storing a specific number of bytes. The problem with this approach becomes apparent when moving out of a single-byte character set; it can create barriers to globalization. To solve the problem, DB2 for LUW Server introduced support for CODEUNITS32 datatype for both character strings (for example, CHAR, VARCHAR, and CLOB) and graphic strings (GRAPHIC, VARGRAPHIC, and DBCLOB). The CLI and .Net drivers support the metadata APIs that return the number of code unit characters that every CODEUNIT32 column can store. With these APIs, users can simplify their application development by identifying the number of characters the application can store in the database. They no longer need to identify the number of bytes to arrive at the number of characters the application can store.

**Enhancements for DB2 for i in CLI and .Net drivers**

There are three enhancements in support of DB2 for i:

- The DB2 for i server supports the "currently committed" feature from V7R1 onward. Users can now leverage this support for better concurrency control in their application.
- The DB2 CLI and DB2 .NET interfaces now support global variables with DB2 for i (from V7R1 onward). Global variables enable DB2 for i targeted applications to share relational data among SQL statements.
• The DB2 CLI and .NET interfaces support arrays in `CALL` statements with DB2 for i (from V7R1 onward). This enables arrays to be passed to stored procedures on DB2 for i.

Support for stored procedure with multiple return values for Informix in .NET driver

Currently, the Entity Data Modeling (EDM) wizard lists only two types of objects: stored procedures with no return value or one return value, and functions with one return value. Informix supports stored procedures that return multiple scalar values. These type of stored procedures are currently not honored by the EDM wizard.

With DB2 Connect in DB2 Cancun Release 10.5.0.4, the EDM Wizard in Visual Studio will recognize such IDS procedures as a supported data object in the Entity Model. Users can take advantage of the DB2.NET EDM capabilities with such stored procedures.

Microsoft Visual Studio 2013 support in .NET driver

Users are now able to use the IBM Database Add-ins for Visual Studio with Visual Studio 2013 and leverage the feature set for application development targeting IBM Data Servers.

Conclusion

The DB2 10.5.0.4 is packed with new features for drivers in diverse areas such as high availability, serviceability, performance, and licensing. Improvements span Java and non-Java drivers for DB2 servers on all platforms. Try out the new features to reap the true business benefits of this release.
Resources

Learn

- Learn about configuring IBM Data Server Driver for JDBC and SQLJ for DB2 clusters in the IBM Knowledge Center.
- See all of the JDBC driver versions for DB2 Connect releases.
- Follow developerWorks on Twitter.
- Visit the developerWorks Information Management zone to find more resources for DB2 developers and administrators.
- Watch developerWorks on-demand demos ranging from product installation and setup demos for beginners, to advanced functionality for experienced developers.

Get products and technologies

- Download different versions of DB2 Connect.
- Evaluate IBM products in the way that suits you best: Download a product trial, try a product online, or use a product in a cloud environment.

Discuss

- Get involved in the developerWorks Community. Connect with other developerWorks users while you explore developer-driven blogs, forums, groups, and wikis.
About the authors

Pallavi Priyadarshini

Pallavi Priyadarshini has more than 14 years of product development experience. She is currently the architect of DB2 Connect Java client. She has developed core functionalities in DB2 z/OS server in Silicon Valley Labs and also developed web-based and security applications as part of two Silicon Valley startups. She regularly gives presentations at conferences and is the technical advocate for enterprise accounts. She has co-authored an IBM Redbooks® publication on DB2 in SOA and papers in data-centric solutions.

Iti Rawat

Iti Rawat is the QA manager for DB2 Connect. She has more than 15 years of experience in the IT industry, including nine years with IBM. She has worked on various relational databases, such as DB2, Informix, and Oracle. She is Green Belt certified in 6 Sigma methodology.

Rajendra Kamath

Rajendra Kamath currently leads the IBM Common Client and Tooling team that includes .NET, CLI/ODBC, and Visual Studio Integration for applications targeting IBM Data Servers. His primary interests is on data driven application and tooling with IBM Data Servers.

Shilu Mathai

Shilu Mathai is a recognized technical expert for CLI and Embedded. He is a lab advocate for DB2 Connect and is leading CLI/embedded driver feature development.