



CCDUG
CenCan 2024



Central Canada

Db2 Users Group

**Db2 for z/OS – Application Development
Made Easy**

Brian Tsao

IBM

Platform: Db2 for z/OS

Db2 for z/OS

117 Billion

SQL / day

67 of the Fortune 100
companies

8 of the top 10 insurers

45 of the world's top 50 banks

7 of the top 10 global retailers

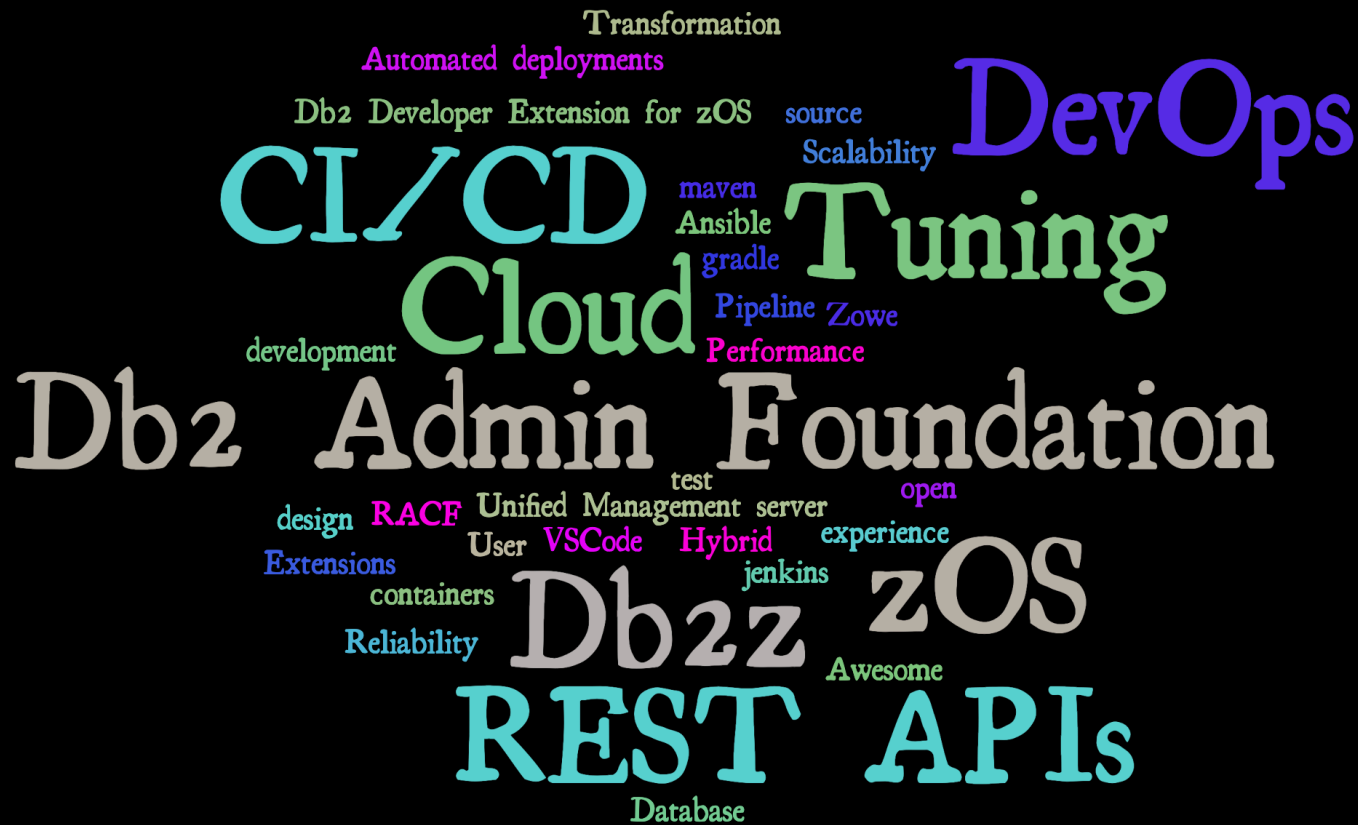
1579 Million

Commits / day

183 Billion

Rows in a single table

Goal and product strategy



Bring Db2 to
you!

Data Studio functions are replaced by role-based products



Deb
Early tenure z/OS
application developer

**IBM Db2 for z/
OS Developer
Extension**

VS Code extension that provides language support for developing Db2 for z/OS SQL applications

- SQL formatting, syntax checking, code completion
- Run SQL, review query results and history
- Deploy, run and debug native stored procedures
- Analyze and tune the performance of SQL queries



Kathleen
Experienced z/OS
application developer

**IBM Developer
for z/OS (IDz)**

Integrated Db2 tooling for application developers

- Generally available on Oct 14, 2022
- Single Eclipse install, macOS support
- Phase one of Db2 features delivered in IDz 16.0.0



Peter
Database Admin

**IBM Db2
Administration
Foundation for
z/OS**

One graphical UI that transforms administrative tasks

- Consolidates administrative capabilities of Data Studio, Data Server Manager and more
- Runs entirely on z/OS with zero-client installation
- Eases learning curve for new users and simplifies for experienced staff with task-driven features

Target persona



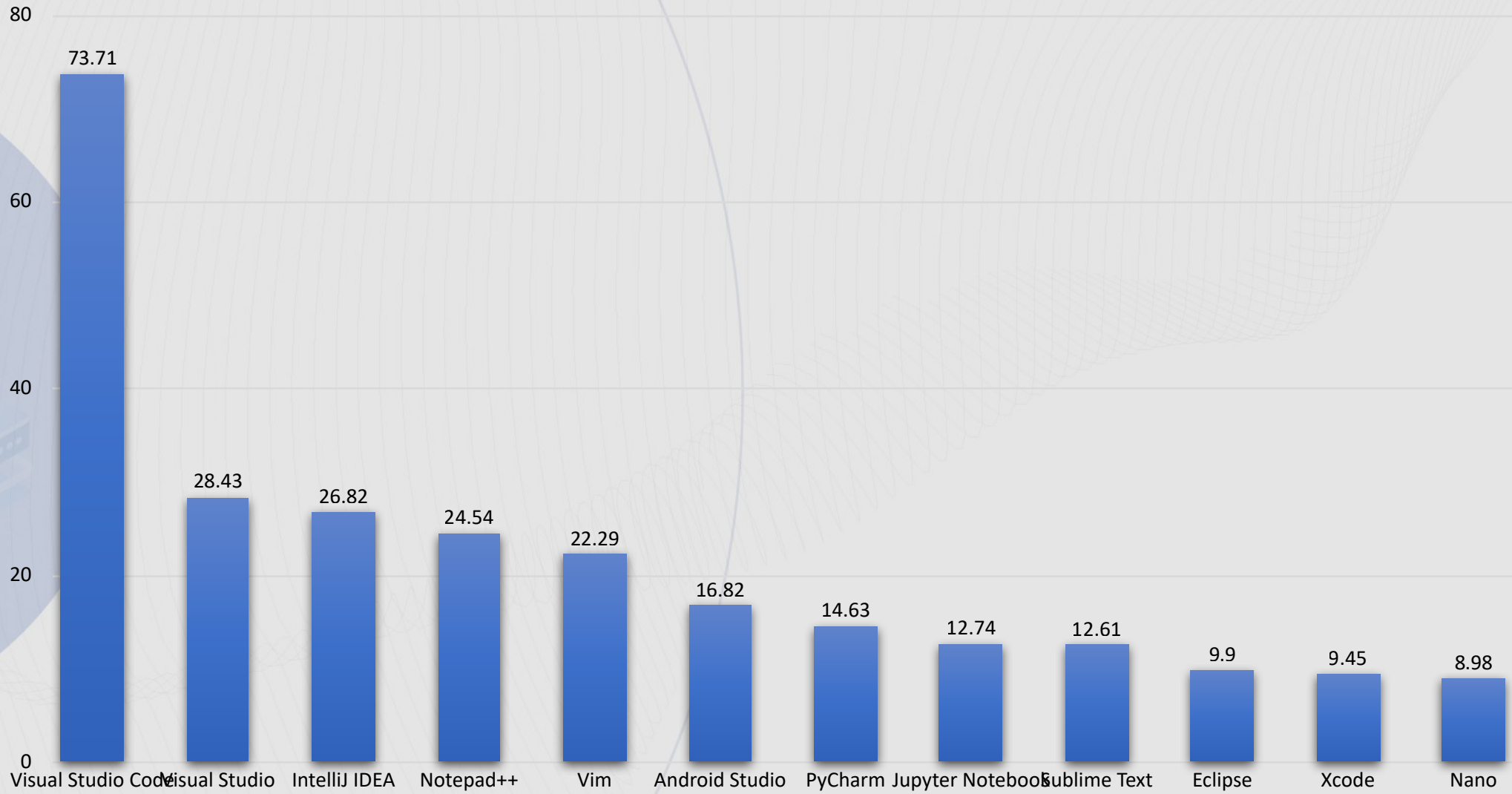
Dev z/OS Developer

Use Web IDE with Db2 services to

- Code, debug, and tune Java, COBOL, PL1, Node applications that access Db2 for z/OS via SQL
- Code, analyze, run, tune SQL statements
- Code, debug, and tune Db2 for z/OS stored procedures
- Develop Db2 for z/OS Native Rest services

Why Visual Studio Code?

86,544 responses - 2023 stack overflow Developer [Survey](#)



Db2 Application development - Feature highlights and timeline

2020/21
V1.1

- Usability features
 - Syntax highlighting and checking
 - Code snippets
 - Code completion
 - Run SQL (BYOL)
 - JDBC tracing
- Native stored procedure debug
- SQL Formatting and embedded SQL execution
- Integration with SQL Tuning services
 - Single query tuning (No charge)
 - Statistics Advisor
 - Visual Explain
 - Query Environment Capture

2022/23
V2.1

- Db2 for z/OS v13 support
- IBM Developer for z/OS V 16.0 release with native support for Db2 for z/OS
- Integration with SQL Tuning services
 - Advanced single query tuning (Licensed)
 - Access Path Advisor
 - Access Path Comparison
 - Index Advisor
 - Query Rewrite Advisor
 - SQL Annotator
- Catalog Navigation support
 - Storage groups
 - Databases
 - Tables
 - Schemas
 - Indexes
 - Views
 - Plans
 - Packages
 - Stored procedures
 - Aliases
 - Sequences
 - Tablespaces
 - Triggers
 - UDF's
 - UDT's
 - Variables
 - REST Services

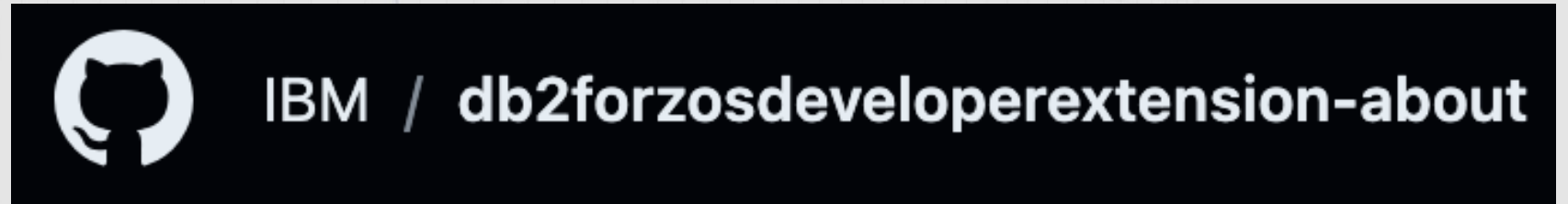
2024
Current V2.1.5

- External stored procedure development/deploy
 - Java stored procedure
 - External SQL stored procedure
- More Db2 for z/OS capabilities in IBM Developer for z/OS
- Interactive SQL execution within **notebook interface**
- VSCode color themes
- Catalog Navigation multi-column filter
 - Storage groups
 - Databases
 - Tables
 - Indexes
 - Stored procedures

Db2 Application development - Feature highlights and timeline

Future

- Integrations:
 - IBM Db2 DevOps Experience for z/OS– Enable application instance provisioning, DDL development, business rules checking, etc.
- IBM Wazi dev spaces integration
- External stored procedure debugging
 - Java stored procedure
 - External SQL stored procedure
- Intelli-sense
- Import connections from Data studio
- DDL Generation
- More Db2 for z/OS capabilities in IBM Developer for z/OS



<https://github.com/IBM/db2forzosdeveloperextension-about>

Report a bug

Create a bug report that describes a problem, regression, or faulty behavior.

Get started

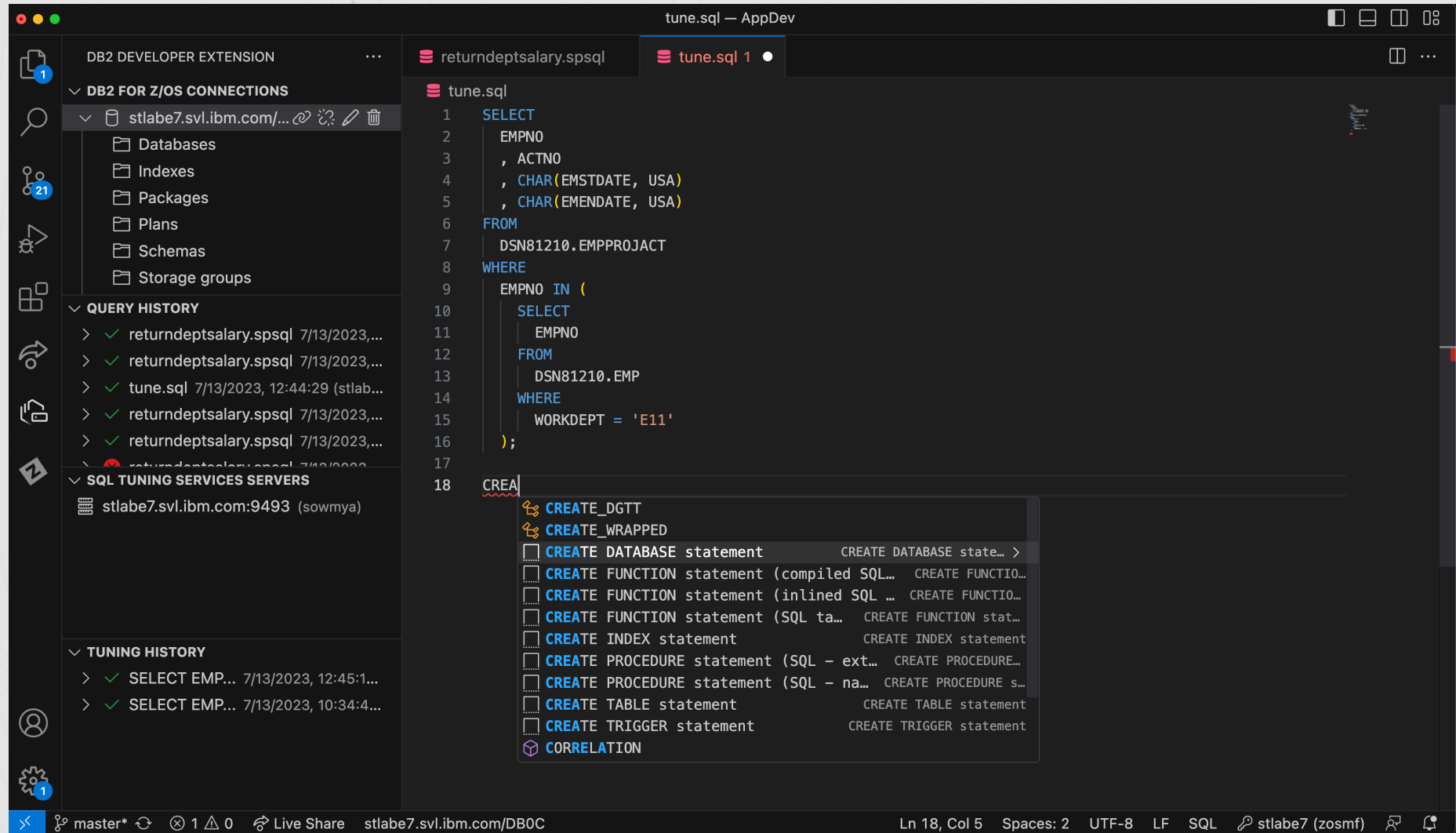
Request a new feature

Request a new feature or enhancement to help improve IBM Db2 for z/OS Developer Extension.

Get started

IBM Db2 for z/OS Developer Extension

User interface – Db2
Application development
support on Visual Studio
IDE



IBM Db2 for z/OS Developer Extension

Interactive SQL

User interface - Db2
Application development
support on Visual Studio
IDE

The screenshot displays the IBM Db2 Developer Extension interface within Visual Studio. The main window shows a code editor with a SQL query:

```
1 SELECT * FROM INVALIDTABLE;
```

The query execution resulted in an error:

```
ExecutionError: ADMF001.INVALIDTABLE IS AN UNDEFINED NAME. SQLCODE=-204, SQLSTATE=42704, DRIVER=4.32.28
```

The interface also shows a query history panel with several queries, including a CREATE TABLE statement:

```
1 CREATE
CREATE_DGTT
CREATE_WRAPPED
CREATE DATABASE statement
CREATE FUNCTION statement (compiled SQL...)
CREATE FUNCTION statement (inlined SQL...)
CREATE FUNCTION statement (SQL ta...)
CREATE INDEX statement
CREATE PROCEDURE statement (Java - IN/OUT p...)
CREATE PROCEDURE statement (Java - return a...)
CREATE PROCEDURE statement (SQL - ext...)
CREATE PROCEDURE statement (SQL - na...)
```

A table of employee data is displayed, showing columns for EMPNO, FNAME, LNAME, ADDRESS, CITY, STATE, COUNTRY, SALARY, BONUS, and COMM. The table contains 20 rows of data.

EMPNO	FNAME	LNAME	ADDRESS	CITY	STATE	COUNTRY	SALARY	BONUS	COMM
000010	CHR						52750.00	1000.00	4220.00
000020	M						41250.00	800.00	3300.00
000030							38250.00	800.00	3060.00
000050							40175.00	800.00	3214.00
000060							32250.00	600.00	2580.00
000070	EVA	PULASKI					36170.00	700.00	2893.00
000090	EILEEN	HENDERSON					29750.00	600.00	2380.00
000100	THEODORE	SPENSER					26150.00	500.00	2092.00
000110	VINCENZO	LUCCHESI					46500.00	900.00	3720.00
000120	SEAN	O'CONNELL					29250.00	600.00	2340.00
000130	DOLORES	QUINTANA					23800.00	500.00	1904.00
000140	HEATHER	NICHOLLS					28420.00	600.00	2274.00
000150	BRUCE	ADAMSON					25280.00	500.00	2022.00
000160	ELIZABETH	PIANKA					22250.00	400.00	1780.00
000170	MASATOSHI	YOSHIMURA					24680.00	500.00	1974.00
000180	MARILYN	SCOUTTEN					21340.00	500.00	1707.00
000190	JAMES	WALKER					20450.00	400.00	1636.00
000200	DAVID	BROWN					27740.00	600.00	2217.00
000210	WILLIAM	JONES					18270.00	400.00	1462.00
000220	JENNIFER	LUITZ					29840.00	600.00	2387.00
000230	JAMES	JEFFERSON					22180.00	400.00	1774.00
000240	SALVATORE	MARINO					28760.00	600.00	2301.00
000250	DANIEL	SMITH					19180.00	400.00	1534.00
000260	SYBIL	JOHNSON					17250.00	300.00	1380.00
...									
200240	ROBERT	MONTEVERDE					28760.00	600.00	2301.00

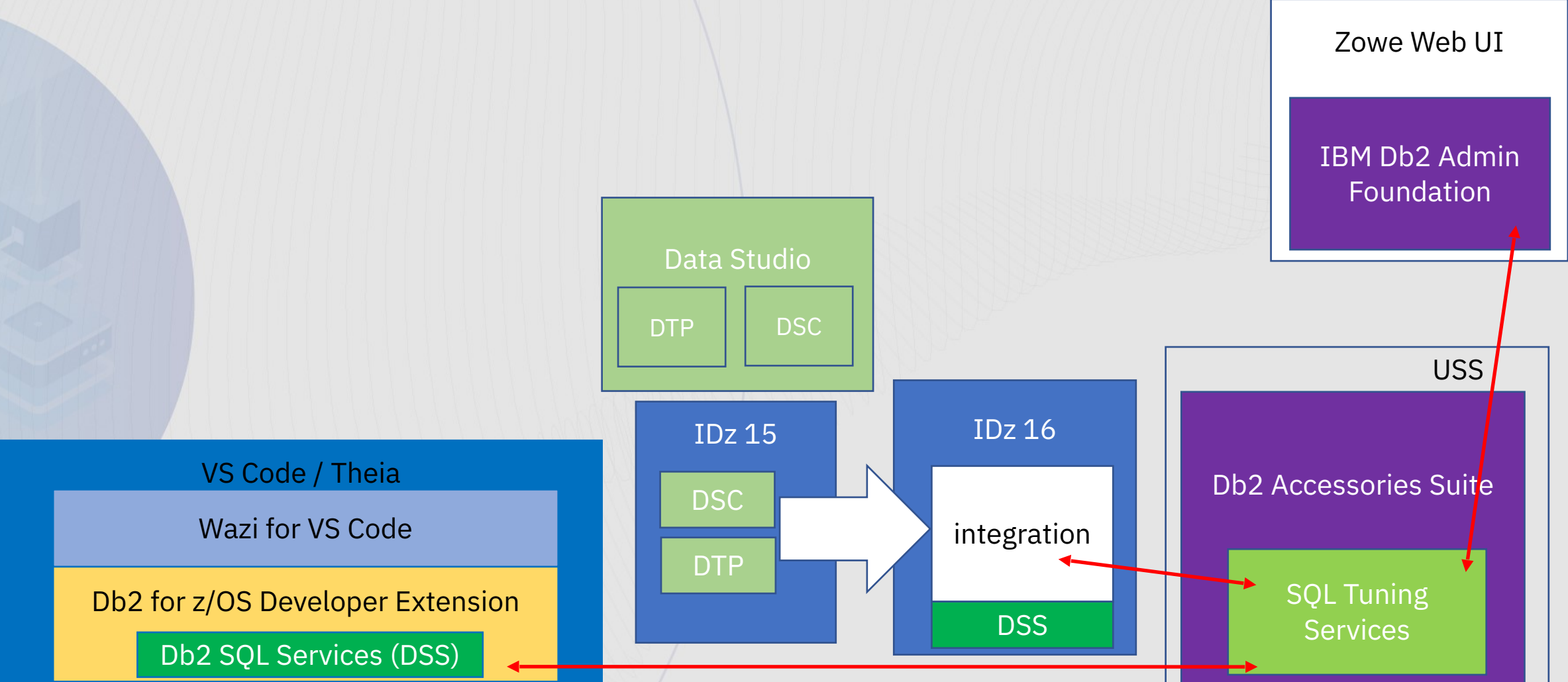
IBM Developer for z/OS is:



Anonymous customer comments

- ‘I find it *incredibly efficient to program COBOL* with IDz. To have multiple window open, used the editor copy-paste commands, open up copybooks or get previews, so many features
- ‘Its an *easy application* to use and very *helpful in my day-to-day role* of production support’
- ‘*Great for teamwork*’
- ‘I use the product for my school homework, *I love the layout, ease of use, and consistent efficiency* to get my homework done’
- ‘There is some *nice features* in IDz, regarding USS, *debugging, dataset browsing and copying, source analysis, etc.* Furthermore, *we use Git*, and have direct access to our source code so we actually give *the opportunity to work in a “normal” manner* in IDz/ Eclipse -...this makes it *easier for the new mainframer*’

Future Db2 for z/OS Tooling for developers (using Eclipse)



Multi-phased approach for delivery of Db2 for z/OS features within IDz

IDz 16.0.0 (4Q22)

- Configure IDz to use the Db2 for z/OS client license file
- Configure DB2 Subsystem in RSE
- Select a SQL Statement and Execute It
- Configure SQL Execution Options
- Browse SQL Results and Review Prior SQL Executions
- Integration with Db2 Accessories Suite for 3 no-charge SQL Tuning Services
 - Visual Explain,
 - Stats Advisor,
 - Query Environment Capture

IDz 16.0.1 (1Q23)

- Run SQL, Tune SQL from LPEX
- COBOL & PL/I Editor support for Semantic Validation of SQL Objects

IDz 16.0.2 (2Q23)

- Explore DB2 Catalog (Phase 1)
 - Schemas, Storage Groups, Tables, Databases
- Favorites
- Browse Tables
- Override JDBC driver
- Connectivity & licensing improvements

4Q23

- Explore DB2 Catalog (Phase 2)
 - Indexes, Packages, Plans, Stored Procedures, Views
- SQL Editor with Format SQL
- New SQL Script
 - Open connected SQL Editor
 - Open a Query History statement(s) in a SQL editor
 - Open DDL or Package Statements in a SQL Editor
 - Generate a SELECT statement with all columns from a Table/View
- Edit Tables
- Push to client support

Planned for 2024

- Explore DB2 Catalog (Phase 3)
 - Table spaces, Triggers, UDFs, Aliases, Sequences, UDTs, Variables, REST services
- DCLGEN (Table, View, Alias)
- Stored Procedures
 - Create, Deploy, Debug/Run
- Overview Diagram

IBM - VS Code Extensions



Zowe Explorer

🕒 103ms

VS Code extension, powered by Zowe CLI, th...

📦 Zowe



Zowe Explorer Extension for FTP

🕒 60ms

Adds zFTP support to Zowe Explorer demons...

📦 Zowe



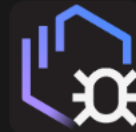
Zowe Explorer for IBM CICS

📦 4K

Extension to the Zowe Explorer for IBM CICS

📦 Zowe

Install



IBM Z Open Debug

🕒 13ms

Provides a Debug Adapter Protocol (DAP) cli...

📦 IBM

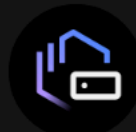


IBM Z Open Editor

🕒 323ms

Provides COBOL, PL/I, HLASM, and REXX lan...

📦 IBM



IBM Db2 for z/OS Developer Extens...

🕒 82ms

Provides support for developing IBM Db2 for ...

📦 IBM



Demo time!



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Thank you!

Central Canada

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Platform: Db2 for z/OS