

Boost your SQL Performance

[Rudi van Helvoirt](#)

25 september 2024

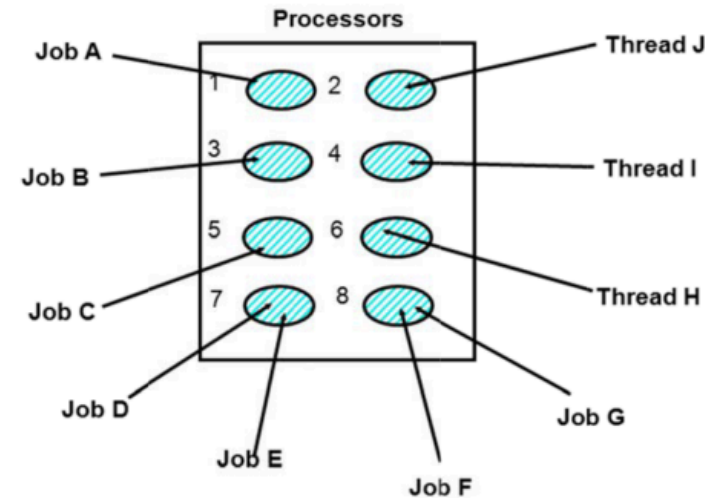
Agenda

- Boost your SQL Performance when Running
- Boost your SQL Performance when Developing

Boost your SQL Performance when Running



N-way processing



- ✓ n Processors can work on several jobs or threads at one time without any special programming
- ✓ Memory is shared across all processors
- ✓ Database is shared across all jobs and all processors
- ✓ No one job is running on more than one processor

Boost your SQL Performance when Running

DB2 Symmetric MultiProcessing

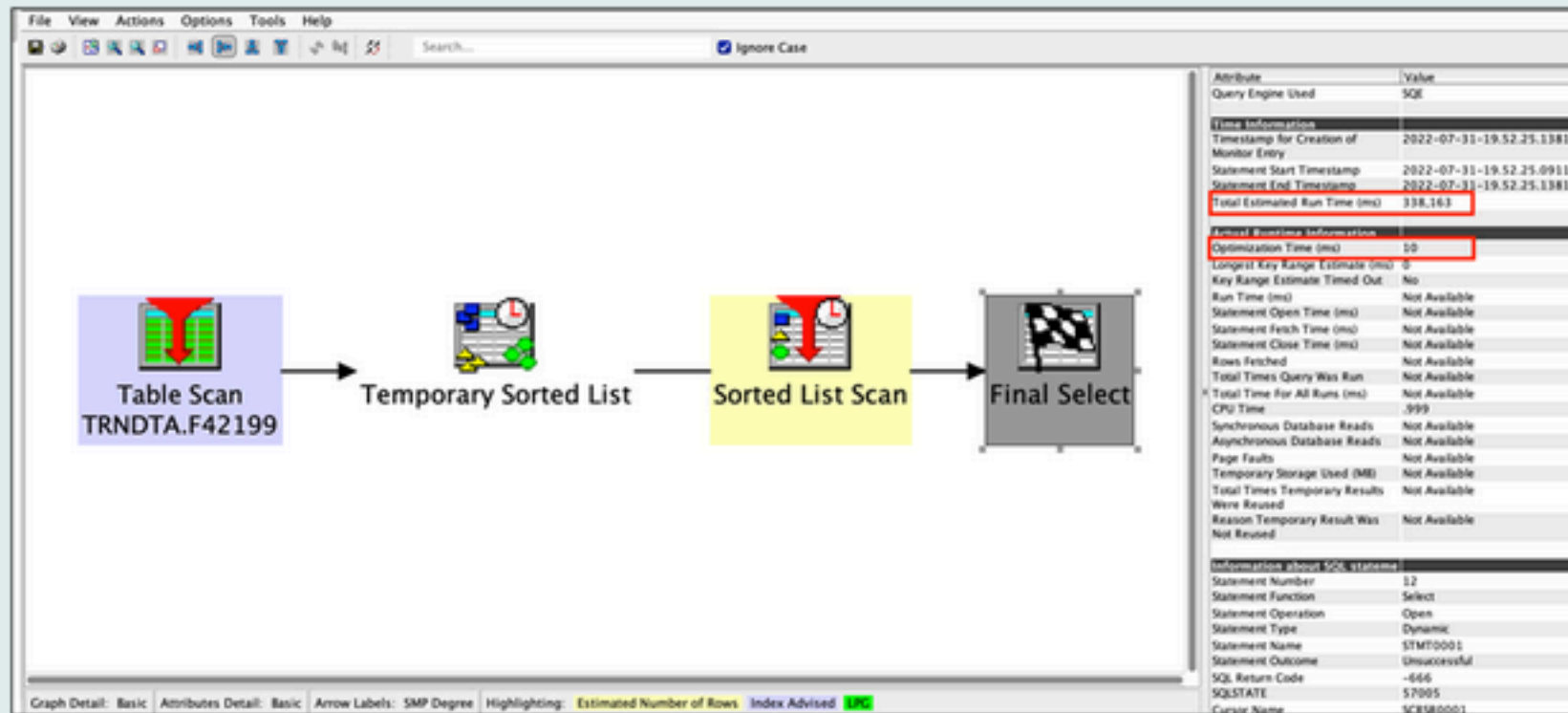
[Getting Started with Db2 SMP](#)

[Db2 SMP MultiThreading](#)

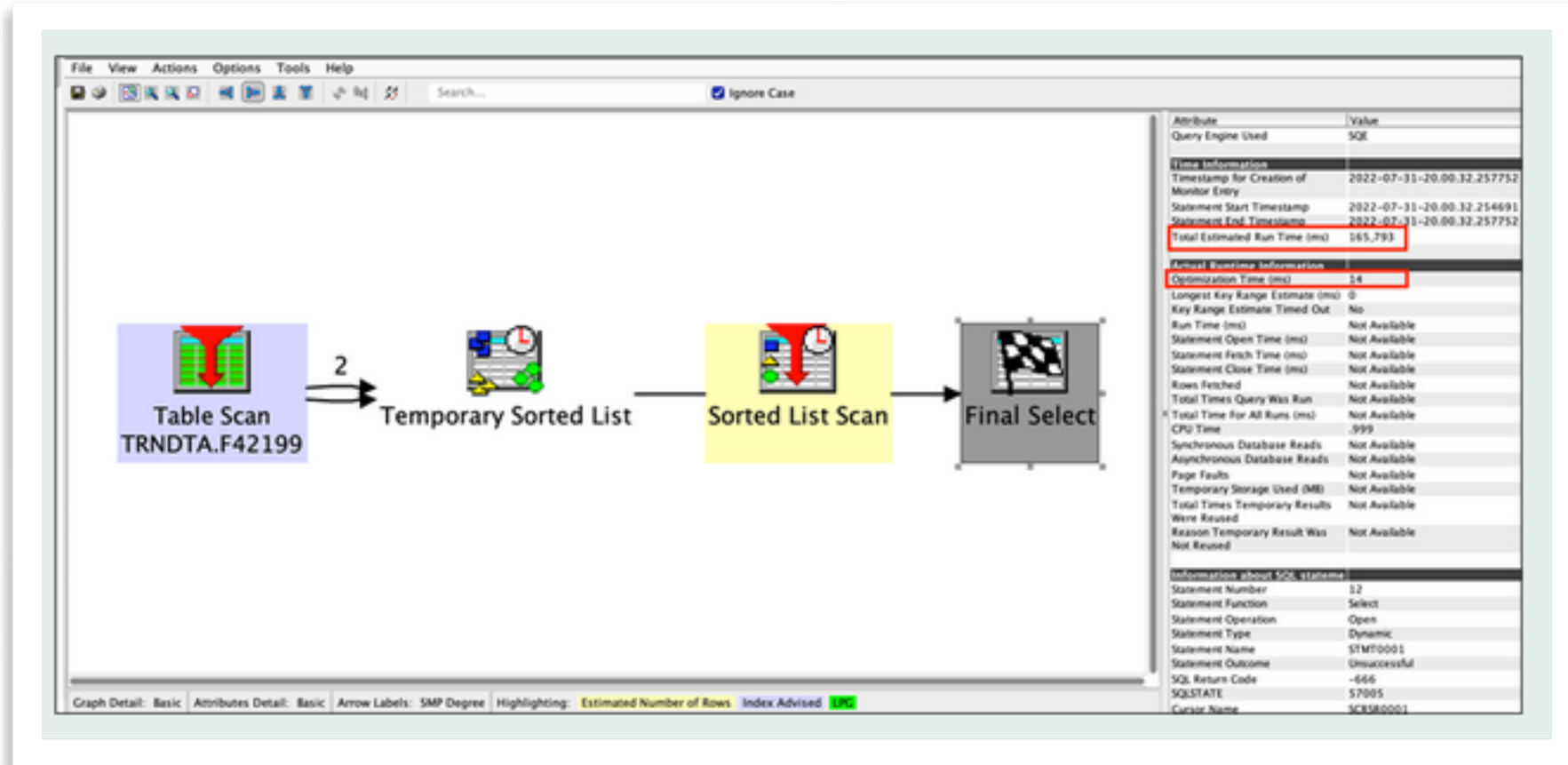
[Introduction to DB2 Symmetric Multiprocessing for IBM i](#)

Boost your SQL Performance when Running



Before running the SQL statement using SMP, Visual Explain will look similar to the screen shown below:



Boost your SQL Performance when Running



Boost your SQL Performance when Running

Data access method	Table scan
Description	Reads all the rows from the table and applies the selection criteria to each of the rows within the table. The rows in the table are processed in no guaranteed order, but typically they are processed sequentially.
Advantages	<ul style="list-style-type: none">• Minimizes page I/O operations through asynchronous pre-fetching of the rows since the pages are scanned sequentially• Requests a larger I/O to fetch the data efficiently
Considerations	<ul style="list-style-type: none">• All rows in the table are examined regardless of the selectivity of the query• Rows marked as deleted are still paged into memory even though none are selected. You can reorganize the table to remove deleted rows.
Likely to be used	<ul style="list-style-type: none">• When expecting many rows returned from the table• When the number of large I/Os needed to scan is fewer than the number of small I/Os required to probe the table
Example SQL statement	<pre>SELECT * FROM Employee WHERE WorkDept BETWEEN 'A01' AND 'E01' OPTIMIZE FOR ALL ROWS</pre>
Database Monitor and Plan Cache record indicating use	QQRID 3000 - Table Scan
SMP parallel enabled	Yes 
Also referred to as	Table Scan, Preload
Visual Explain icon	

Boost your SQL Performance when Developing

IBM i Access Client Solutions

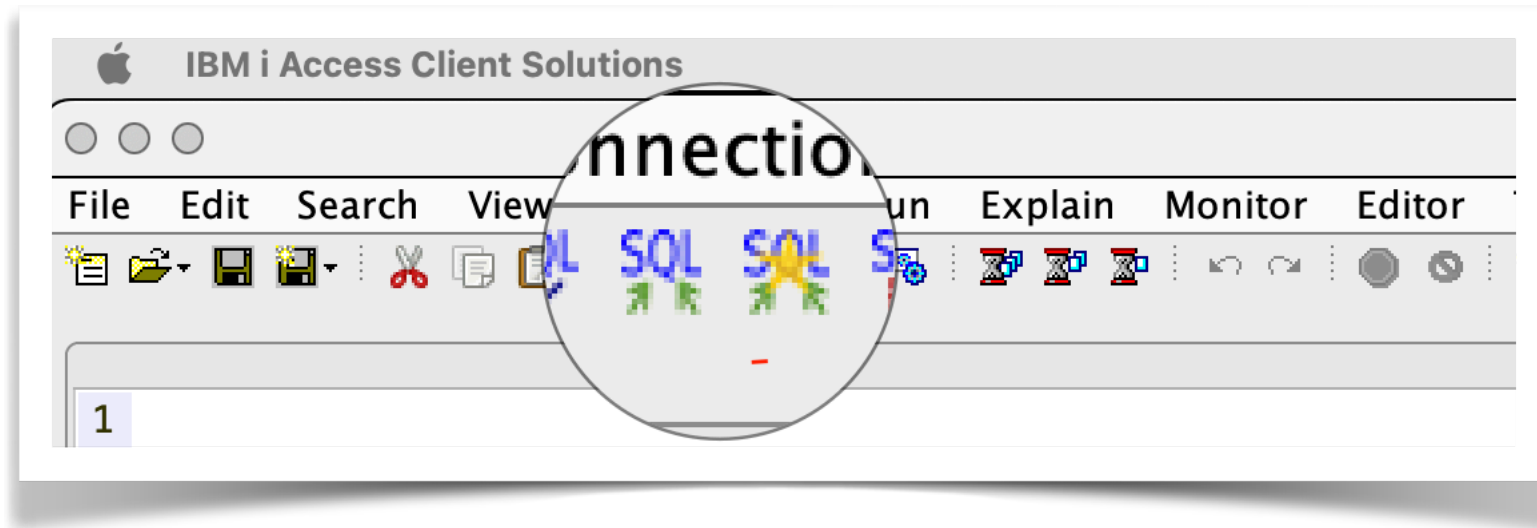
Navigator for i

Visual Studio Code - Db2 for i Extension

Boost your SQL Performance when Developing

IBM i Access Client Solutions:

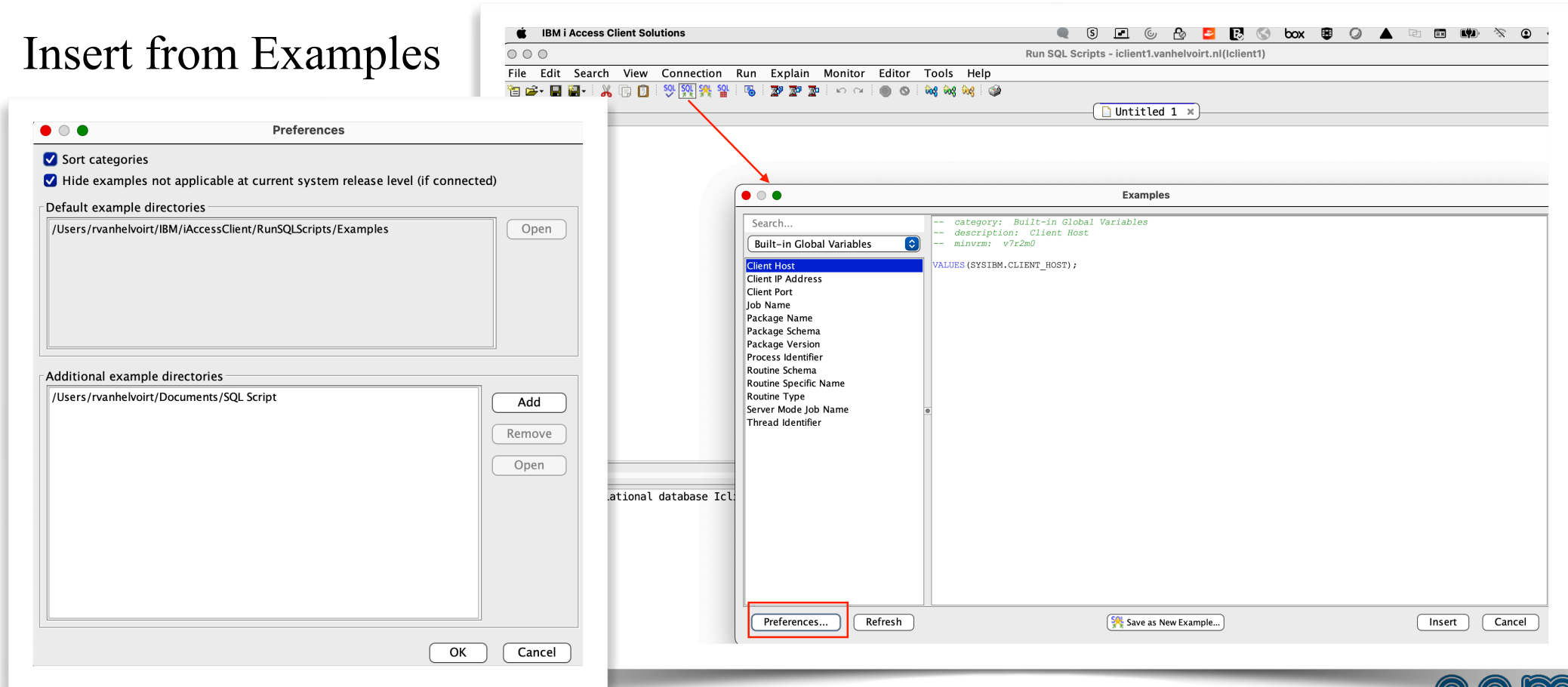
Insert from Examples/Save as New Example



Boost your SQL Performance when Developing

IBM i Access Client Solutions:

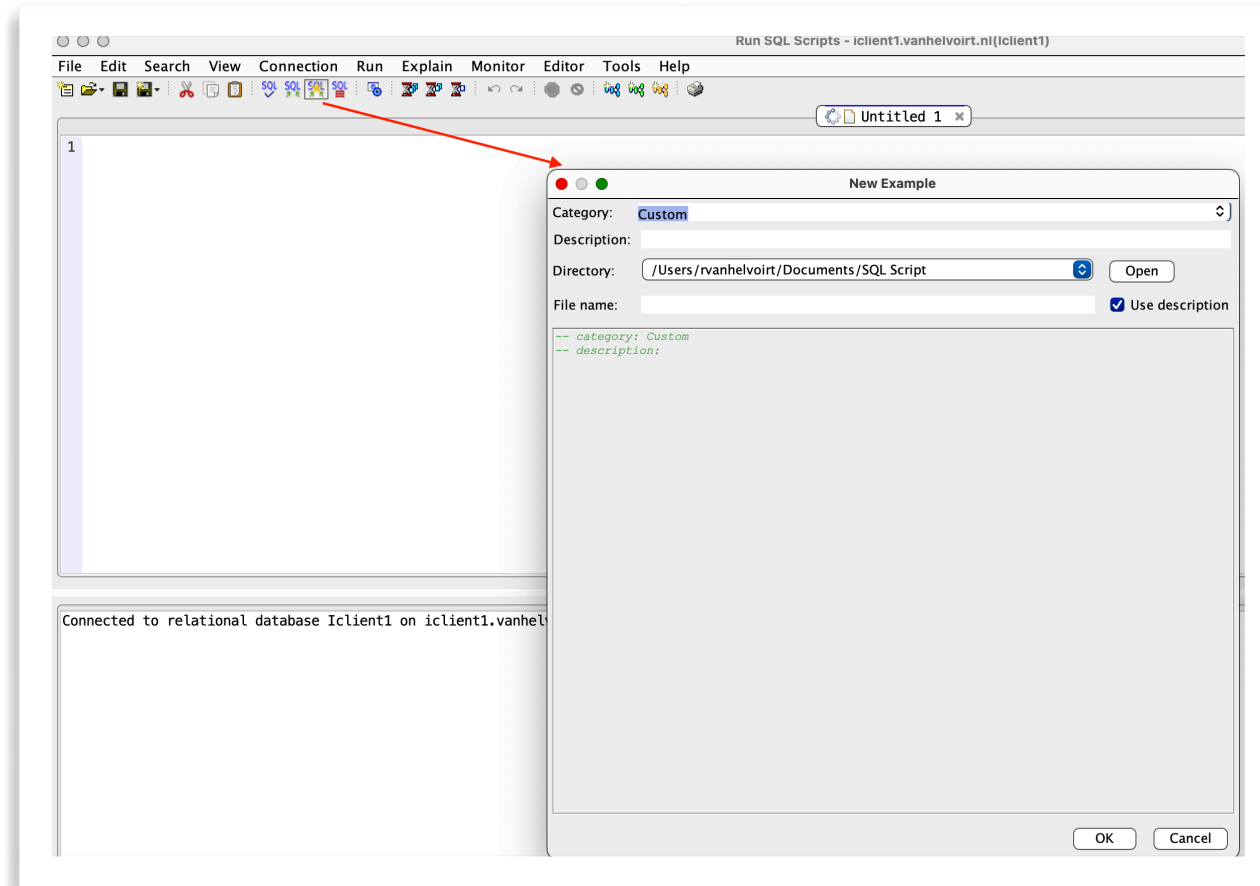
Insert from Examples



Boost your SQL Performance when Developing

IBM i Access Client Solutions:

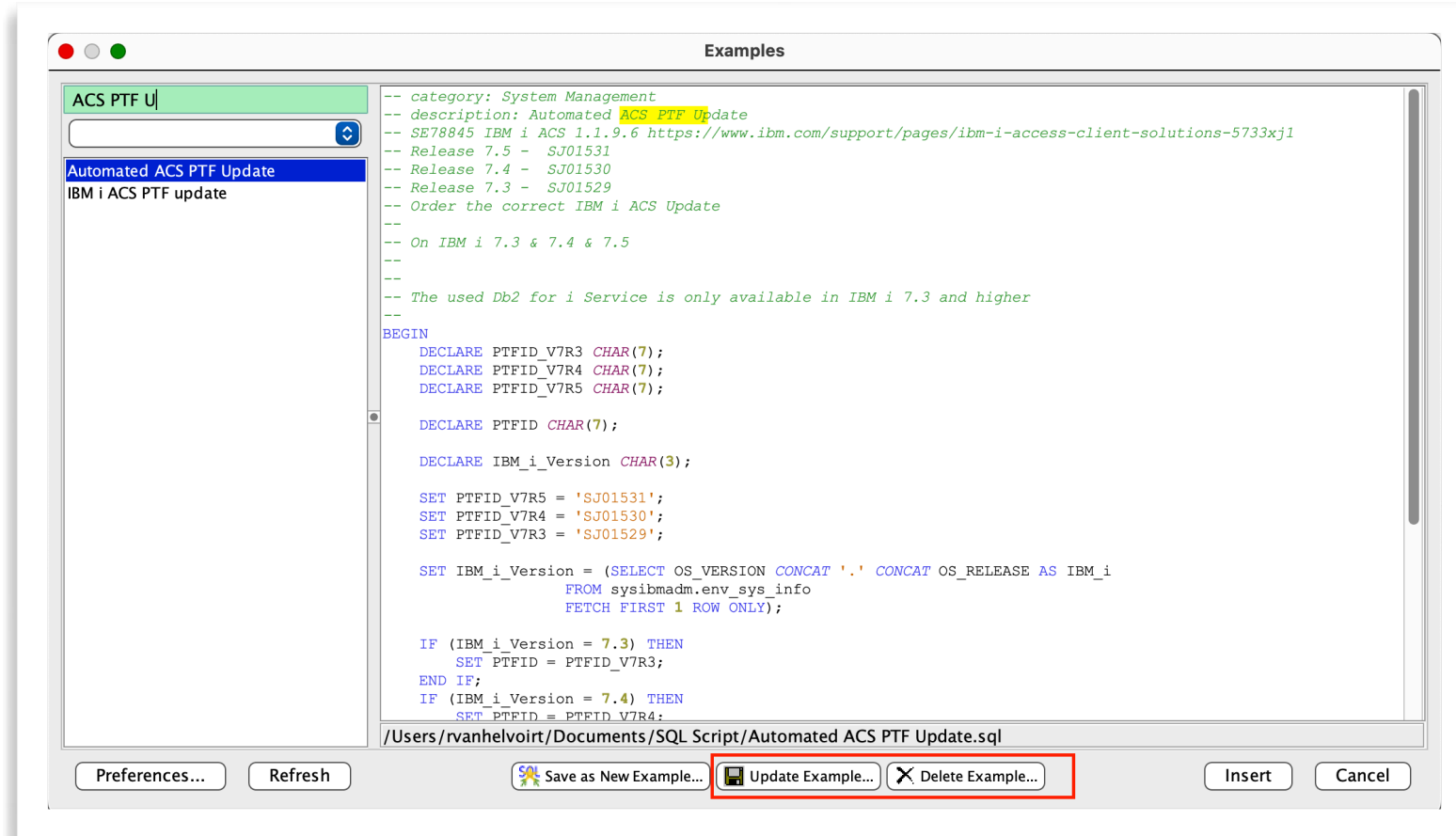
Save as New Example



Boost your SQL Performance when Developing

IBM i Access Client Solutions:

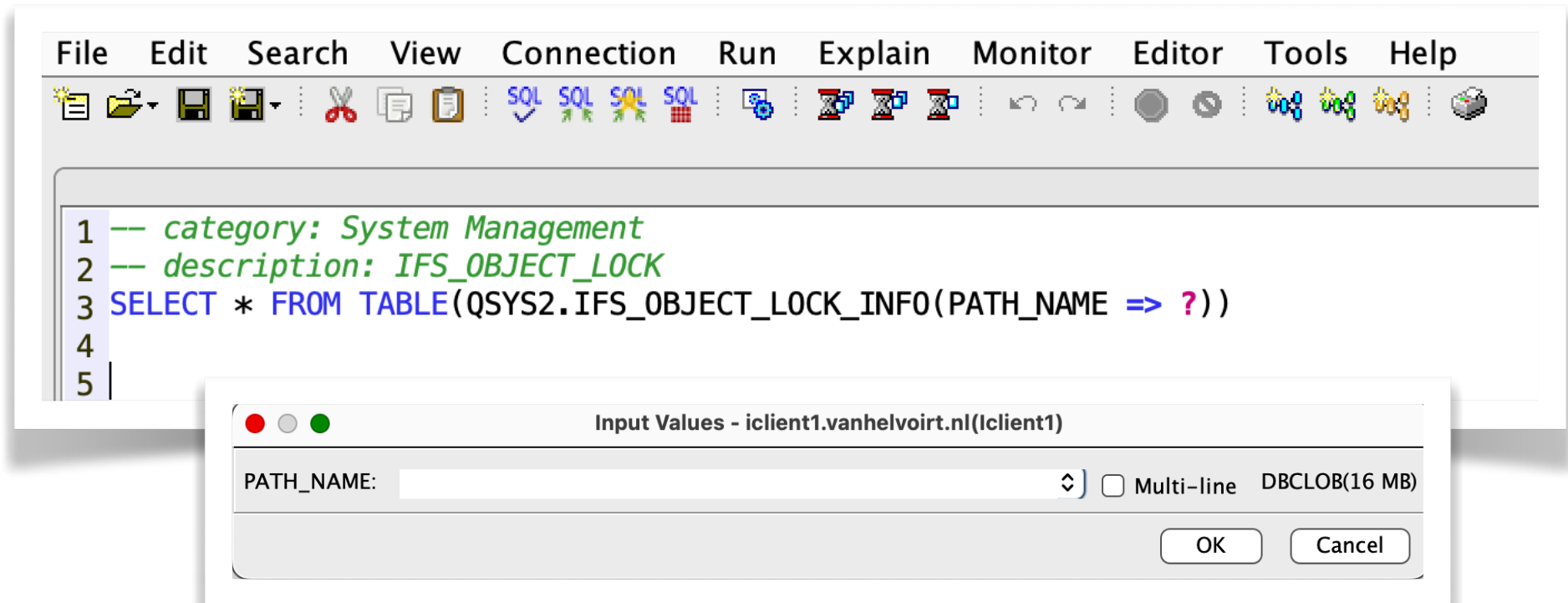
New in 1.1.9.6



Boost your SQL Performance when Developing

IBM i Access Client Solutions:

Prompting



The screenshot displays the IBM i Access Client Solutions interface. The main window is a SQL editor with a menu bar (File, Edit, Search, View, Connection, Run, Explain, Monitor, Editor, Tools, Help) and a toolbar. The editor contains the following SQL code:

```
1 -- category: System Management
2 -- description: IFS_OBJECT_LOCK
3 SELECT * FROM TABLE(QSYS2.IFS_OBJECT_LOCK_INFO(PATH_NAME => ?))
4
5
```

An 'Input Values' dialog box is open in the foreground, titled 'Input Values - iclient1.vanhelvoirt.nl(liclient1)'. It features a text input field for 'PATH_NAME:', a dropdown arrow, a 'Multi-line' checkbox, and a 'DBCLOB(16 MB)' label. The 'OK' and 'Cancel' buttons are at the bottom right.

Boost your SQL Performance when Developing

IBM i Access Client Solutions:

Prompting

```
1 -- category: System Management
2 -- description: FTP2IBMCMD with Prompting
3 set current schema = qrplobj;
4 Create variable Case_Number char(11);
5 Create variable IFS_File varchar(500);
6
7 Set qrplobj.Case_Number = :Enter_Case_Number_Like_TSxxxxxxx;
8 Set qrplobj.IFS_file = :Enter_IFS_file;
9
10 CALL SYSTOOLS.LPRINTF('QMGT00LS/FTP2IBMCMD INPUT(*IFS) CASENBR('' CONCAT QRPLOBJ.Case_Number CONCAT '') IFSFILE('' CONCAT QRPLOBJ.IFS_File CONCAT '')');
11
12 CALL qsys2.qcmdexc('QMGT00LS/FTP2IBMCMD INPUT(*IFS) CASENBR('' CONCAT QRPLOBJ.Case_Number CONCAT '') IFSFILE('' CONCAT QRPLOBJ.IFS_File CONCAT '')');
13
```



Input Values - iclient1.vanhelvoirt.nl(Iclient1)

Enter_IFS_file: | Multi-line VARCHAR(500)

OK Cancel

Boost your SQL Performance when Developing

IBM i Access Client Solutions:

Job Log

The screenshot displays the IBM i Access Client Solutions interface. The main window shows a SQL script with the following content:

```
1 -- category: System Management
2 -- description: FTP2IBMCMD with Prompting
3 set current schema = qrplibj;
4 Create variable Case_Number char(11);
5 Create variable IFS_File varchar(500);
6
7 Set qrplibj.Case_Number = :Enter_Case_Number_like;
8 Set qrplibj.IFS_file = :Enter_IFS_file;
9
10 CALL SYSTOOLS.LPRINTF('QMGTTOOLS/FTP2IBMCMD INPUT(*IFS
11
12 CALL qsys2.qcmdexc('QMGTTOOLS/FTP2IBMCMD INPUT(*IFS
13
14
15
16
17
```

A red circle highlights the 'Tools' menu in the top toolbar, with an arrow pointing to a job log window. The job log window, titled '497867/QUSER/QZDASOINIT Job Log - iclient1.vanhelvoirt.nl', displays the following output:

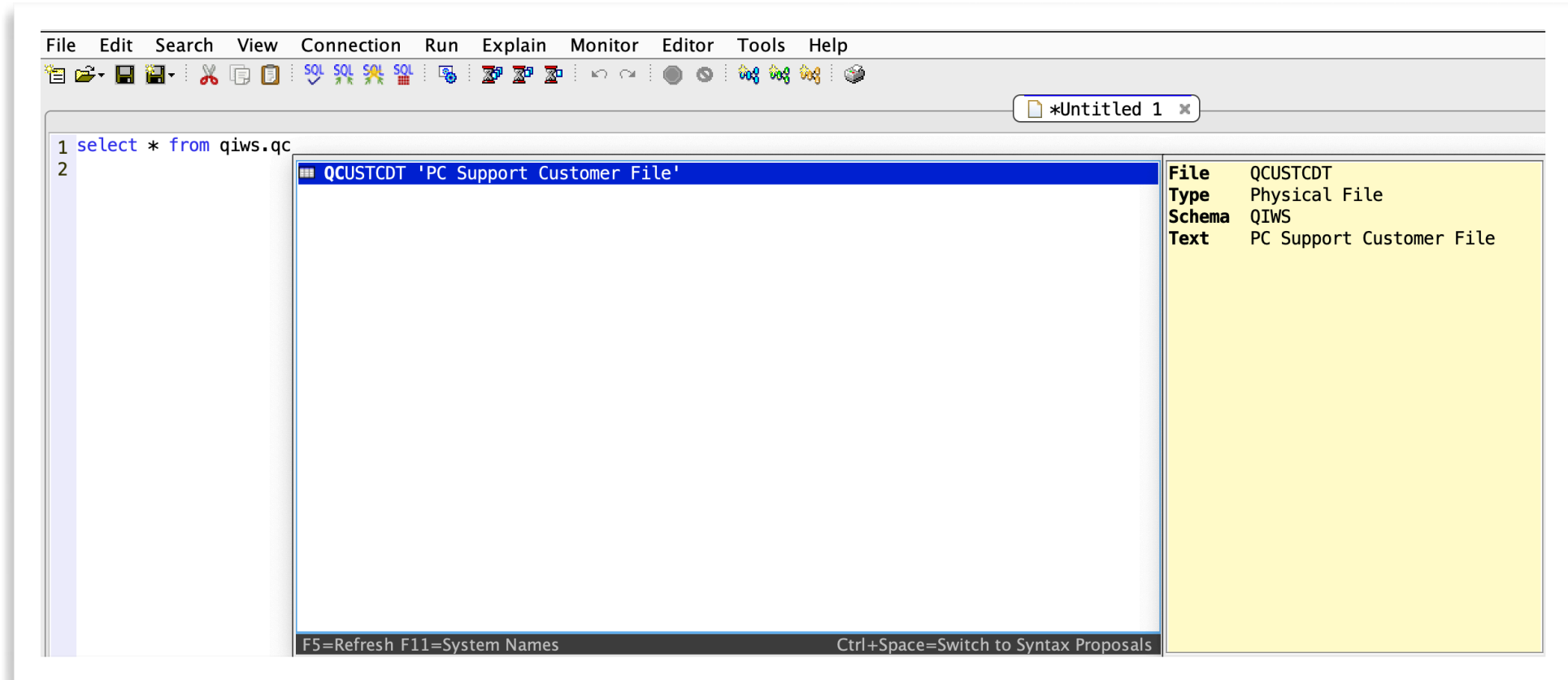
Message ID	Message
	QMGTTOOLS/FTP2IBMCMD INPUT(*IFS CASE_NUMBER=1234567890 IFS_FILE=/usr/sample.zip)
CPC2191	Object IFS_FILE in QTEMP type *MODULE deleted.
CPC5D0B	Service program IFS_FILE created in library QTEMP.
CZS0607	Module IFS_FILE was created in library QTEMP on 24-09-24 at 11:21:40.
CPC7305	Member IFS_FILE added to file QSQLT00000 in QTEMP.
CPC7305	Member IFS_FILE added to file QSQLSRC in QTEMP.
CPF5813	File QSQLSRC in library QTEMP already exists.
CPC2191	Object CASE_00001 in QTEMP type *MODULE deleted.
CPC5D0B	Service program CASE_00001 created in library QRPL0BJ.
CZS0607	Module CASE_00001 was created in library QTEMP on 24-09-24 at 11:21:38.
CPC7305	Member CASE_00001 added to file QSQLT00000 in QTEMP.

A context menu is open over the first message, showing options: Copy, Copy Column (Message), and %C.

Boost your SQL Performance when Developing

IBM i Access Client Solutions:

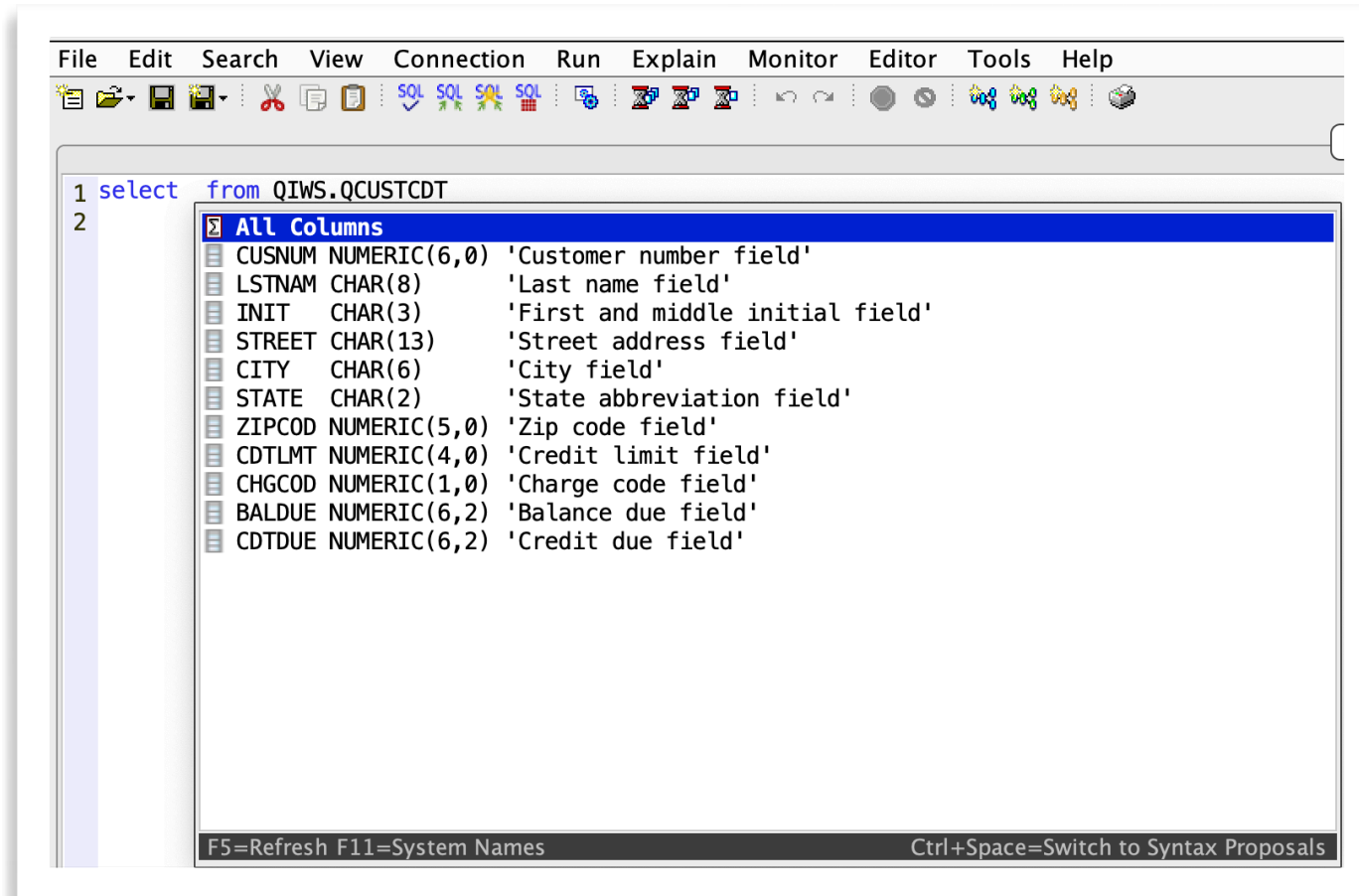
Content Assist



Boost your SQL Performance when Developing

IBM i Access Client Solutions:

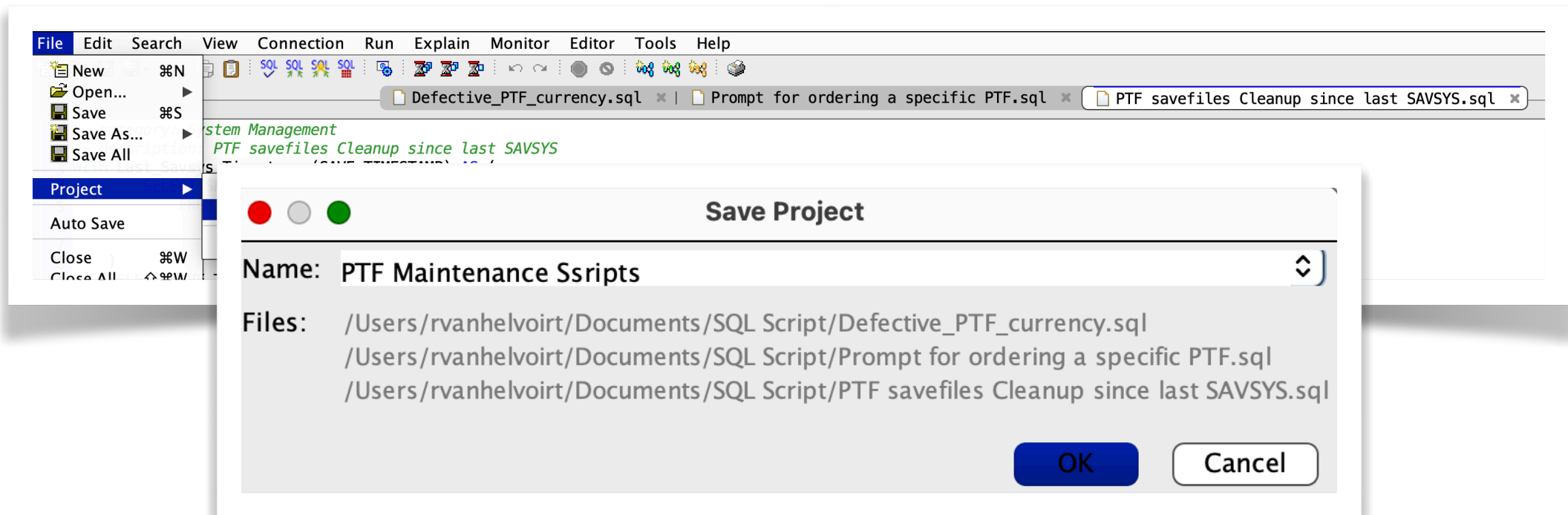
Content Assist



Boost your SQL Performance when Developing

IBM i Access Client Solutions:

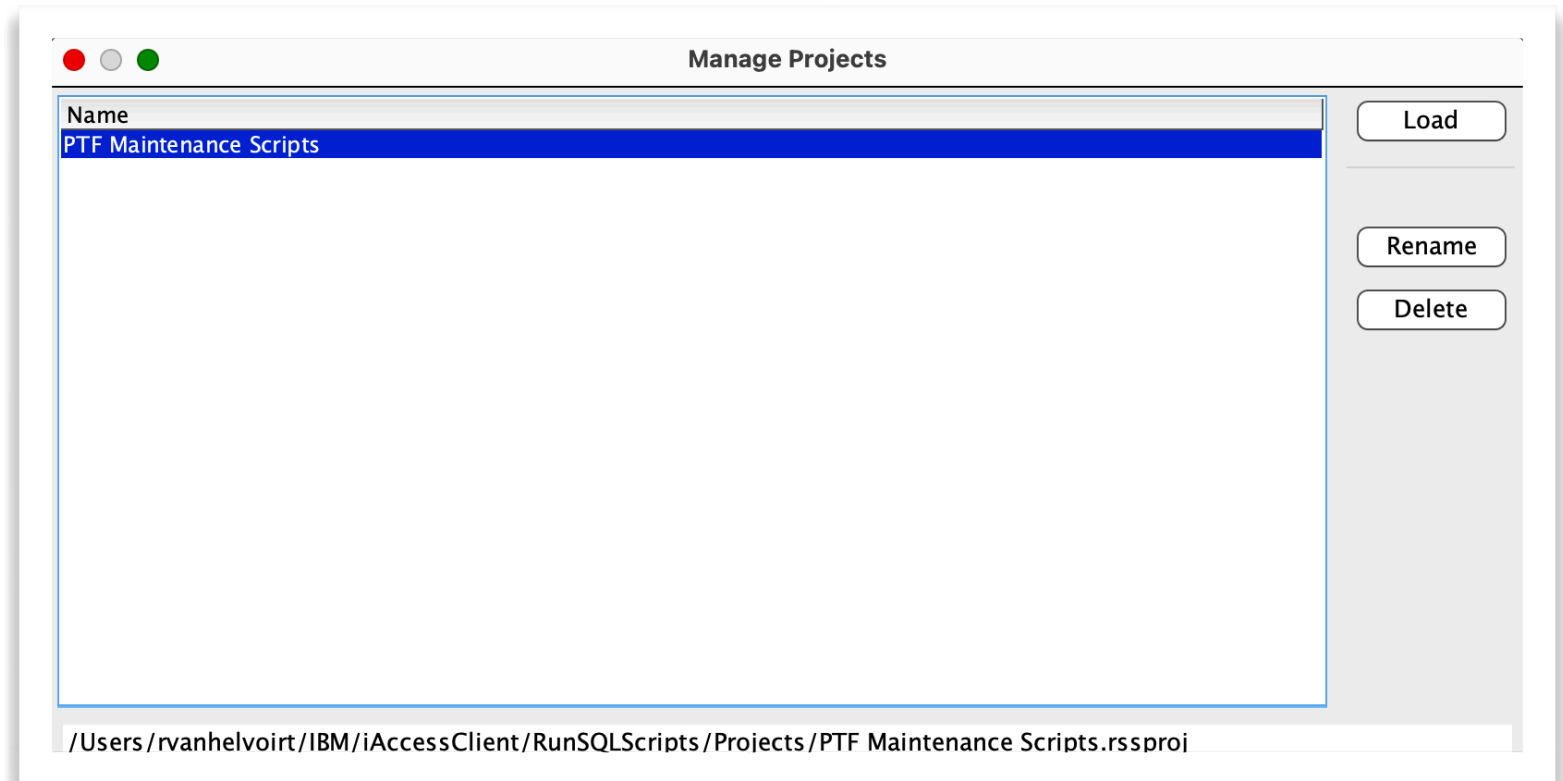
Project (New in 1.1.9.6)



Boost your SQL Performance when Developing

IBM i Access Client Solutions:

Project (New in 1.1.9.6)



Boost your SQL Performance when Developing

Navigator for i (New in Q3 2024 September HTTP Group PTF)

IBM Navigator for i

Active Java Virtual Machine (JVM) Jobs

Job Name	Process ID	Start Time	Initial Thread Task Count	Java Thread Count	Total GC Time	GC Cycle Number	GC Policy Name	Java Home
456470/QSYS/QSRVMON	10	2024-08-09 22:44:48.282000	1178	29	6156	52	gencon	/QOpenSys/QIBM/ProdData/JavaVM/jdk80/64bit/jre
457386/QLWISVR/ADMIN2	545	2024-08-12 15:06:27.994000	12676	50	9089	62	gencon	/QOpenSys/QIBM/ProdData/JavaVM/jdk80/64bit/jre
457387/QWEBADMIN/ADMIN3	548	2024-08-12 15:00:00					gencon	/QOpenSys/QIBM/ProdData/JavaVM/jdk80/64bit/jre
457388/QLWISVR/ADMIN5	547	2024-08-12 15:00:00					gencon	/QOpenSys/QIBM/ProdData/JavaVM/jdk80/64bit/jre
457393/QWEBADMIN/ADMIN4	551	2024-08-12 15:00:00					gencon	/QOpenSys/QIBM/ProdData/JavaVM/jdk80/64bit/jre
489507/QWEBADMIN/ADMIN1	5229	2024-09-13 16:00:00					gencon	/QOpenSys/QIBM/ProdData/JavaVM/jdk17/64bit/jre

View SQL (iclient1.vanhelvoirt.nl)

```
SELECT *  
FROM QSYS2.JVM_INFO
```

Run SQL in VSCode Run SQL Close

Boost your SQL Performance when Developing

Navigator for i

View SQL (iclient1.vanhelvoirt.nl)

```
SELECT *  
FROM QSYS2.JVM_INFO
```

IBM i Access Client Solutions

File Edit View Actions Tools Help

- Generate Service Logs
- Package Service Logs
- Reset for Maintenance
- System Debugger
- Key Management
- Navigator Requests
- Service Directory

System: iclient1.vanhelvoirt.nl

- General
 - Data Transfer
 - 5250 Emulator
 - Integrated File System
 - Navigator for i
 - SSH Terminal

▶ Run SQL in VSCode ▶ Run SQL ✕ Close

Allow this site to open the vscode link with Code?

[Choose a different application.](#)

Always allow **https://iclient1.vanhelvoirt.nl:2003** to open **vscode** links

Cancel Open Link

Allow 'Db2 for IBM i' extension to open this URI?

vscode://halcyontechltd.vscode...Dtrue

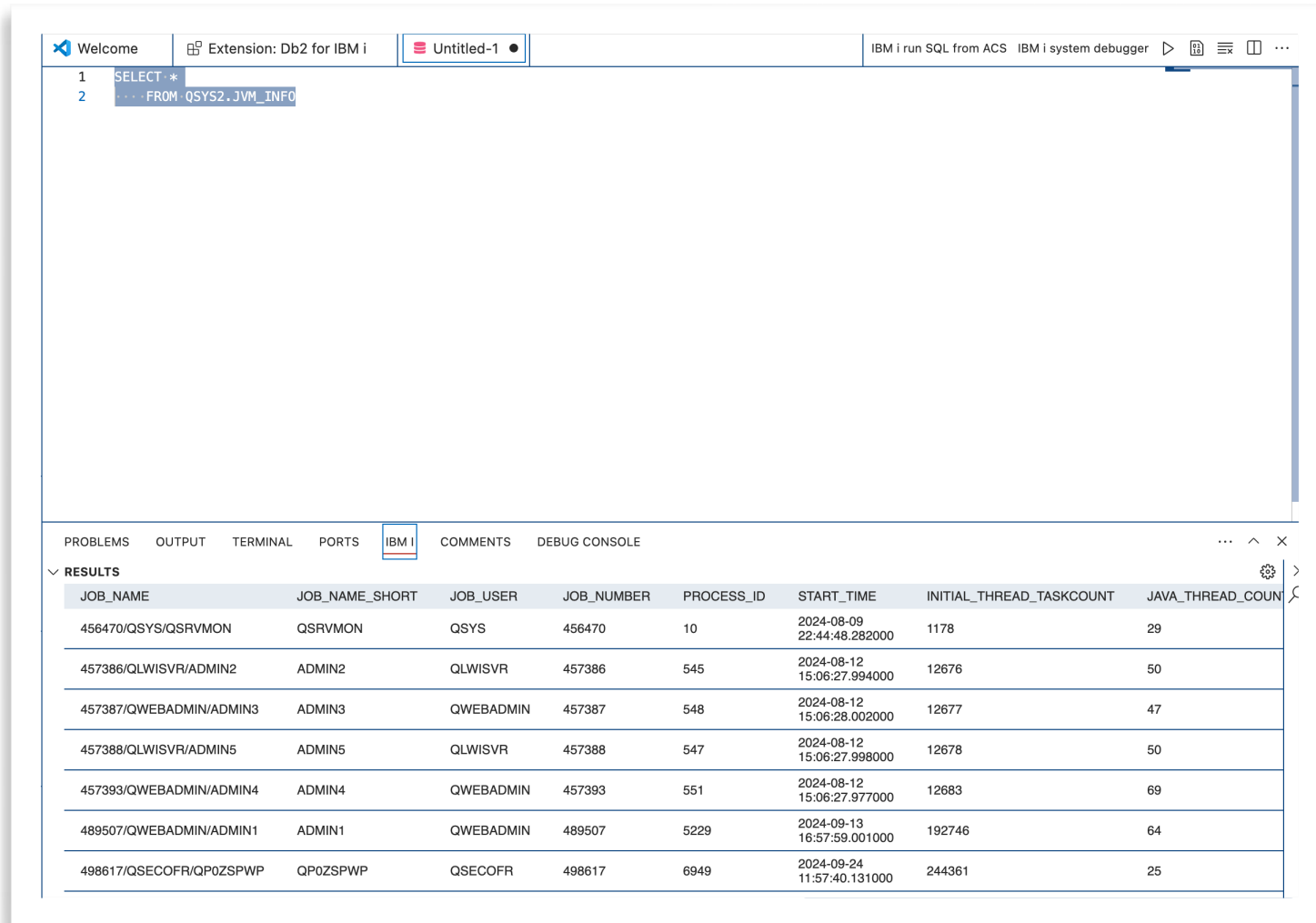
Open

Cancel

Do not ask me again for this extension

Boost your SQL Performance when Developing

Navigator for i - Visual Studio Code



The screenshot shows the Visual Studio Code interface with the 'Db2 for IBM i' extension installed. The editor displays the following SQL query:

```
1 SELECT *
2 FROM QSYS2.JVM_INFO
```

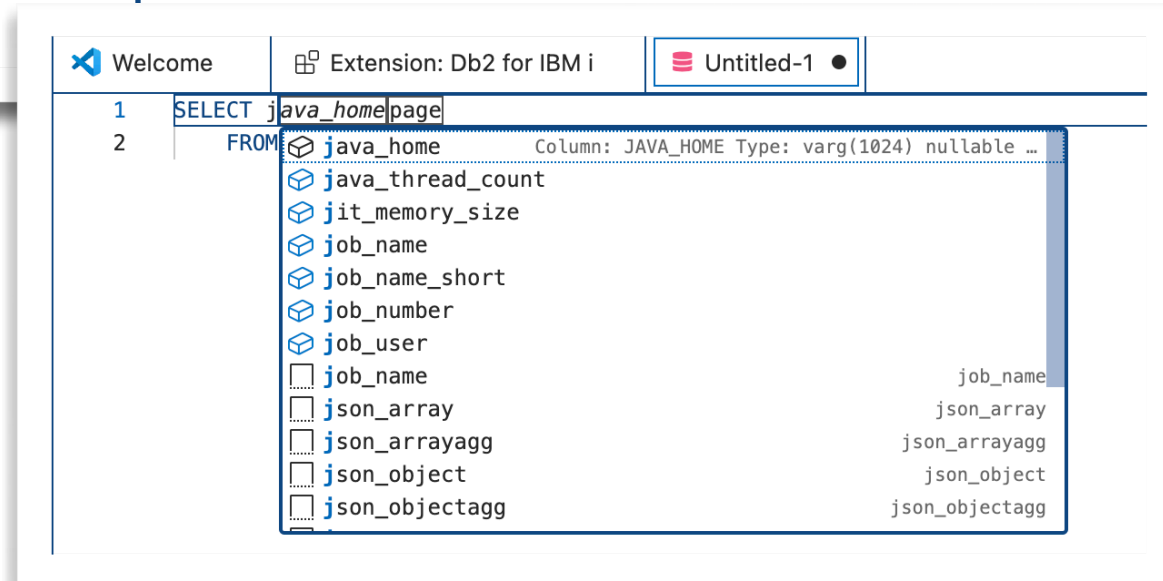
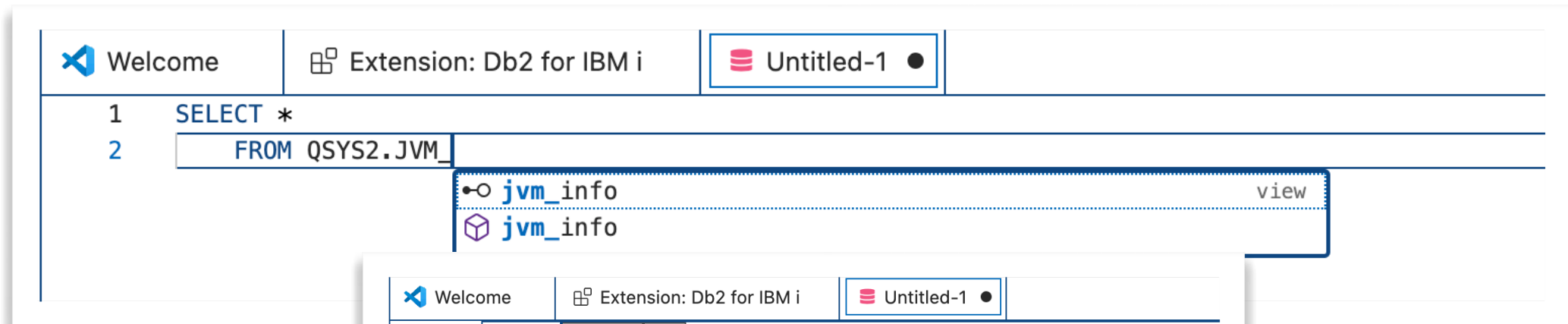
The 'RESULTS' panel at the bottom shows the output of the query as a table with the following data:

JOB_NAME	JOB_NAME_SHORT	JOB_USER	JOB_NUMBER	PROCESS_ID	START_TIME	INITIAL_THREAD_TASKCOUNT	JAVA_THREAD_COUNT
456470/QSYS/QSRVMON	QSRVMON	QSYS	456470	10	2024-08-09 22:44:48.282000	1178	29
457386/QLWISVR/ADMIN2	ADMIN2	QLWISVR	457386	545	2024-08-12 15:06:27.994000	12676	50
457387/QWEBADMIN/ADMIN3	ADMIN3	QWEBADMIN	457387	548	2024-08-12 15:06:28.002000	12677	47
457388/QLWISVR/ADMIN5	ADMIN5	QLWISVR	457388	547	2024-08-12 15:06:27.998000	12678	50
457393/QWEBADMIN/ADMIN4	ADMIN4	QWEBADMIN	457393	551	2024-08-12 15:06:27.977000	12683	69
489507/QWEBADMIN/ADMIN1	ADMIN1	QWEBADMIN	489507	5229	2024-09-13 16:57:59.001000	192746	64
498617/QSECOFR/QP0ZSPWP	QP0ZSPWP	QSECOFR	498617	6949	2024-09-24 11:57:40.131000	244361	25

Boost your SQL Performance when Developing

Visual Studio Code - Db2 for i Extension

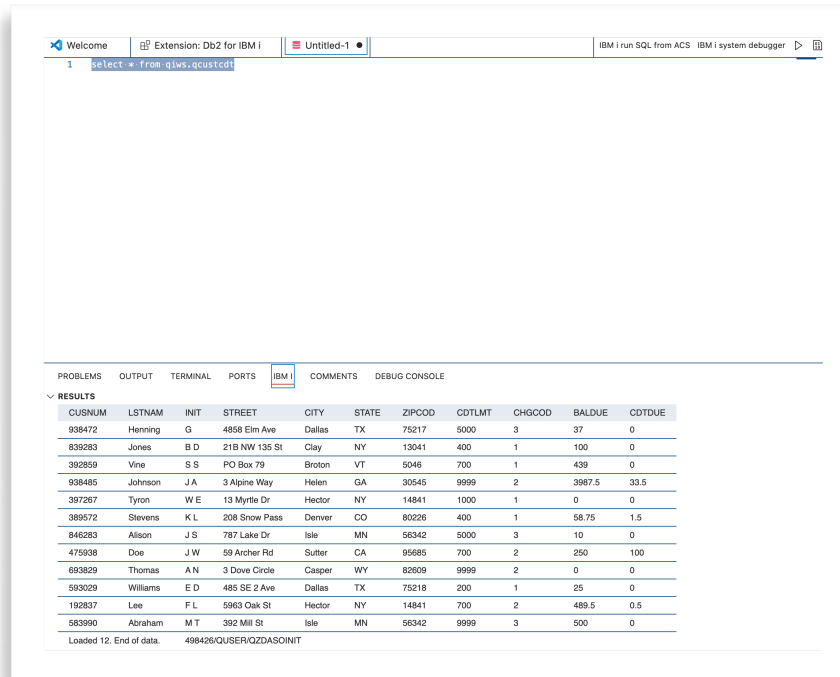
Content Assist



Boost your SQL Performance when Developing

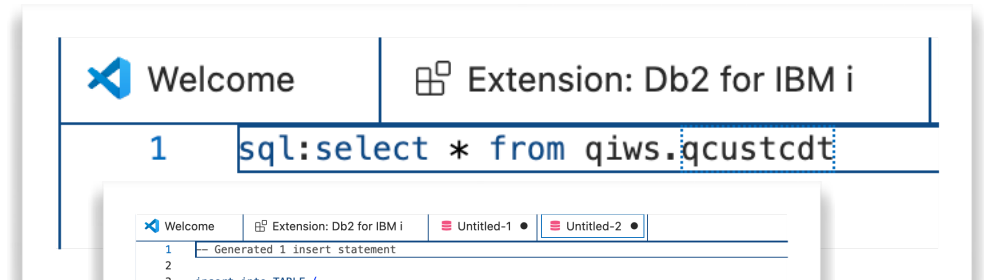
Visual Studio Code - Db2 for i Extension

SQL/JSON




The screenshot shows the Visual Studio Code interface with the 'Db2 for IBM i' extension installed. The editor contains the SQL query: `select * from qiws.qcustcdt`. Below the editor, the 'RESULTS' panel displays a table with 12 columns: CUSNUM, LSTNAM, INIT, STREET, CITY, STATE, ZIPCOD, CDTLMT, CHGCOD, BALDUE, and CDTDUE. The table contains 12 rows of data representing customer records.

CUSNUM	LSTNAM	INIT	STREET	CITY	STATE	ZIPCOD	CDTLMT	CHGCOD	BALDUE	CDTDUE
938472	Henning	G	4858 Elm Ave	Dallas	TX	75217	5000	3	37	0
839283	Jones	B D	218 NW 135 St	Clay	NY	13041	400	1	100	0
392859	Vine	S S	PO Box 79	Broton	VT	5046	700	1	439	0
938485	Johnson	J A	3 Alpine Way	Helen	GA	30545	9999	2	3987.5	33.5
397267	Tyron	W E	13 Myrtle Dr	Hector	NY	14841	1000	1	0	0
389572	Stevens	K L	208 Snow Pass	Denver	CO	80226	400	1	58.75	1.5
846283	Alison	J S	787 Lake Dr	Isle	MN	56342	5000	3	10	0
475938	Doe	J W	59 Archer Rd	Sutter	CA	95685	700	2	250	100
693829	Thomas	A N	3 Dove Circle	Casper	WY	82609	9999	2	0	0
593029	Williams	E D	485 SE 2 Ave	Dallas	TX	75218	200	1	25	0
192837	Lee	F L	5963 Oak St	Hector	NY	14841	700	2	489.5	0.5
583990	Abraham	M T	392 Mill St	Isle	MN	56342	9999	3	500	0



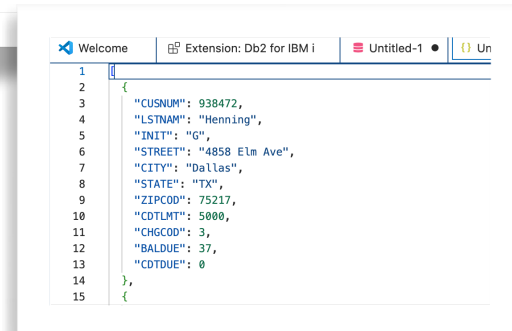
The screenshot shows the Visual Studio Code interface with the 'Db2 for IBM i' extension installed. The editor contains the SQL query: `sql:select * from qiws.qcustcdt`. The 'Welcome' and 'Extension: Db2 for IBM i' tabs are visible at the top.



The screenshot shows the Visual Studio Code interface with the 'Db2 for IBM i' extension installed. The editor contains the generated SQL insert statement: `Generated 1 insert statement`. The statement is an `insert into` query with a list of values for the `qiws.qcustcdt` table, including columns like `CUSNUM`, `LSTNAM`, `INIT`, `STREET`, `CITY`, `STATE`, `ZIPCOD`, `CDTLMT`, `CHGCOD`, `BALDUE`, and `CDTDUE`.



The screenshot shows the Visual Studio Code interface with the 'Db2 for IBM i' extension installed. The editor contains the JSON query: `json:select * from qiws.qcustcdt`. The 'Welcome' and 'Extension: Db2 for IBM i' tabs are visible at the top.



The screenshot shows the Visual Studio Code interface with the 'Db2 for IBM i' extension installed. The editor contains the generated JSON output: `{ "CUSNUM": 938472, "LSTNAM": "Henning", "INIT": "G", "STREET": "4858 Elm Ave", "CITY": "Dallas", "STATE": "TX", "ZIPCOD": "75217", "CDTLMT": "5000", "CHGCOD": "3", "BALDUE": "37", "CDTDUE": "0" }`. The 'Welcome' and 'Extension: Db2 for IBM i' tabs are visible at the top.

Boost your SQL Performance when Developing

Visual Studio Code - Db2 for i Extension

[Db2 for i Extension documentation](#)

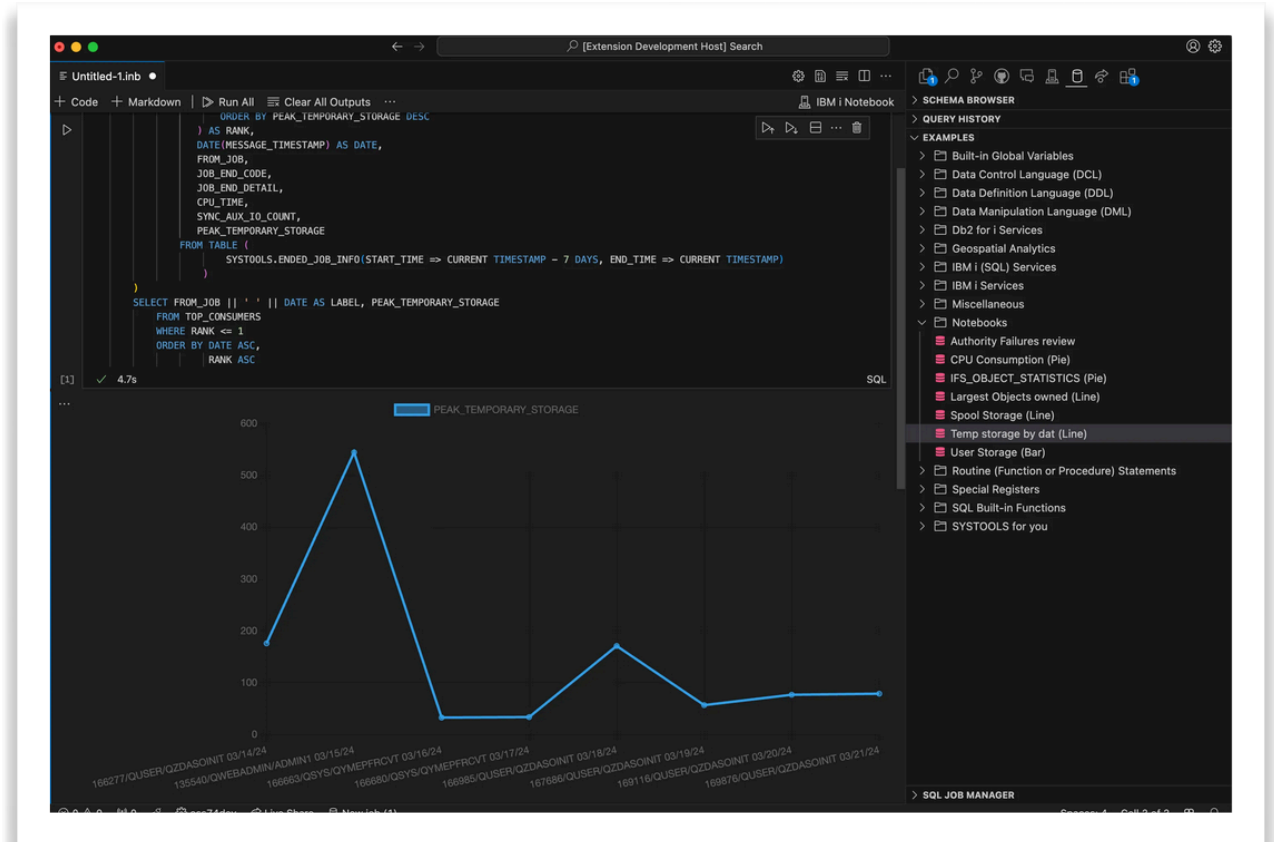
SQL processors

SQL Job Manager

SQL Error Logging Facility (SELF)

Visual Explain

Notebooks



Thank you