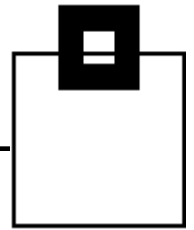


SQL PerformanceExpert (SPX) in an IBM RATIONAL world

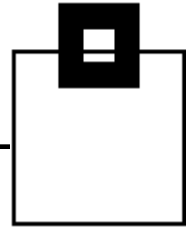


DB2 for z/OS SQL Performance – Plug-in for Rational Developers



Roy Boxwell, 2012-03-20

SQL PerformanceExpert (SPX) in an IBM RATIONAL world

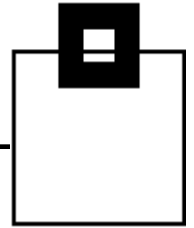


AGENDA

- Review of the current topology – The BIG picture
- How a DBA works today – Green Screen and Batch
- How a developer works today – Green Screen and Batch
- How a Rational Developer can work today – GUI/ISPF
- How a Rational Developer can also work today - GUI



SQL PerformanceExpert (SPX) in an IBM RATIONAL world



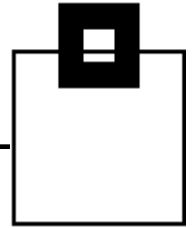
HYBRID

GUI

3270



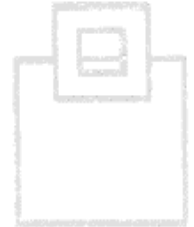
SQL PerformanceExpert (SPX) in an IBM RATIONAL world



HYBRIDGE to modernize

GUI

3270



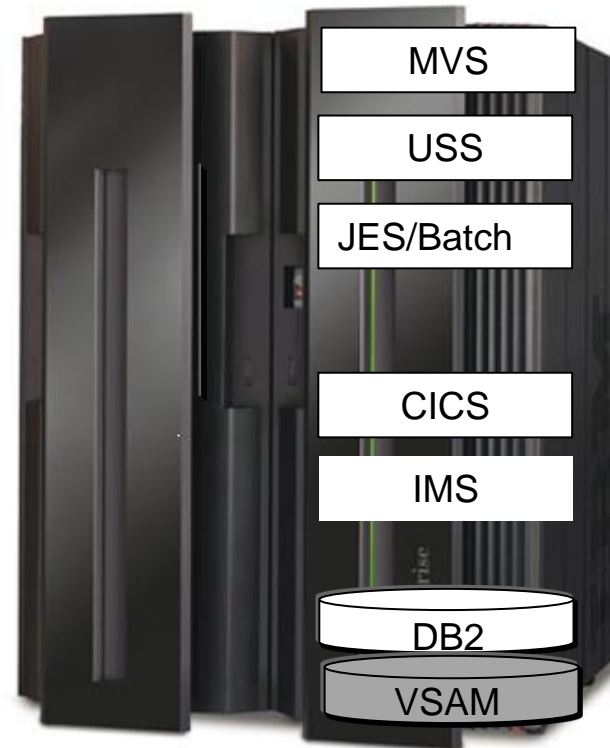
SQL PerformanceExpert (SPX) in an IBM RATIONAL world

HYBRIDGE to modernize

GUI

3270

Rational Developer
for System z

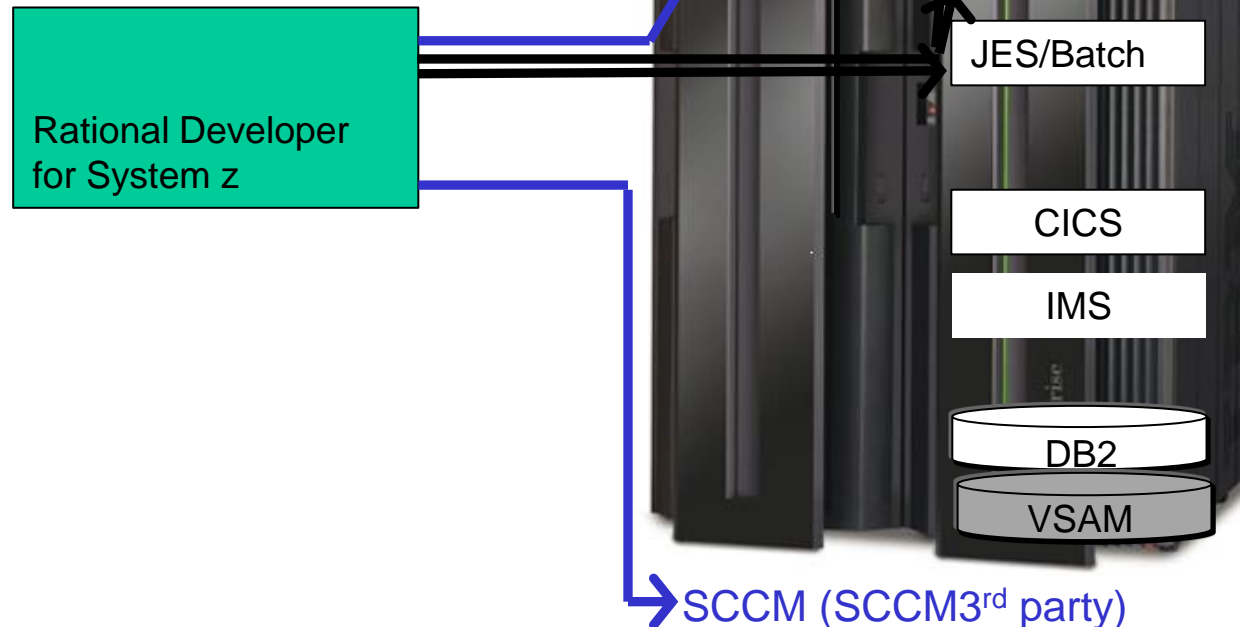


SQL PerformanceExpert (SPX) in an IBM RATIONAL world

HYBRIDGE to modernize

GUI

3270

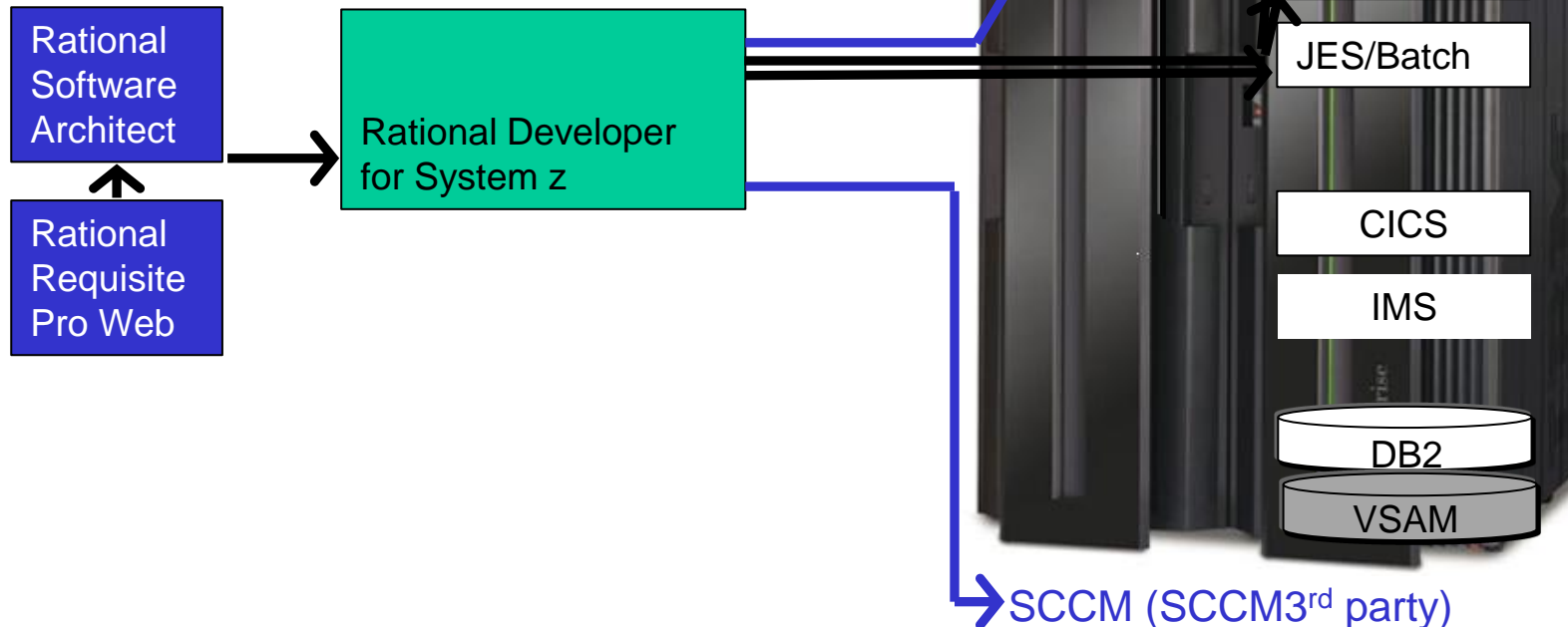


SQL PerformanceExpert (SPX) in an IBM RATIONAL world

HYBRIDGE to modernize

GUI

3270

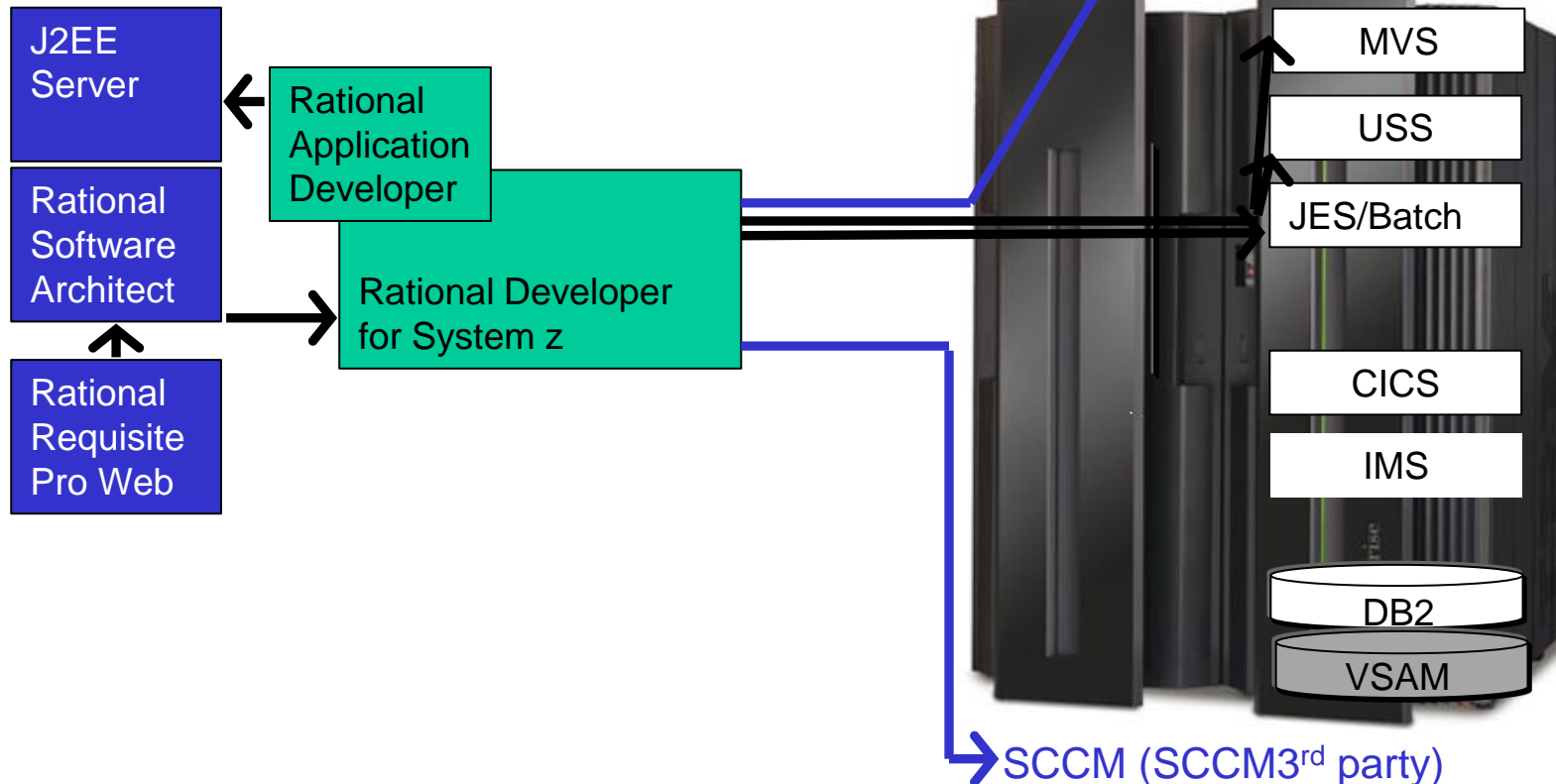


SQL PerformanceExpert (SPX) in an IBM RATIONAL world

HYBRIDGE to modernize

GUI

3270

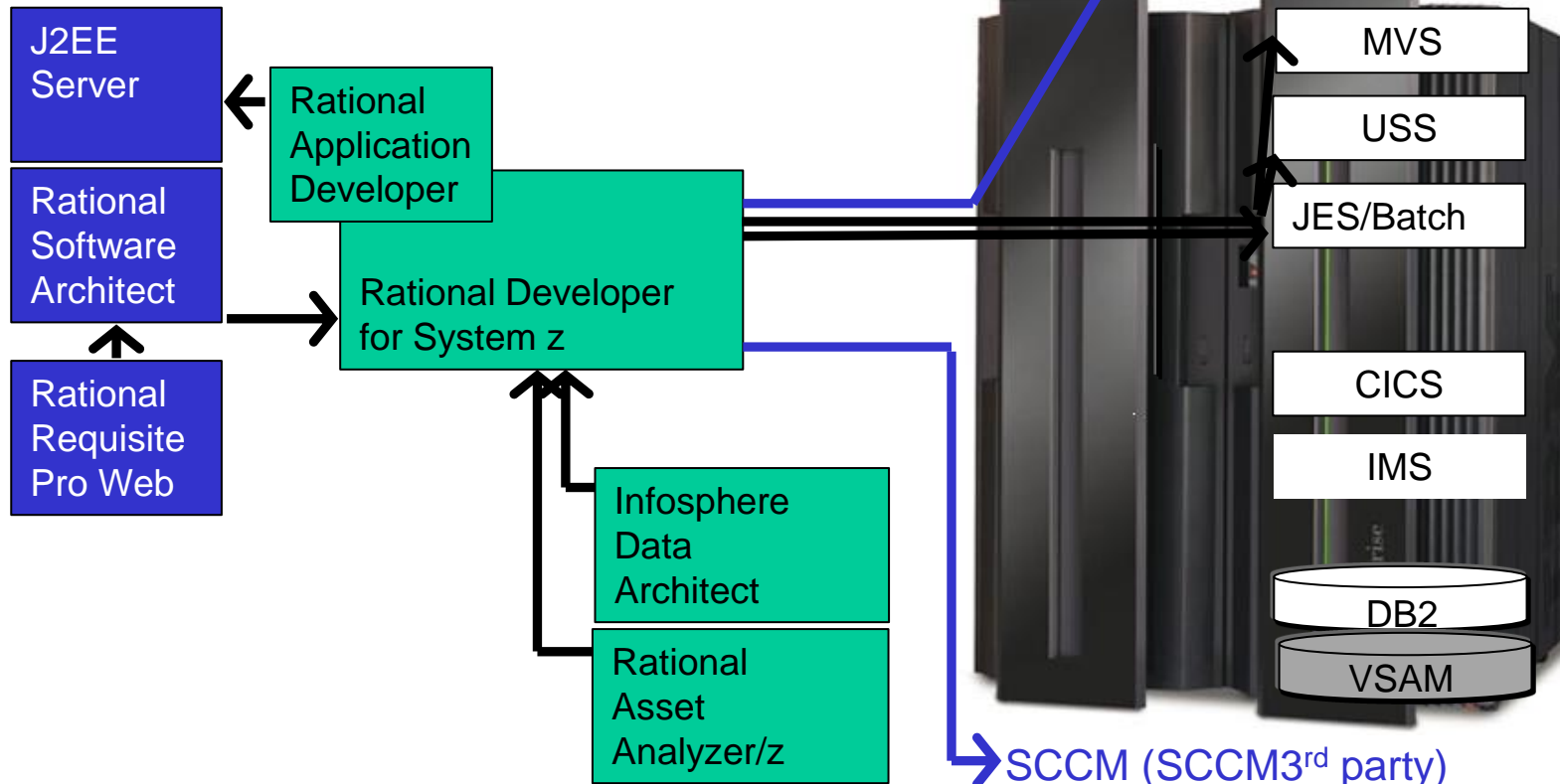


SQL PerformanceExpert (SPX) in an IBM RATIONAL world

HYBRIDGE to modernize

GUI

3270

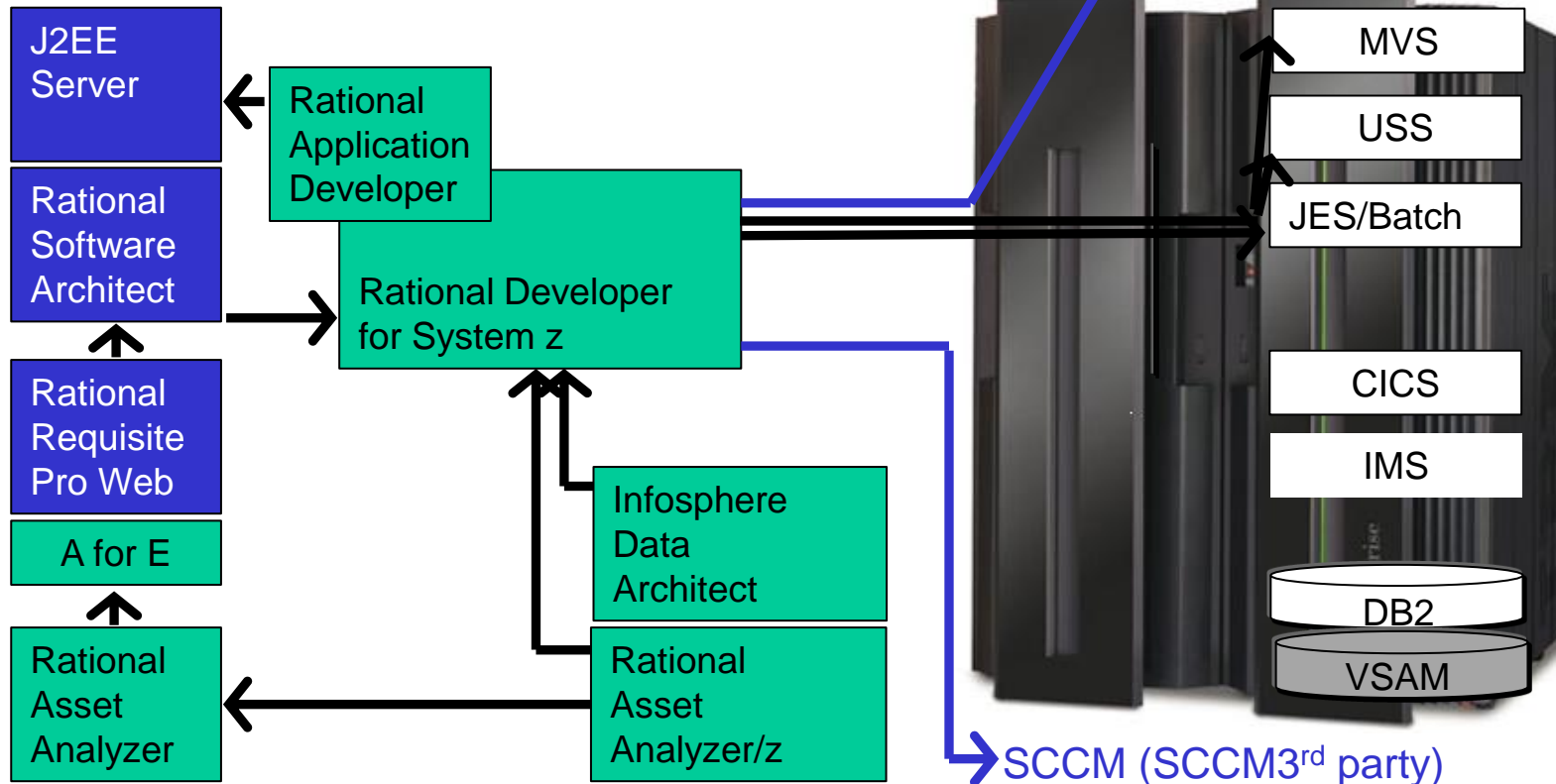


SQL PerformanceExpert (SPX) in an IBM RATIONAL world

HYBRIDGE to modernize

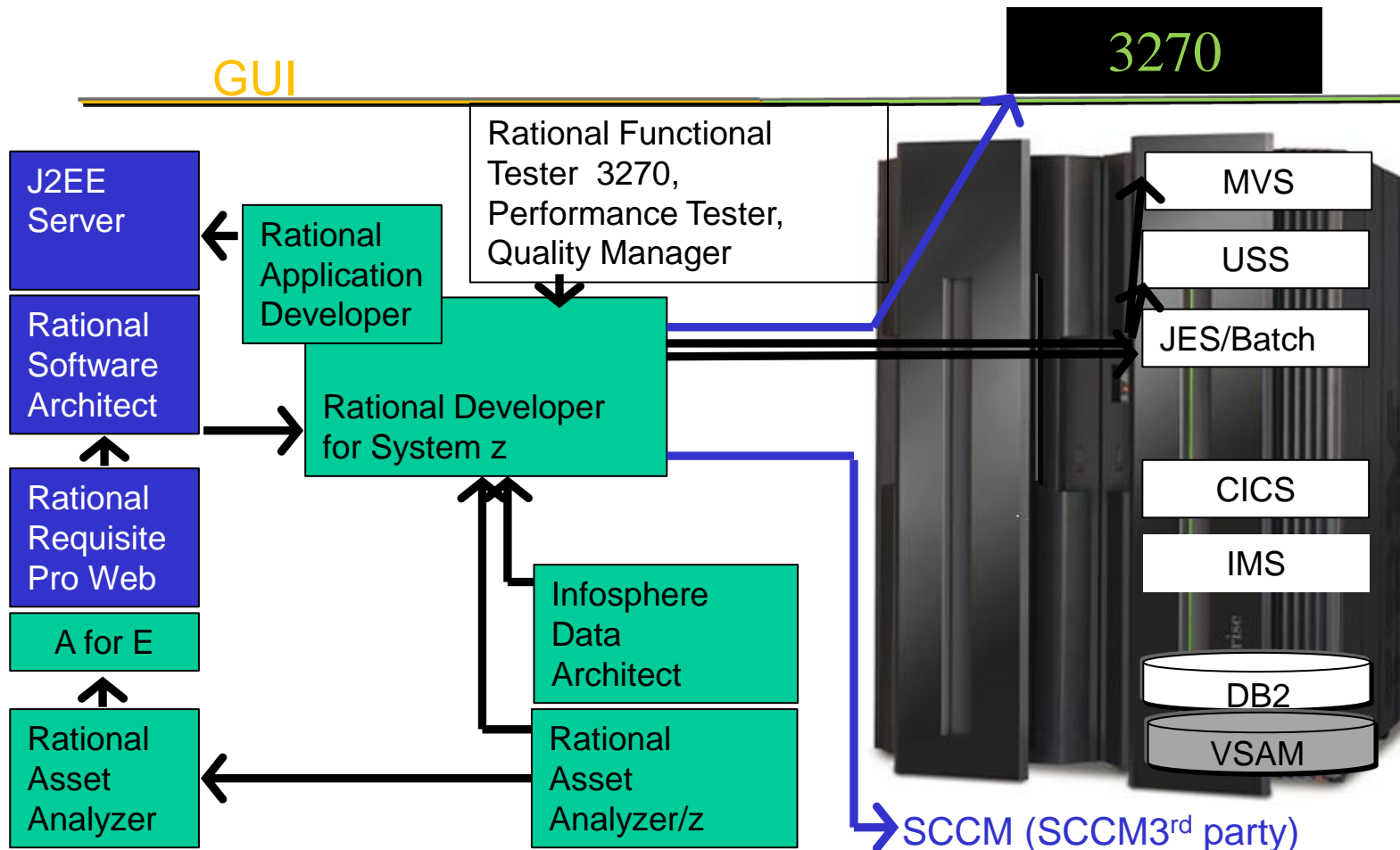
GUI

3270



SQL PerformanceExpert (SPX) in an IBM RATIONAL world

HYBRIDGE to modernize

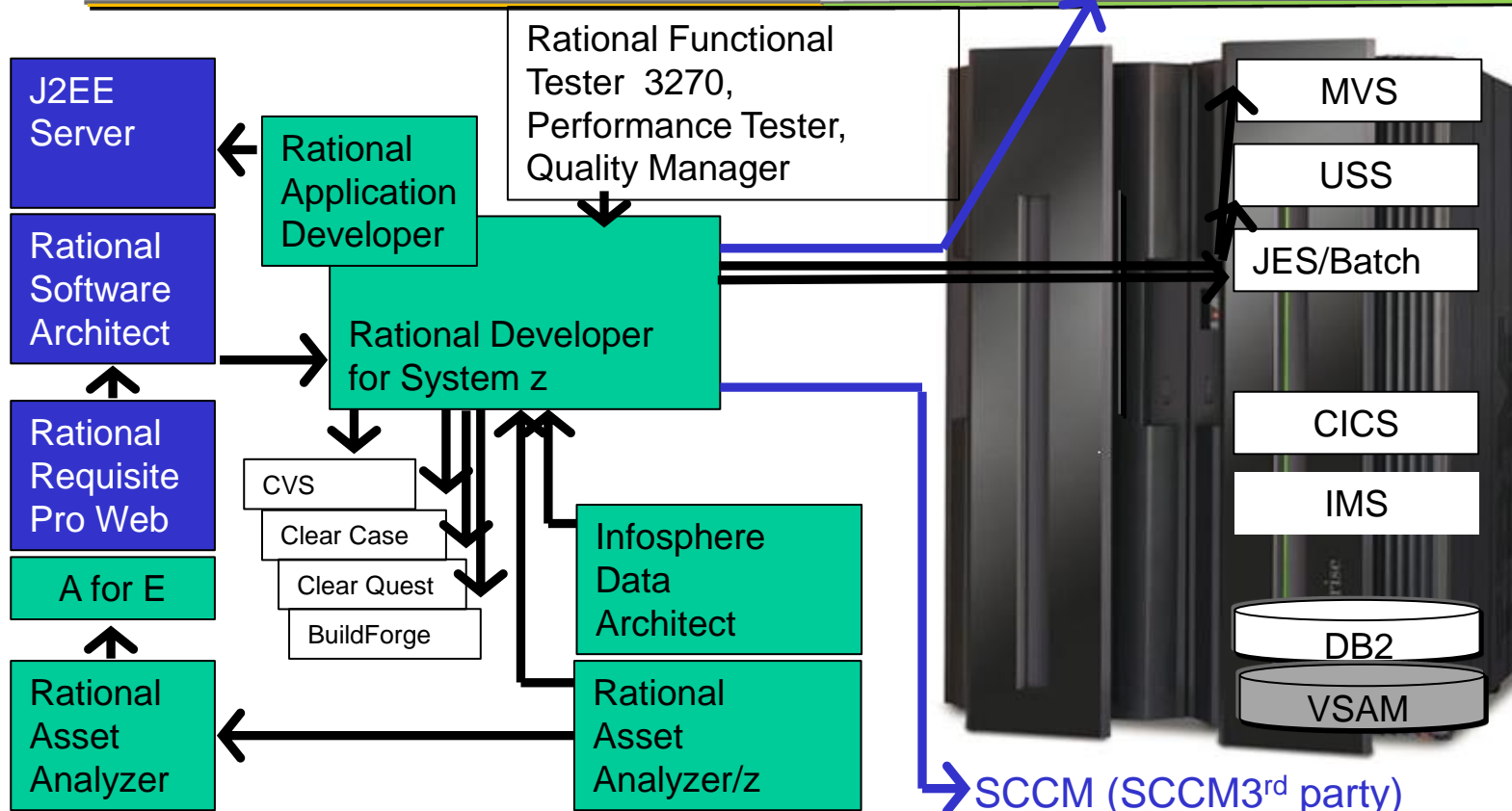


SQL PerformanceExpert (SPX) in an IBM RATIONAL world

HYBRIDGE to modernize

GUI

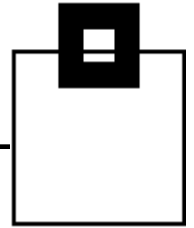
3270



Task	Percentage
GUI	32.7%
Backend	25.0%
Frontend	25.0%
Other	17.3%



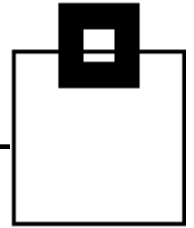
SQL PerformanceExpert (SPX) in an IBM RATIONAL world



How does a DB2 DBA work today?



SQL PerformanceExpert (SPX) in an IBM RATIONAL world



How does a DB2 DBA work today?



Well it is either Batch or Green screen like this...




SQL PerformanceExpert (SPX) in an IBM RATIONAL world

```
Analyze+ for DB2 z/OS ----- EDIT Statement Text ----- Columns 00001 00072
Command ==> _____ Scroll ==> CSR

Primary cmd: END, CAN(cel), A(nalyze), X(EXecute), SE(tup)
FILE : BOXWELL.SPUFI.IN(RECUR)
***** ***** Top of Data *****
000001      DECLARE CURS6-VIV2 CURSOR FOR
000002      WITH VIVLIST
000003          (MAX
000004              ,BCREATOR
000005              ,BNAME
000006              ,BTYP
000007              ,DCREATOR
000008              ,DNAME
000009              ,DTYPE) AS
000010      (SELECT 1
000011          ,STRIP(A.BCREATOR)
000012          ,STRIP(A.BNAME)
000013          ,A.BTYPE
000014          ,STRIP(A.DCREATOR)
000015          ,STRIP(A.DNAME)
000016          ,A.DTYPE
000017      FROM SYSIBM.SYSVIEWDEP A
000018      WHERE A.BTYPE IN ('M' , 'T' , 'V')
```

Here a developer has written an SQL...



SQL PerformanceExpert (SPX) in an IBM RATIONAL world

```
Analyze+ for DB2 z/OS ----- Explain Text ----- LINE 00000001 COL 001 080
Command ==> _____ Scroll ==> CSR
EXPLAIN: DYNAMIC      MODE: CATALOG                      DB2: S91A
Primary cmd: END, D(Explain Data), V(iolations), R(unstats), P(redicates),
             S(statement Text), C(atalog Data), M(ode Catalog/History),
             PR(int Reports), SAVExxx, SHOWxxx

DSN : BOXWELL.SPUFI.IN                      MEMBER : RECUR
STMT :      1
Milliseconds:      117  Service Units:      252  Cost Category: B

PLAN_TABLE Description
-----
QBLOCKNO:   1 Type: SELECT
Outer table: IQAEQB01.VIVLIST Correlation: B
  Access path information:
    Sequential tablespace scan
    Sequential prefetch is done
  Locking strategy:
    UNCOMMITTED READ
Inner table: SYSIBM.SYSTABLES Correlation: A
  JOIN strategy: NESTED-LOOP-JOIN
  Join type: INNER JOIN
  Access path information:
```

Great data for the DBA to see what is going on...

SQL PerformanceExpert (SPX) in an IBM RATIONAL world

```
Analyze+ for DB2 z/OS ----- Explain Data (1/6) ----- Entry 1 from 7
Command ==> _____ Scroll ==> CSR
EXPLAIN: DYNAMIC      MODE: CATALOG      DB2: S91A
Primary cmd: END, T(Explain Text), V(iolations), R(unstats), P(redictates),
             S(tatement Text), C(atalog Data), M(ode Catalog/History), Z(oom),
             PR(int Reports), SAVExxx, SHOWxxx
Line   cmd: Z(oom), C(osts), I(ndexes of table), S(hort catalog), T(able),
             V(irtual indexes of table), X(IndexX)
DSN : BOXWELL.SPUFI.IN                      Member : RECUR
Stmt :      1
Milliseconds:      117  Service Units:      252  Cost Category: B

  QBNO QBTYPE CREATOR  TABLE NAME          MTCH IX METH PRNT TABL PRE  MXO
  PLNO TABNO  XCREATOR INDEX NAME          ACTYP COLS ON OD   QBLK TYPE FTCH PSQ
  ----
-      1 SELECT IQAEQB01 VIVLIST              R      0 N   0   0 C   S   0
-      1 5
-      1 SELECT SYSIBM  SYSTABLES             I      2 N   1   0 T           0
-      2 1      SYSIBM  DSNDTX01
-      1 SELECT              0 N   3   0 -           0
-      3 0
-      2 UNIONA              0   0   0 -           0
-      1 0
```

And the result is nice and clear...

SQL PerformanceExpert (SPX) in an IBM RATIONAL world

```
Analyze+ for DB2 z/OS ----- Violations ----- LINE 00000007 COL 001 080
Command ==> _____ Scroll ==> CSR
EXPLAIN: DYNAMIC      MODE: CATALOG      DB2: S91A
Primary cmd: END, D(Explain Data), T(Explain Text), R(unstats), P(predicates),
             S(statement Text), C(atalog Data), M(ode Catalog/History),
             PR(int Reports), SAVExxx, SHOWxxx

DSN : BOXWELL.SPUFI.IN      MEMBER : RECUR
STMT :      1

-----
----- RULE-NO.: 9048      (WARNING) -----
External sort because of UNION or DISTINCT. QBLOCKNO: 1, PLANNO: 3
Try to avoid the sort.
----- RULE-NO.: 9071      (WARNING) -----
Predicate is stage 1, but not indexable. QBLOCKNO: 4, Access: STAGE1,
Predicate: B.BTYPE<>'T'
Try to rewrite the predicate as indexable or try to add another (indexable)
predicate for this column(s) to the WHERE or ON clause.
----- RULE-NO.: 9069      (ERROR) -----
Runstats check found serious rule violations.
Please look into the runstats report.
----- RULE-NO.: 9099      (WARNING) -----
The statement costs are category B. DB2 could not determine them exactly.
```

With rule assisted auditing and explanations...

SQL PerformanceExpert (SPX) in an IBM RATIONAL world

```
Analyze+ for DB2 z/OS ----- Runstats ----- LINE 00000009 COL 001 080
Command ==> _____ Scroll ==> CSR
EXPLAIN: DYNAMIC      MODE: CATALOG      DB2: S91A
Primary cmd: END, D(Explain Data), T(Explain Text), V(iolations), P(redictates),
             S(statement Text), C(atalog Data), M(ode Catalog/History),
             PR(int Rep.), SAVExxx, SHOWxxx

DSN : BOXWELL.SPUFI.IN      MEMBER : RECUR
STMT :      1

-----

VIOLATION  DSNDB06.SYSDBASE SYSIBM.SYSTABLES
W - OBSOLETE SYSTABLES . . . . . : 2011-07-05-13.34.18.292116
S - IX DRF < NPAGESF . . . . . : BOXWELL.SYSTABLES +.0000000000E+00 < +.2672
S - IX DRF < NPAGESF . . . . . : SYSIBM .DSNDTX03 +.0000000000E+00 < +.2672

IGNORED    DSNDB06.SYSVIEWS SYSIBM.SYSVIEWDEP

Summary output for SQL Statement

Tables read . . . . . : 2
Tables ignored . . . . . : 1
Tables checked . . . . . : 1
```

Also going down to check the DB2 Catalog Statistics.
Remember that >50% of all performance problems are bad statistics.

SQL PerformanceExpert (SPX) in an IBM RATIONAL world

```
Analyze+ for DB2 z/OS ----- Catalog Report ----- LINE 00000001 COL 001 080
Command ==> _____ Scroll ==> CSR
EXPLAIN: DYNAMIC      MODE: CATALOG                      DB2: S91A
Primary cmd: END, D(Explain Data), T(Explain Text), V(iolations), R(unstats),
             S(statement Text), P(predicates), M(mode Catalog/History),
             PR(int Reports), SAVExxx, SHOWxxx
```

Table: SYSIBM.SYSTABLES

Stats: 2011-07-05-13.34.18.292116

No. of rows (CARDF): 5.351 / 2.672 pages

RTS data TOTALROWS : 135.423 / 4.541 pages

Index: BOXWELL.SYSTABLES

Stats: 2011-07-05-13.34.18.292116 Type: Type-2 index

Levels: 3 / 125 leaf pages and FULLKEYCARDF 5.351

CLUSTERRATIO = 76,42%

RTS data LEVELS: 1 / 129 leaf pages and TOTALENTRIES: 5.512

Indexcolumn ! Format ! Dist. Values ! A/D ! NL ! Stats

-----+-----+-----+-----+-----+-----

TBCREATOR ! VARCHAR(128) ! 40 ! ASC ! N ! OK

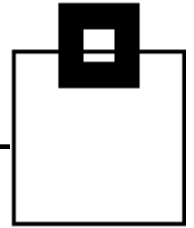
TBNAME ! VARCHAR(128) ! 784 ! ASC ! N ! OK

TYPE ! CHAR(1) ! 8 ! ASC ! N ! OK

CREATOR ! VARCHAR(128) ! 121 ! ASC ! N ! OK

And detailing all that you need to know about the object(s).

SQL PerformanceExpert (SPX) in an IBM RATIONAL world



All of this also in a Batch job that can check from one to thousands of DBRMs.



Either in the development phase running against a test DB2 or even using DRDA so that the EXPLAIN runs on the actual production machine giving instant feedback of how the SQL will react.

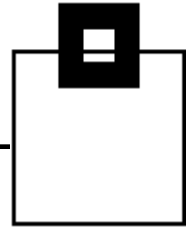


(Normally DRDA access is not allowed so people use other methods or tools to copy the statistics and the machine environment, e.g. VOX, from production to a system where the EXPLAIN can run giving a 100% reliable outcome)



Or in the QA or Production Staging area.

SQL PerformanceExpert (SPX) in an IBM RATIONAL world

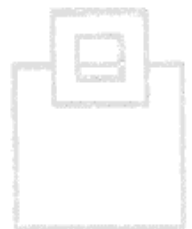


```
VIEW          SE.MDB2VNEX.TCOBOL(SQLDDL) - 01.01          Columns 00001 00072
Command ==> ANALYZE          Scroll ==> CSR
252900      EXEC SQL
2##000      DECLARE CURS6-VIV2 CURSOR FOR
253100      WITH VIVLIST
253200          (MAX
253300          ,BCREATOR
253400          ,BNAME
253500          ,BTYPE
253600          ,DCREATOR
253700          ,DNAME
253800          ,DTYPE) AS
253900      (SELECT 1
254000          ,STRIP(A.BCREATOR)
254100          ,STRIP(A.BNAME)
254200          ,A.BTYPE
254300          ,STRIP(A.DCREATOR)
254400          ,STRIP(A.DNAME)
254500          ,A.DTYPE
254600      FROM SYSIBM.SYSVIEWDEP A
254700      WHERE A.BTYPE IN ('M' , 'T' , 'V')
254800          AND A.DTYPE IN ('M' , 'V')
254900          AND A.DCREATOR = :WS-CREATOR
```



OK, what about the developer???

Use of an edit macro enables a branch into the same SQL checking directly from the code...



SQL PerformanceExpert (SPX) in an IBM RATIONAL world

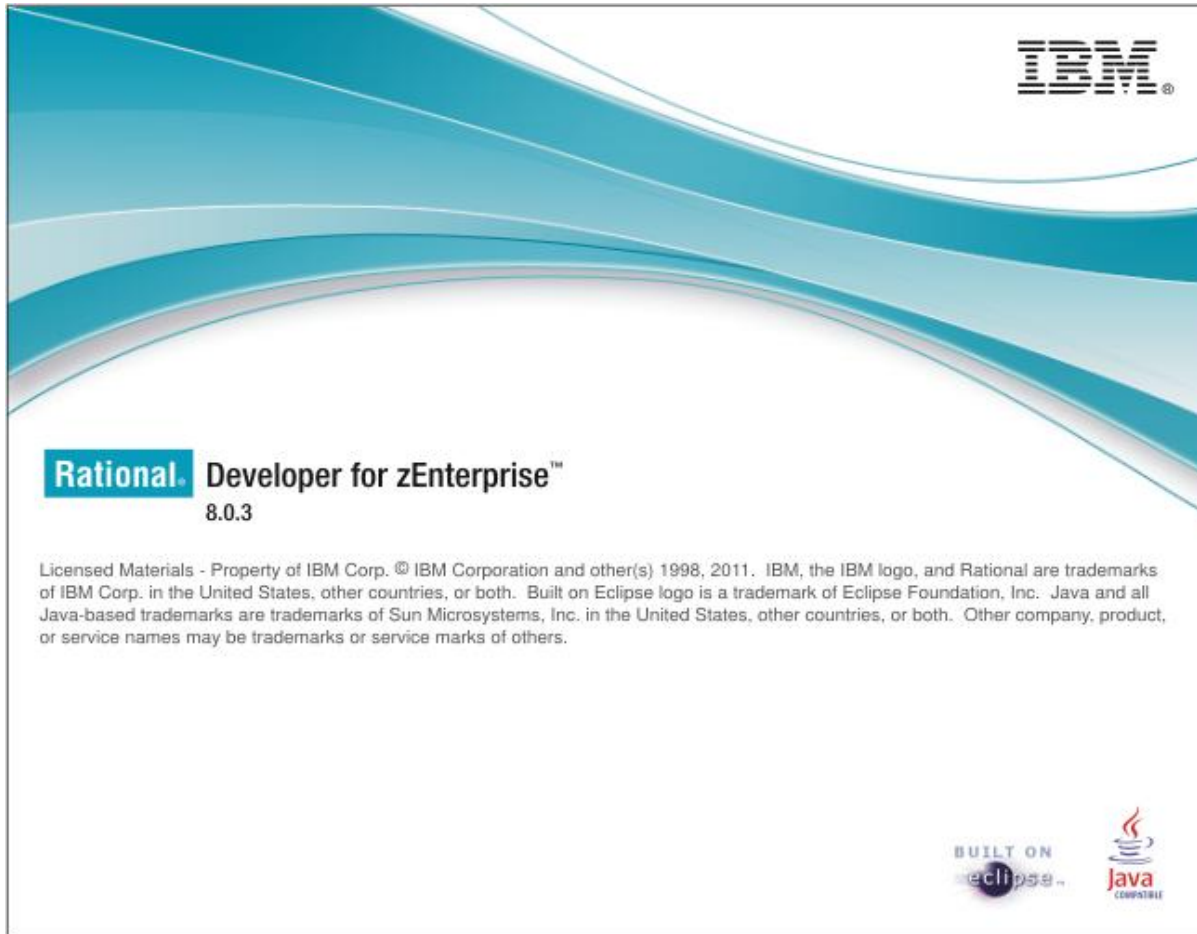
```
Analyze+ for DB2 z/OS ----- Explain Data (1/6) ----- Entry 1 from 7
Command ==> Scroll ==> CSR
EXPLAIN: DYNAMIC      MODE: CATALOG      DB2: S91A
Primary cmd: END, T(Explain Text), V(iolations), R(unstats), P(redicates),
             S(statement Text), C(atalog Data), M(ode Catalog/History), Z(oom),
             PR(int Reports), SAVExxx, SHOWxxx
Line   cmd: Z(oom), C(osts), I(ndexes of table), S(hort catalog), T(able),
             V(irtual indexes of table), X(Index)
DSN : SE.MDB2VNEX.TCOBOL      Member : SQLDDL
Stmt :      2530
Milliseconds:      117  Service Units:      252  Cost Category: B

  QBNO QBTYPE CREATOR  TABLE NAME      MTCH IX METH PRNT TABL PRE  MXO
  PLNO TABNO  XCREATOR INDEX NAME      ACTYP COLS ON OD   QBLK TYPE FTCH PSQ
  -----
-    1 SELECT IQAEQB01 VIVLIST          R      0 N   0   0 C   S    0
  1 5
-    1 SELECT SYSIBM  SYSTABLES        I      2 N   1   0 T    0
  2 1      SYSIBM  DSNDTX01
-    1 SELECT          0 N   3   0 -    0
  3 0
  2 UNIONA          0   0   0 -    0
  1 0
```

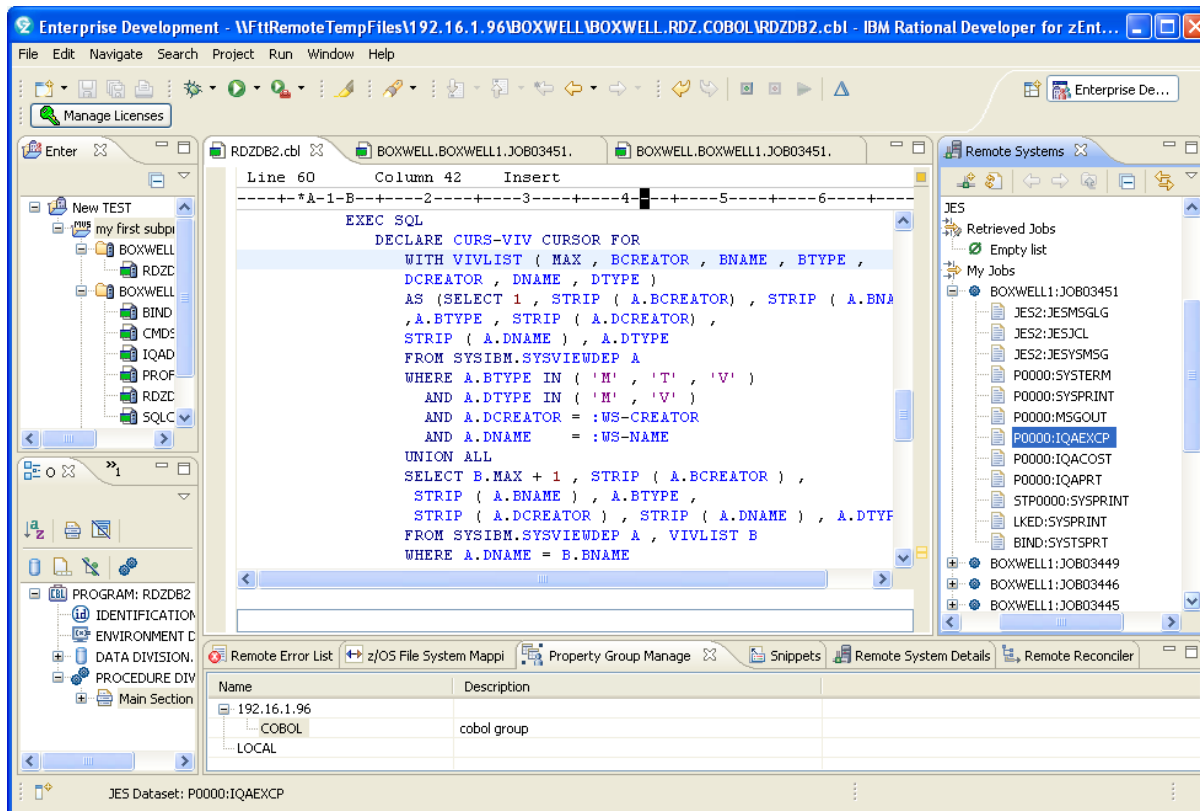
And the result is again nice and clear – Note the slight difference with DSN, Member, and Stmt of course.

SQL PerformanceExpert (SPX) in an IBM RATIONAL world

And now Rational Developer for zEnterprise

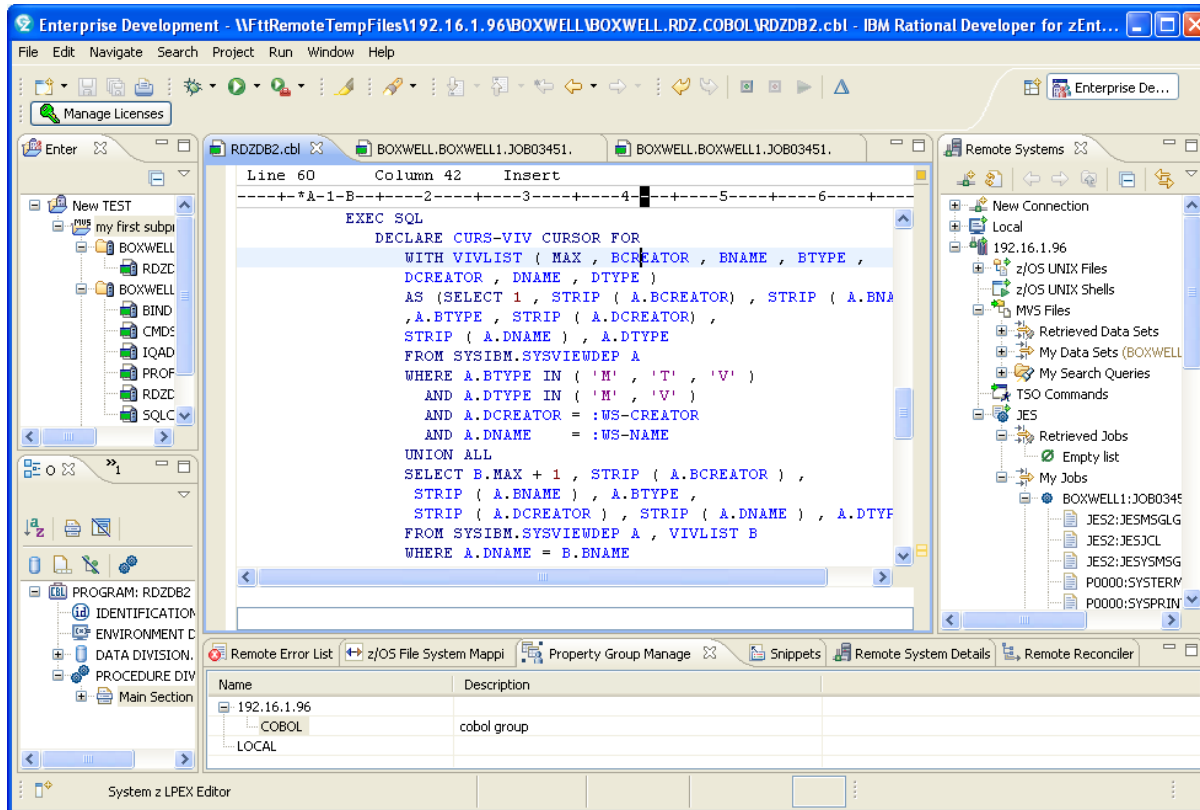


SQL PerformanceExpert (SPX) in an IBM RATIONAL world



Here is COBOL code with that SQL statement again. The host JCL Procs have been changed to call the SPX SQL Performance Analyzer.

SQL PerformanceExpert (SPX) in an IBM RATIONAL world



After rebuilding the subproject the view on the right hand side can be refreshed to review the job details.

SQL PerformanceExpert (SPX) in an IBM RATIONAL world

The screenshot displays the IBM Rational Developer for zEnterprise interface. The main window shows a SQL query editor with the following content:

```
Line 66      Column 1      Insert      Browse
-----1-----2-----3-----4-----5-----6-----7
Precomp TS   : 2012-03-15-10.07.22.005542   Contoken Hex : 1928AB15
Version      : - NONE -
Stmtno       :          98                   Queryno      :
Sectno       :          2
Milliseconds  :          117                 Service Units: 2
Degree       : ANY

Statement Text
-----
DECLARE
CURSOR VIV
CURSOR FOR
WITH
VIVLIST ( MAX , BCREATOR , BNAME , BTYPE , DCREATOR , DNAME , DTYPE
AS (
SELECT
1 , STRIP ( A.BCREATOR ) , STRIP ( A.BNAME ) , A.BTYPE , STRIP
DCREATOR ) , STRIP ( A.DNAME ) , A.DTYPE
```

The left pane shows a project tree with folders like 'my first subproj', 'BOXWELL', 'RDZC', 'BIND', 'CMD\$', 'IQAD', 'PROF', 'RDZC', and 'SQLC'. The right pane shows a 'Remote Systems' tree with a list of jobs under 'My Jobs', including 'BOXWELL1:JOB03451' and 'BOXWELL1:JOB03449'. The bottom pane shows a 'Remote Error List' table with columns 'Name' and 'Description'.

Name	Description
192.16.1.96	
COBOL	cobol group
LOCAL	

SQL PerformanceExpert (SPX) in an IBM RATIONAL world

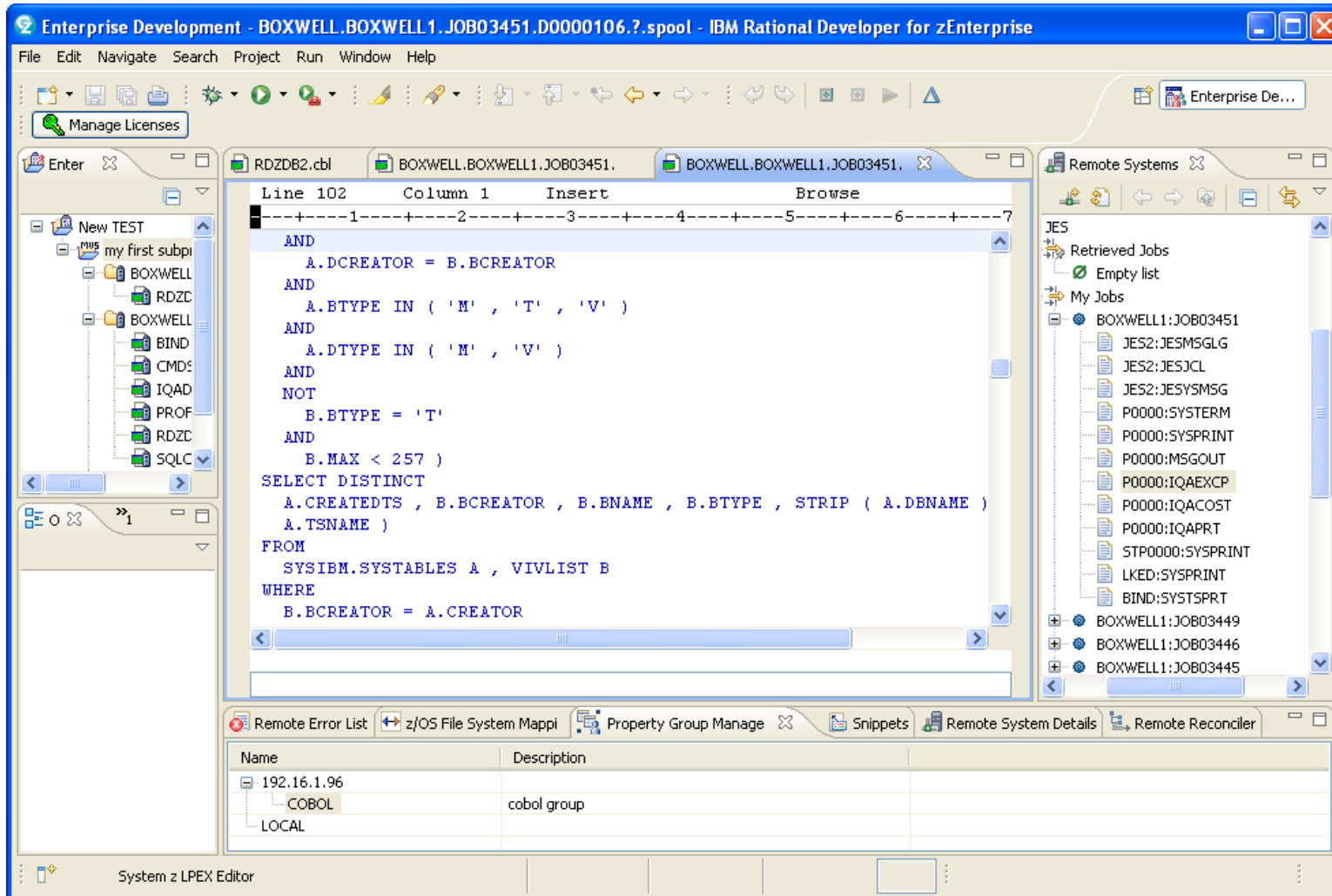
The screenshot displays the IBM Rational Developer for zEnterprise interface. The main window shows a SQL query in the editor, with a toolbar at the top and a project browser on the left. The query is as follows:

```
Line 84      Column 1      Insert      Browse
-----1-----2-----3-----4-----5-----6-----7
FROM
  SYSIBM.SYSVIEWDEP A
WHERE
  A.BTYPE IN ( 'M' , 'T' , 'V' )
AND
  A.DTYPE IN ( 'M' , 'V' )
AND
  A.DCREATOR = :WS-CREATOR
AND
  A.DNAME = :WS-NAME
UNION ALL
SELECT
  B.MAX + 1 , STRIP ( A.BCREATOR ) , STRIP ( A.BNAME ) , A.BTYPE
  A.DCREATOR ) , STRIP ( A.DNAME ) , A.DTYPE
FROM
  SYSIBM.SYSVIEWDEP A , VIVLIST B
WHERE
  A.DNAME = B.BNAME
```

The right-hand pane shows the 'Remote Systems' view, listing various jobs and systems. The bottom pane shows the 'Remote Error List' and 'z/OS File System Mapping' table.

Name	Description
192.16.1.96	
COBOL	cobol group
LOCAL	

SQL PerformanceExpert (SPX) in an IBM RATIONAL world



SQL PerformanceExpert (SPX) in an IBM RATIONAL world

The screenshot displays the IBM Rational Developer for zEnterprise interface. The main editor window shows a COBOL program with SQL statements. The SQL PerformanceExpert (SPX) results are visible at the bottom of the editor, showing two warnings (RULE-NO.: 9001 and 9002) related to estimated running time and service units. The left pane shows a project tree with folders like 'my first subproj' and 'BOXWELL'. The right pane shows a 'Remote Systems' tree with various system entries. The bottom status bar indicates 'System z LPEX Editor'.

Enterprise Development - BOXWELL.BOXWELL1.JOB03451.D0000106.?.spool - IBM Rational Developer for zEnterprise

File Edit Navigate Search Project Run Window Help

Manage Licenses

Enter

my first subproj

BOXWELL

RDZC

BOXWELL

BIND

CMD5

IQAD

PROF

RDZC

SQLC

Line 120 Column 1 Insert Browse

AND

B.BNAME = A.NAME

AND

B.BTYPE IN ('M' , 'T' , 'V')

FOR FETCH ONLY

WITH UR

Explain S(tatic)/D(ynamic) PLTA,STTA,PRTA,FITA,COTA: D,D,D,D,U

DB2 Version PLTA,STTA: 0810,0810

Violations

----- RULE-NO.: 9001 (WARNING) -----

Estimated runningtime > 25 milliseconds.

Try to optimize the access.

----- RULE-NO.: 9002 (WARNING) -----

Estimated service units > 25.

Try to optimize the access.

Remote Systems

JES

Retrieved Jobs

Empty list

My Jobs

BOXWELL1:JOB03451

JES2:JESMSG LG

JES2:JESJCL

JES2:JESYSMSG

P0000:SYSTERM

P0000:SYSPRINT

P0000:MSGOUT

P0000:IQAEXCP

P0000:IQACOST

P0000:IQAPRT

STP0000:SYSPRINT

LKED:SYSPRINT

BIND:SYSPRPT

BOXWELL1:JOB03449

BOXWELL1:JOB03446

BOXWELL1:JOB03445

Remote Error List z/OS File System Mappi Property Group Manage Snippets Remote System Details Remote Reconciler

Name	Description
192.16.1.96	
COBOL	cobol group
LOCAL	

System z LPEX Editor

SQL PerformanceExpert (SPX) in an IBM RATIONAL world

The screenshot displays the IBM Rational Developer for zEnterprise interface. The main window shows the SQL PerformanceExpert (SPX) results for a query. The results are organized into sections: 'External sort because of UNION or DISTINCT. QBLOCKNO: 1, PLANNO: 3 Try to avoid the sort.', 'Predicate is stage 1, but not indexable. QBLOCKNO: 4, Access: STAGE Predicate: B.BTYPE<>'T' Try to rewrite the predicate as indexable or try to add another (in predicate for this column(s) to the WHERE or ON clause.', and 'The statement costs are category B. DB2 could not determine them ex Reason: TABLE CARDINALITY The cost results are only a hint. If possible, try to change the st make an exact cost determination possible.' Below these sections is the 'Access Path Description' which shows 'QBLOCKNO: 1 Type: SELECT' and 'Outer table: BOXWELL.VIVLIST Correlation: B'.

The interface also includes a 'Remote Systems' panel on the right, showing a list of systems including BOXWELL1:JOB03451, JES2:JESMSG LG, JES2:JESJCL, JES2:JESYSMSG, P0000:SYSTERM, P0000:SYSPRINT, P0000:MSGOUT, P0000:IQAEXCP, P0000:IQACOST, P0000:IQAPRT, STP0000:SYSPRINT, LKED:SYSPRINT, and BIND:SYSTSPRT. The bottom panel shows a table with columns 'Name' and 'Description', listing systems like 192.16.1.96, COBOL, and LOCAL.

Name	Description
192.16.1.96	
COBOL	cobol group
LOCAL	



SQL PerformanceExpert (SPX) in an IBM RATIONAL world

The screenshot displays the IBM Rational Developer for zEnterprise interface. The main window shows the SQL PerformanceExpert (SPX) results for a query. The query is a UNION ALL of two subqueries, both using parallel execution. The results show that the physical sort of the result table to remove duplicate rows is done, and the access path information indicates a matching index scan.

Line 174 Column 1 Insert Browse

```
-----1-----2-----3-----4-----5-----6-----7-----
ACCESS PARALLEL GROUP = 2
4 parallel I/O streams used in joining composite table
JOIN PARALLEL GROUP = 2
Parallel execution for query using multiple tasks
Sort information:
Physical sort of result table to remove duplicate rows is done
QBLOCKNO: 2 Type: UNION ALL
QBLOCKNO: 3 Type: NONCORRELATED SUBQUERY
Reference link to QBLOCKNO: 2
Table accessed: SYSIBM.SYSVIEWDEP Correlation: A
Access path information:
MATCHING INDEX SCAN, MATCHCOLS: 3
Index used because of in-clause in predicate
Index used: BOXWELL.SYSVIEWDEP
Scan of data pages
Locking strategy:
UNCOMMITTED READ
QBLOCKNO: 4 Type: NONCORRELATED SUBQUERY
```

Remote Systems

- JES
- Retrieved Jobs
- Empty list
- My Jobs
- BOXWELL1:JOB03451
 - JES2:JESMSG LG
 - JES2:JESJCL
 - JES2:JESYSMSG
 - P0000:SYSTERM
 - P0000:SYSPRINT
 - P0000:MSGOUT
 - P0000:IQAEXCP
 - P0000:IQACOST
 - P0000:IQAPRT
 - STP0000:SYSPRINT
 - LKED:SYSPRINT
 - BIND:SYSPTSRT
- BOXWELL1:JOB03449
- BOXWELL1:JOB03446
- BOXWELL1:JOB03445

Remote Error List

Name	Description
192.16.1.96	
COBOL	cobol group
LOCAL	

System z LPEX Editor

SQL PerformanceExpert (SPX) in an IBM RATIONAL world

The screenshot displays the IBM Rational Developer for zEnterprise interface. The main window shows the SQL PerformanceExpert (SPX) results for a query. The query is identified as 'Reference link to QBLOCKNO: 2'. The execution plan details the access path information, including 'Sequential tablespace scan' and 'Sequential prefetch is done'. The locking strategy is 'UNCOMMITTED READ'. The inner table is 'SYSIBM.SYSVIEWDEP' with a correlation of 'A'. The join strategy is 'NESTED-LOOP-JOIN' and the join type is 'INNER JOIN'. The access path information for the inner table includes 'MATCHING INDEX SCAN, MATCHCOLS: 3', 'Index used because of in-clause in predicate', 'Index used: BOXWELL.SYSVIEWDEP', and 'Scan of data pages'. The locking strategy for the inner table is also 'UNCOMMITTED READ'.

The interface includes a 'Remote Systems' panel on the right, showing a list of systems including 'JES2:JESMSG LG', 'JES2:JESJCL', 'JES2:JESYSMSG', 'P0000:SYSTERM', 'P0000:SYSPRINT', 'P0000:MSGOUT', 'P0000:IQAEXCP', 'P0000:IQACOST', 'P0000:IQAPRT', 'STP0000:SYSPRINT', 'LKED:SYSPRINT', 'BIND:SYSPRINT', 'BOXWELL1:JOB03449', 'BOXWELL1:JOB03446', and 'BOXWELL1:JOB03445'.

The bottom panel shows a table with the following data:

Name	Description
192.16.1.96	
COBOL	cobol group
LOCAL	

SQL PerformanceExpert (SPX) in an IBM RATIONAL world

The screenshot displays the IBM Rational Developer for zEnterprise interface. The main window shows the 'Access Path' browser for the table 'BOXWELL.VIVLIST'. The table structure is as follows:

TABLE	INDEX	CORRELATION_NAME	GROUP_MEMBER	QB	PN	AC	MA	ME	I
BOXWELL.VIVLIST		B		1	1	R	0	0	N
SYSIBM.SYSTABLES		A		1	2	I	2	1	N
SYSIBM.DSNDTX01				1	3		0	3	N
SYSIBM.SYSVIEWDEP		A		2	1		0	0	
BOXWELL.SYSVIEWDEP				3	1	N	3	0	N
BOXWELL.VIVLIST		B		4	1	R	0	0	N
SYSIBM.SYSVIEWDEP		A		4	2	N	3	1	N

The 'Remote Systems' panel on the right shows a list of jobs, including 'JES2:JESMSG LG', 'JES2:JESJCL', 'JES2:JESYSMSG', 'P0000:SYSTERM', 'P0000:SYSPRINT', 'P0000:MSGOUT', 'P0000:IQAEXCP', 'P0000:IQACOST', 'P0000:IQAPRT', 'STP0000:SYSPRINT', 'LKED:SYSPRINT', and 'BIND:SYSPRT'. The 'Remote Error List' panel at the bottom shows a table with columns 'Name' and 'Description', containing entries for '192.16.1.96', 'COBOL', and 'LOCAL'.

SQL PerformanceExpert (SPX) in an IBM RATIONAL world

The screenshot displays the IBM Rational Developer for zEnterprise interface. The main window shows the 'Catalog Statistics' for the table 'SYSIBM.SYSTABLES'. The statistics include the number of rows (5,351 / 2,672 pages) and the total rows (135,421 / 4,541 pages). The index 'BOXWELL.SYSTABLES' is also shown, with its statistics and levels.

Catalog Statistics

Table: SYSIBM.SYSTABLES
Stats: 2011-07-05-13.34.18.292116
No. of rows (CARDF): 5.351 / 2.672 pages
RTS data TOTALROWS : 135.421 / 4.541 pages

Index: BOXWELL.SYSTABLES
Stats: 2011-07-05-13.34.18.292116 Type: Type-2 index
Levels: 3 / 125 leaf pages
CLUSTERRATIO = 76,42%
RTS data LEVELS: 1 / 129 leaf pages and TOTALENTRIES: 5.512

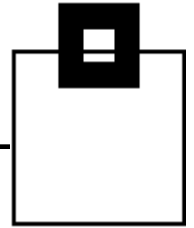
Indexcolumn	Format	Dist. Values	A/D	NL
TBCREATOR	VARCHAR(128)	40	ASC	N
TBNAME	VARCHAR(128)	784	ASC	N

The interface also shows a 'Remote Systems' panel on the right, listing various systems and jobs. The bottom panel displays a 'Remote Error List' and a 'z/OS File System Mapping' table.

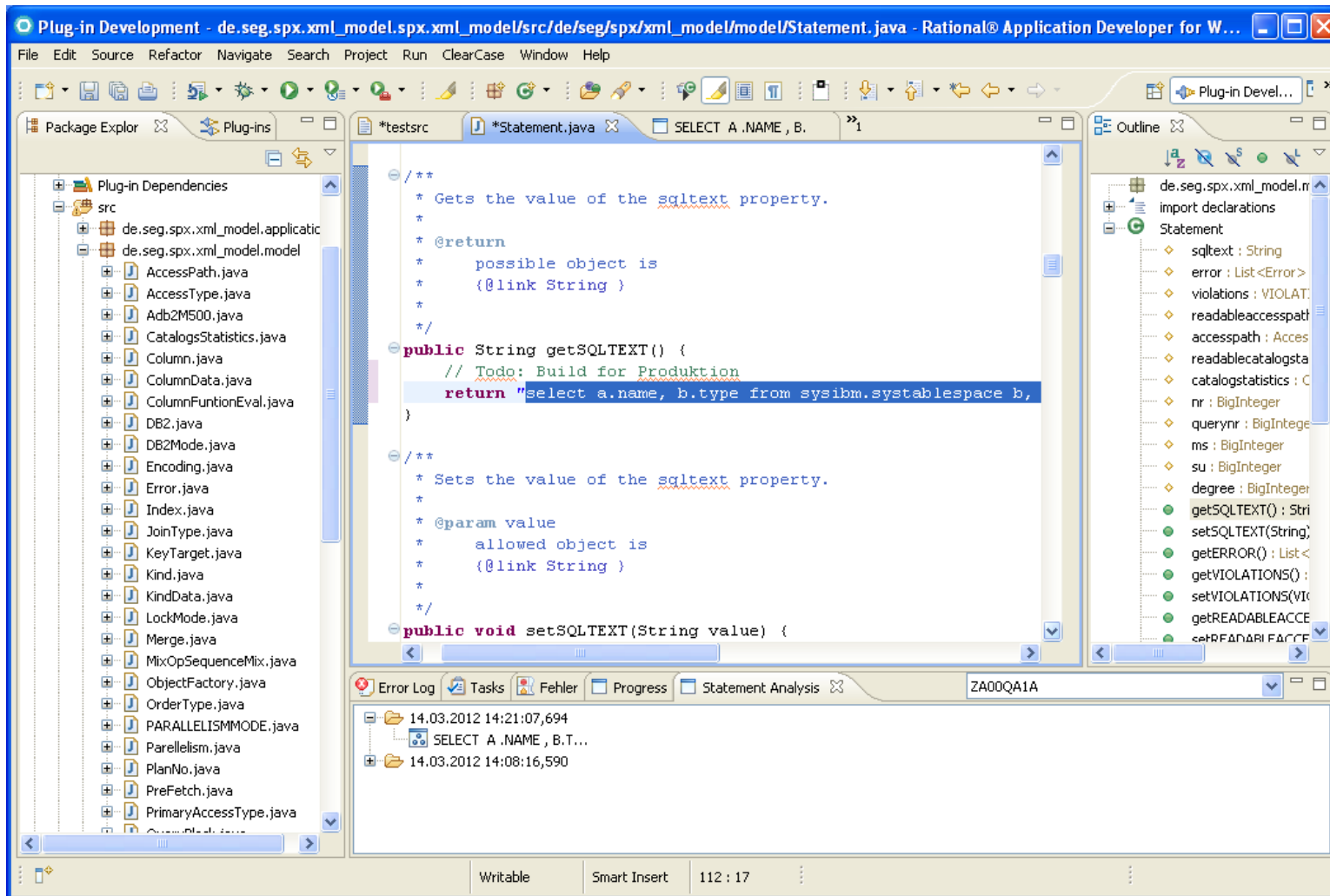
Name	Description
192.16.1.96	
COBOL	cobol group
LOCAL	

SQL PerformanceExpert (SPX) in an IBM RATIONAL world

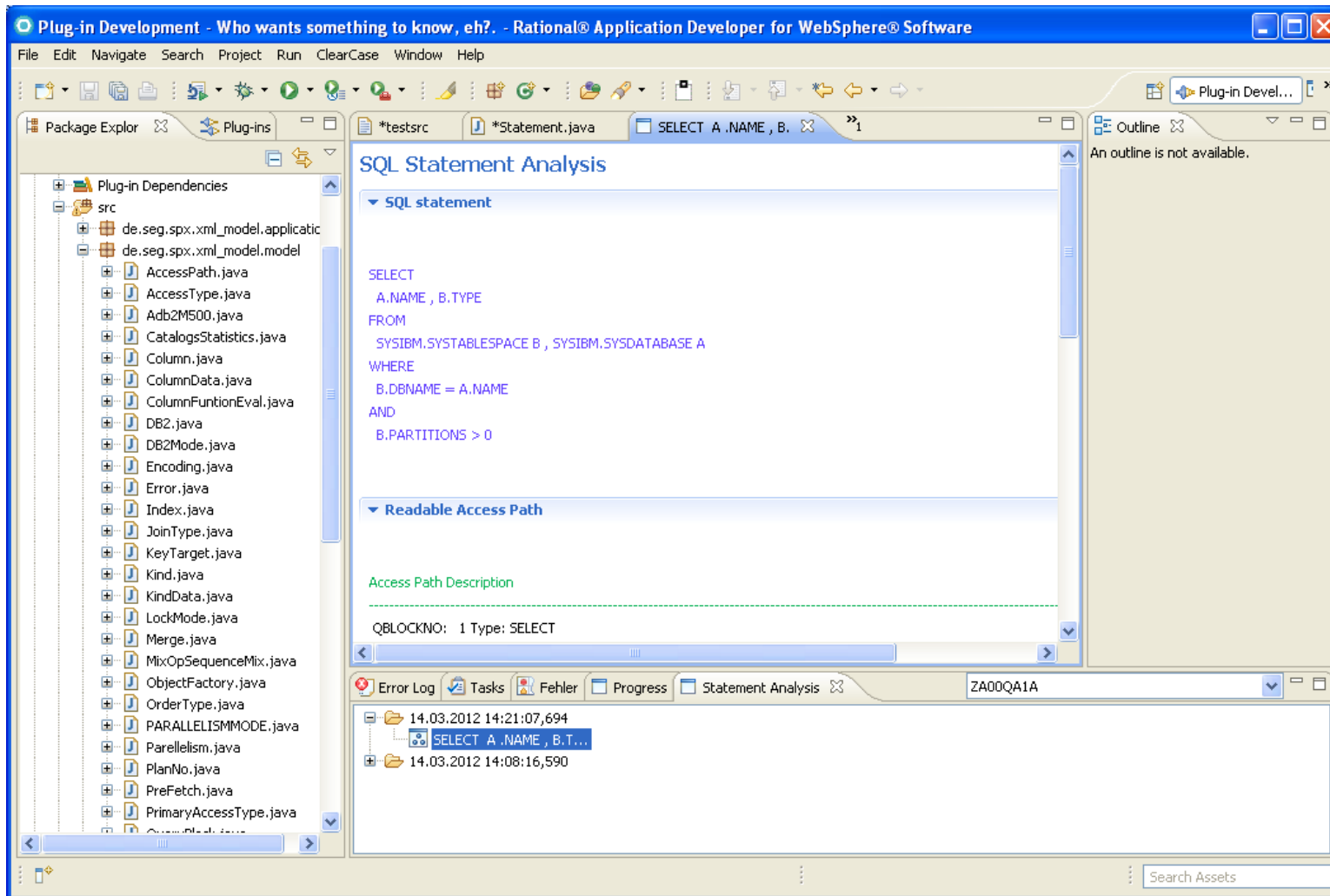
And now Rational Application Developer for WebSphere



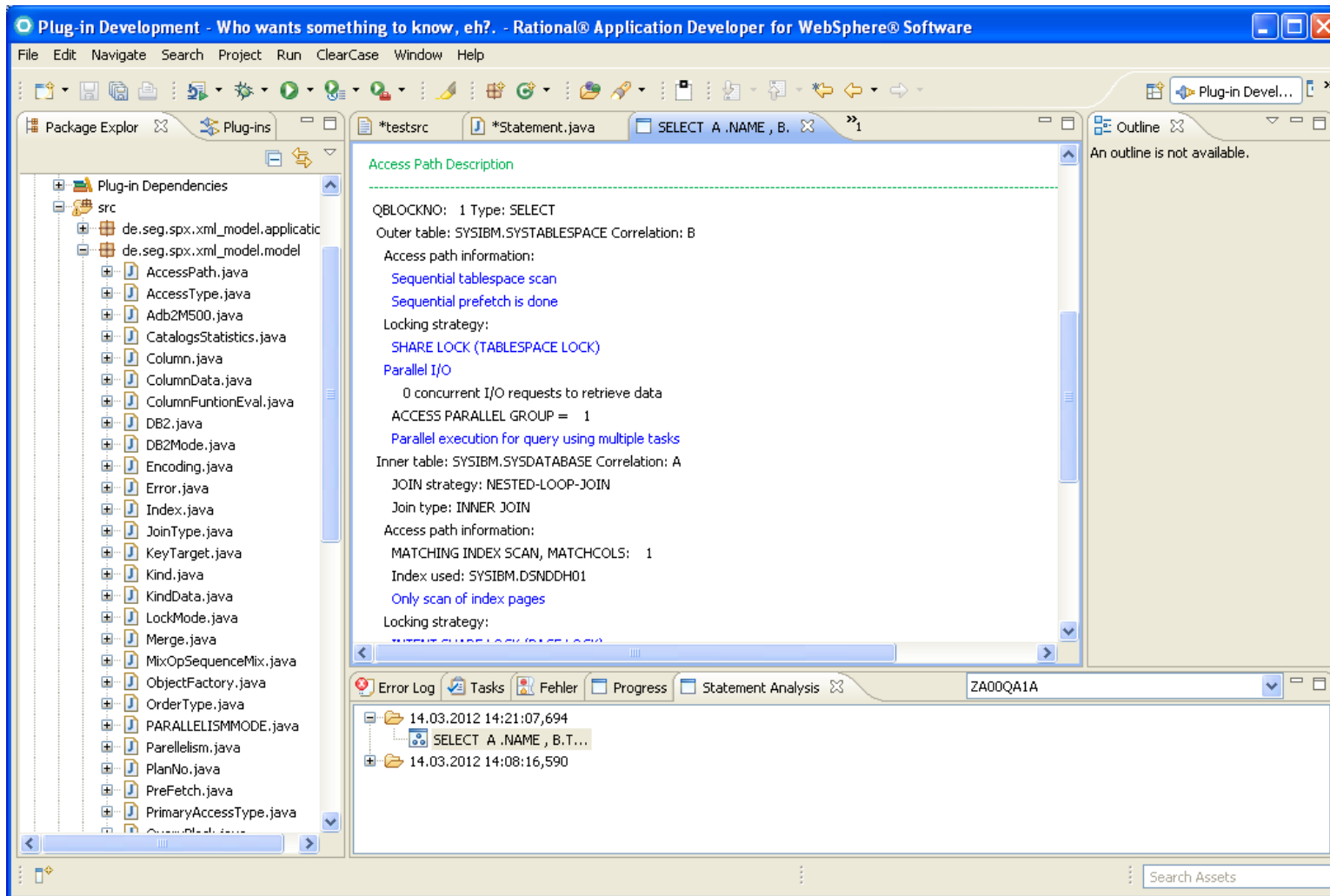
SQL PerformanceExpert (SPX) in an IBM RATIONAL world



SQL PerformanceExpert (SPX) in an IBM RATIONAL world



SQL PerformanceExpert (SPX) in an IBM RATIONAL world



SQL PerformanceExpert (SPX) in an IBM RATIONAL world

The screenshot shows the Rational Application Developer for WebSphere Software interface. The main window is titled "Plug-in Development - Who wants something to know, eh? - Rational® Application Developer for WebSphere® Software". The interface includes a menu bar (File, Edit, Navigate, Search, Project, Run, ClearCase, Window, Help) and a toolbar with various icons. The left pane shows the "Package Explorer" with a tree view of the project structure, including "Plug-in Dependencies" and "src". The central editor displays a SQL query: "SELECT A .NAME , B. T...". Below the query, the execution plan is shown, including details like "MATCHING INDEX SCAN, MATCHCOLS: 1", "Index used: SYSIBM.DSNDH01", "Only scan of index pages", "Locking strategy: INTENT SHARE LOCK (PAGE LOCK)", "Parallel I/O", "0 concurrent I/O requests to retrieve data", "ACCESS PARALLEL GROUP = 1", "0 parallel I/O streams used in joining composite table", "JOIN PARALLEL GROUP = 1", and "Parallel execution for query using multiple tasks". The bottom pane shows the "Error Log" and "Tasks" tabs. The "Error Log" tab is active, displaying a list of errors with columns for "Info...", "Type", and "Description". The errors are warnings related to estimated runtime, service units, and statement costs.

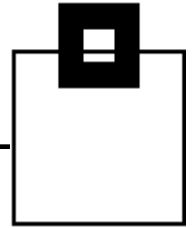
Violation(s)

Info...	Type	Description
⚠	WARNING	Estimated runtime > 25 milliseconds. Try to optimize the access.
⚠	WARNING	Estimated service units > 25. Try to optimize the access.
⚠	WARNING	The statement costs are category B. DB2 could not determine them exactly. Re...

Error Log

Info...	Type	Description
14.03.2012 14:21:07,694		SELECT A .NAME , B. T...
14.03.2012 14:08:16,590		

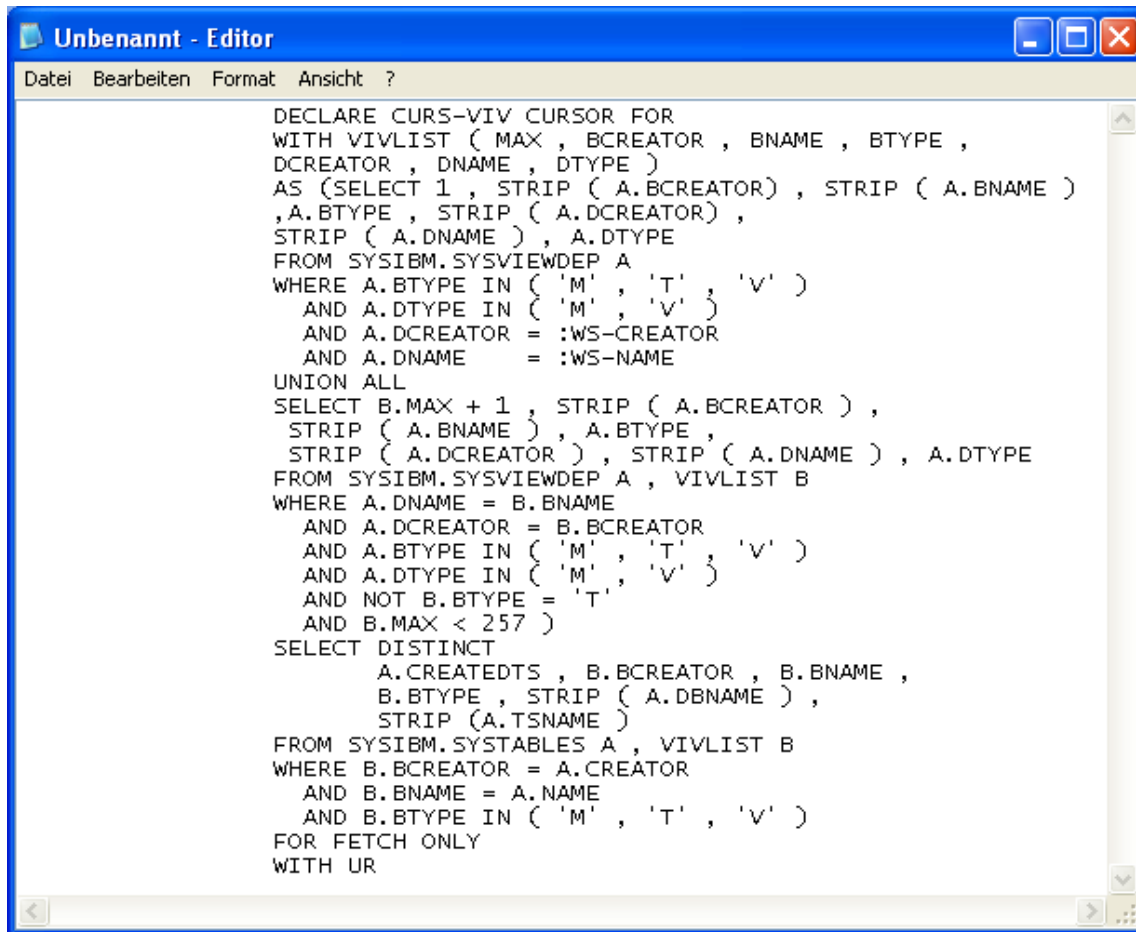
SQL PerformanceExpert (SPX) in an IBM RATIONAL world



Even if your Rapid SQL development tool is **not** integrated into the Rational Worldview it still all connects...



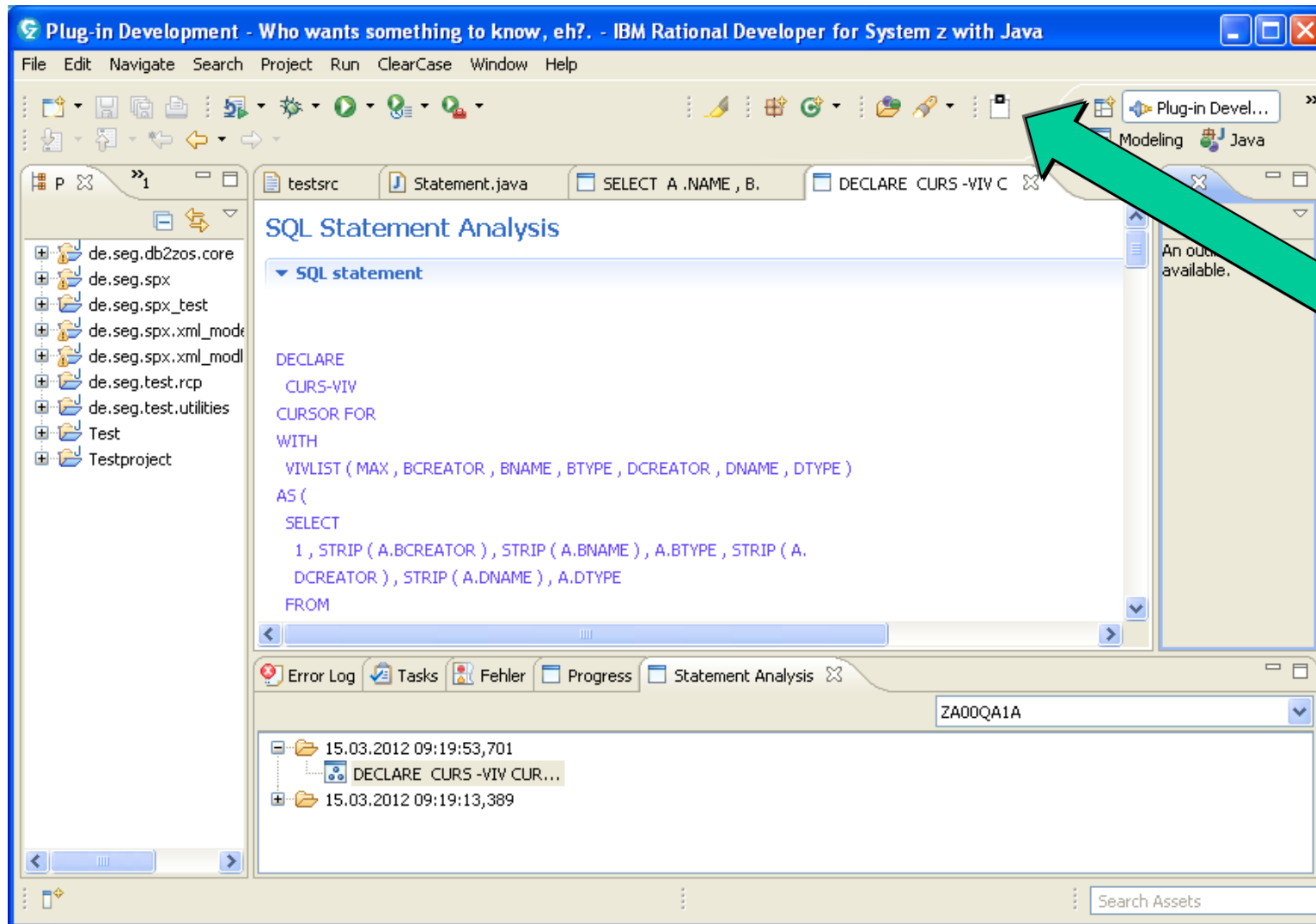
SQL PerformanceExpert (SPX) in an IBM RATIONAL world



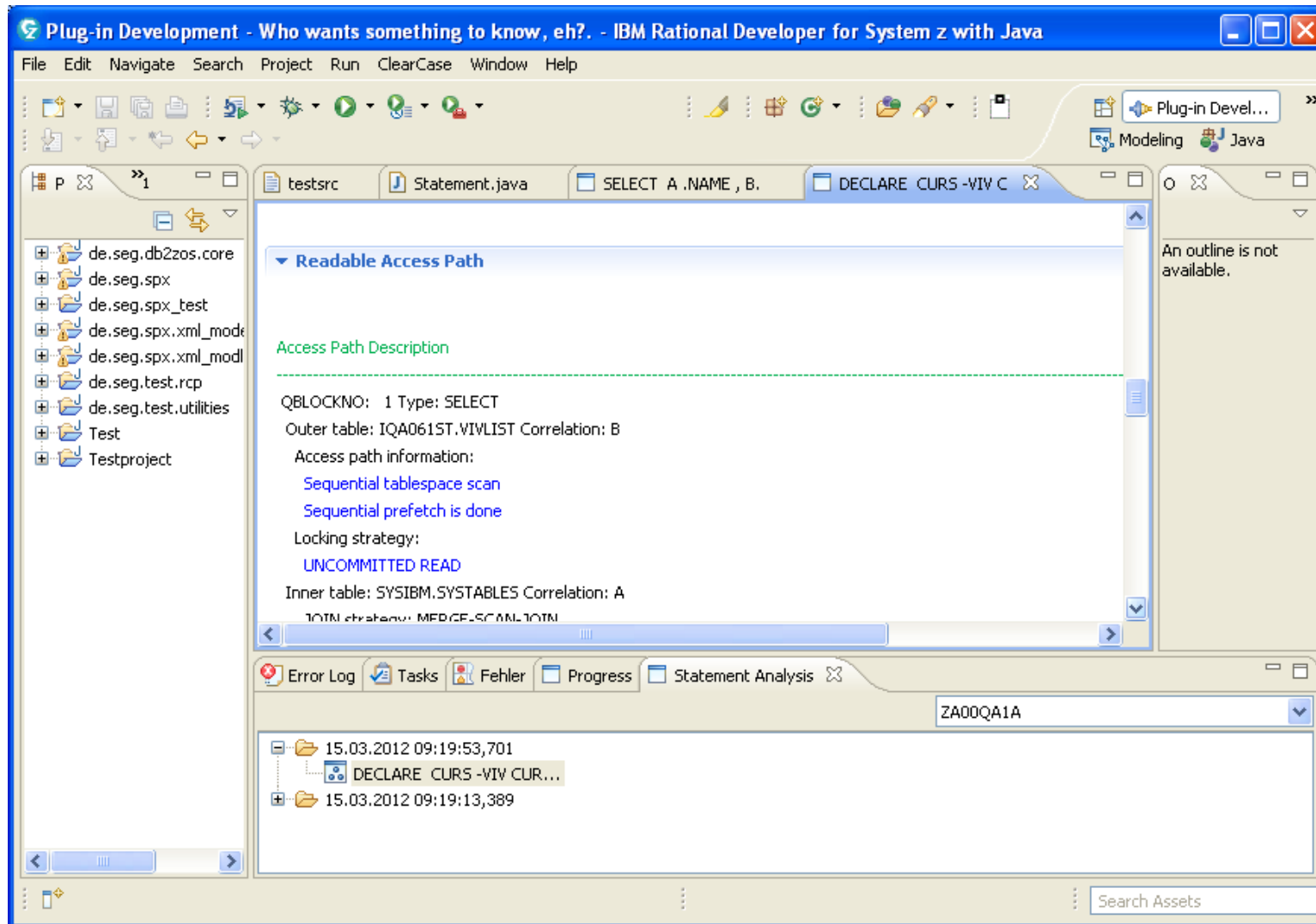
```
DECLARE CURS-VIV CURSOR FOR
WITH VIVLIST ( MAX , BCREATOR , BNAME , BTYPE ,
DCREATOR , DNAME , DTYPE )
AS (SELECT 1 , STRIP ( A.BCREATOR ) , STRIP ( A.BNAME )
,A.BTYPE , STRIP ( A.DCREATOR ) ,
STRIP ( A.DNAME ) , A.DTYPE
FROM SYSIBM.SYSVIEWDEP A
WHERE A.BTYPE IN ( 'M' , 'T' , 'V' )
AND A.DTYPE IN ( 'M' , 'V' )
AND A.DCREATOR = :WS-CREATOR
AND A.DNAME = :WS-NAME
UNION ALL
SELECT B.MAX + 1 , STRIP ( A.BCREATOR ) ,
STRIP ( A.BNAME ) , A.BTYPE ,
STRIP ( A.DCREATOR ) , STRIP ( A.DNAME ) , A.DTYPE
FROM SYSIBM.SYSVIEWDEP A , VIVLIST B
WHERE A.DNAME = B.BNAME
AND A.DCREATOR = B.BCREATOR
AND A.BTYPE IN ( 'M' , 'T' , 'V' )
AND A.DTYPE IN ( 'M' , 'V' )
AND NOT B.BTYPE = 'T'
AND B.MAX < 257 )
SELECT DISTINCT
A.CREATEDTS , B.BCREATOR , B.BNAME ,
B.BTYPE , STRIP ( A.DNAME ) ,
STRIP ( A.TSNAME )
FROM SYSIBM.SYSTABLES A , VIVLIST B
WHERE B.BCREATOR = A.CREATOR
AND B.BNAME = A.NAME
AND B.BTYPE IN ( 'M' , 'T' , 'V' )
FOR FETCH ONLY
WITH UR
```

In any tool e.g. Word, Editor, Squirrel etc.
Start up your Rational Tool of choice and then click the SEG icon.

SQL PerformanceExpert (SPX) in an IBM RATIONAL world



SQL PerformanceExpert (SPX) in an IBM RATIONAL world



SQL PerformanceExpert (SPX) in an IBM RATIONAL world

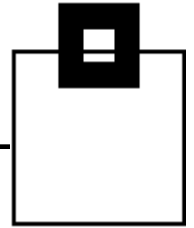
The screenshot shows the IBM Rational Developer for System z with Java interface. The main window displays the results of a SQL query execution, specifically focusing on the SQL PerformanceExpert (SPX) analysis. The query being analyzed is `SELECT A.NAME, B.TYPE` from a table named `DECLARE CURS -VIV CURS`. The SPX results show a `MATCHING INDEX SCAN, MATCHCOLS: 2` using the `SYSIBM.DSNGGX06` index. The locking strategy is `UNCOMMITTED READ`.

Below the SPX results, a table titled **Violation(s)** lists several warnings:

Info...	Type	Description
Warning icon	WARNING	Estimated runtime > 25 milliseconds. Try to optimize the access.
Warning icon	WARNING	Estimated service units > 25. Try to optimize the access.
Warning icon	WARNING	External sort because of UNION or DISTINCT. QBLOCKNO: 1, PLANNO: 3 Try to avoid the sort.
Warning icon	WARNING	Index usage with prefetch. QBLOCKNO: 3, PLANNO: 2 Check if a prefetch is really necessary.
Warning icon	WARNING	Index usage with prefetch. QBLOCKNO: 4, PLANNO: 2 Check if a prefetch is really necessary.

The bottom of the window shows the **Error Log** and **Tasks** panels. The Error Log displays two entries from 15.03.2012 09:19:53,701 and 15.03.2012 09:19:13,389, both related to the `DECLARE CURS -VIV CURS` query. The Tasks panel shows the progress of the query execution.

SQL PerformanceExpert (SPX) in an IBM RATIONAL world

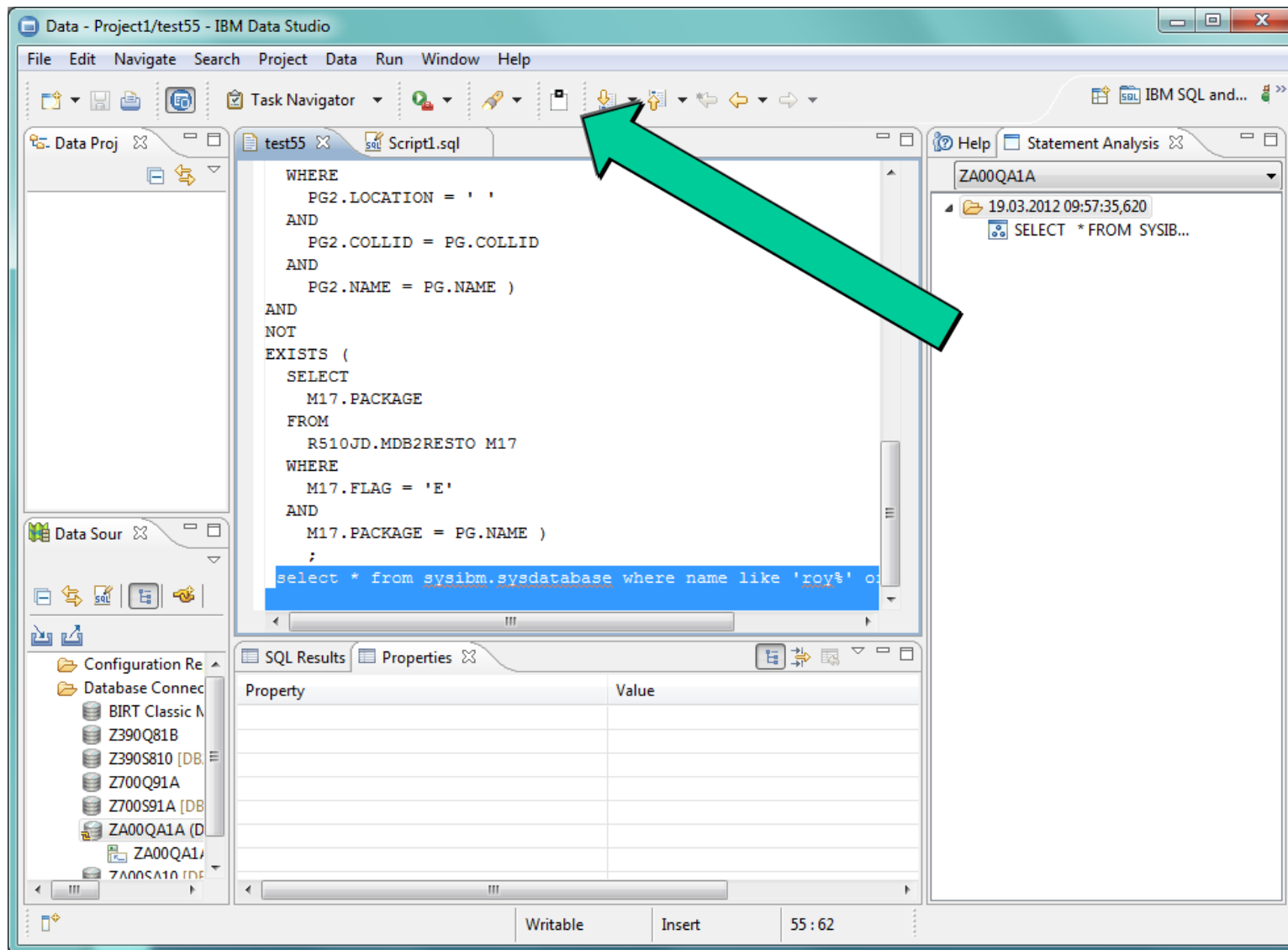


Of course the question is now:

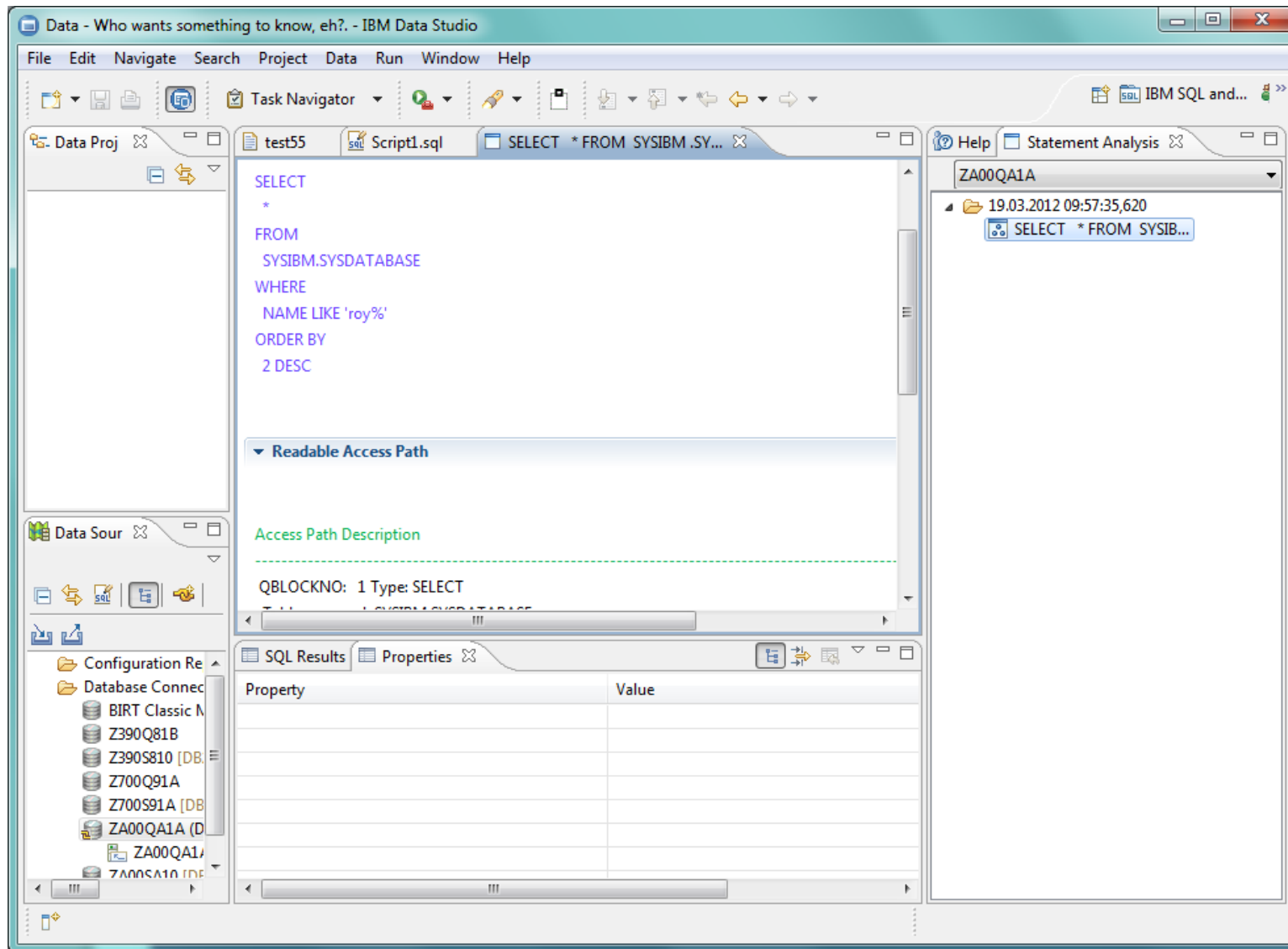
Does it work with DataStudio??



SQL PerformanceExpert (SPX) in an IBM RATIONAL world



SQL PerformanceExpert (SPX) in an IBM RATIONAL world



SQL PerformanceExpert (SPX) in an IBM RATIONAL world

The screenshot displays the IBM Data Studio interface with the following components:

- Top Menu:** File, Edit, Navigate, Search, Project, Data, Run, Window, Help.
- Task Navigator:** Shows the current project and open files, including 'test55', 'Script1.sql', and 'SELECT * FROM SYSIBM.SY...'.
- Left Panel (Data Source Explorer):** Lists database connections: BIRT Classic M, Z390Q81B, Z390S810 [DB], Z700Q91A, Z700S91A [DB], ZA00QA1A (D), and ZA00QA1A [DB].
- Central Editor:** Displays the SQL query: `SELECT * FROM SYSIBM.SY...`. Below the query, it shows the index used (SYSIBM.DSNDH01), the locking strategy (INTENT SHARE LOCK (PAGE LOCK)), and the sort information (Physical sort of result table is performed because of ORDER BY).
- Right Panel (Statement Analysis):** Shows the statement analysis results for the query. It includes a table of violations and errors.
- Bottom Panel (SQL Results):** Displays the results of the query, showing a table with columns 'Property' and 'Value'.

Violation(s) Table:

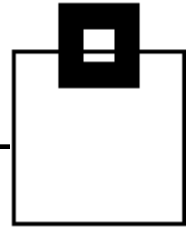
InfoT...	Type	Description	Rule...
⚠	WARNING	External sort because of ORDER BY. QBLOCKNO: 1, ...	9047
⚠	WARNING	SELECT * can lead to unnecessary data transfer. QB...	9065
⚠	WARNING	The statement costs are category B. DB2 could not ...	9099

Error(s) Table:

Property	Value

Statement Tree instantiated - Please expand and double click on statement to show its details.

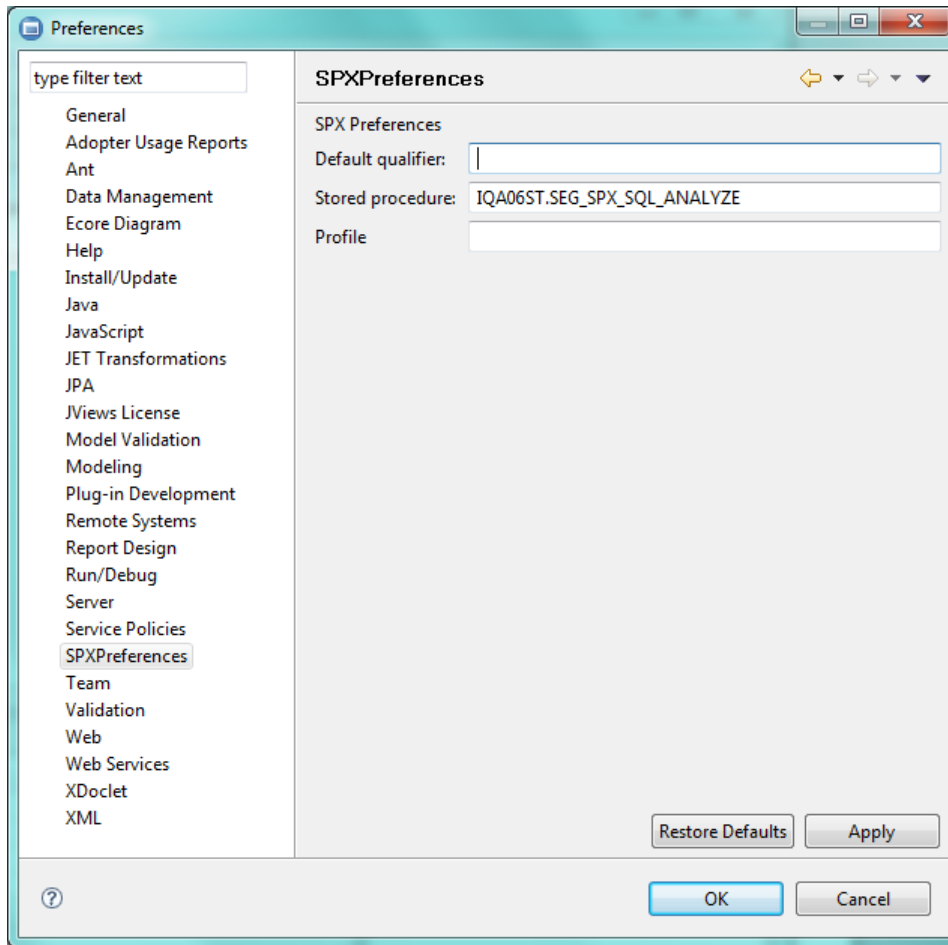
SQL PerformanceExpert (SPX) in an IBM RATIONAL world



Can you tailor it for every developer/DBA?

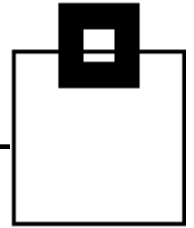


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YES!

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The future is a hybrid world where everything talks to everything using XML with fully automated messaging

The developer signals the DBA group a „problem“ eg
Bad statistics or a needed index



The DBA group receives the problem through an internal ticket

- Analyze the problem
- Determine the „corrective task“ – If any!
- Do the task

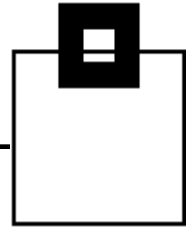


The DBA responsible signals back to the originator that the task is complete



All of this done using either ISPF and/or GUI!

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Questions ????

