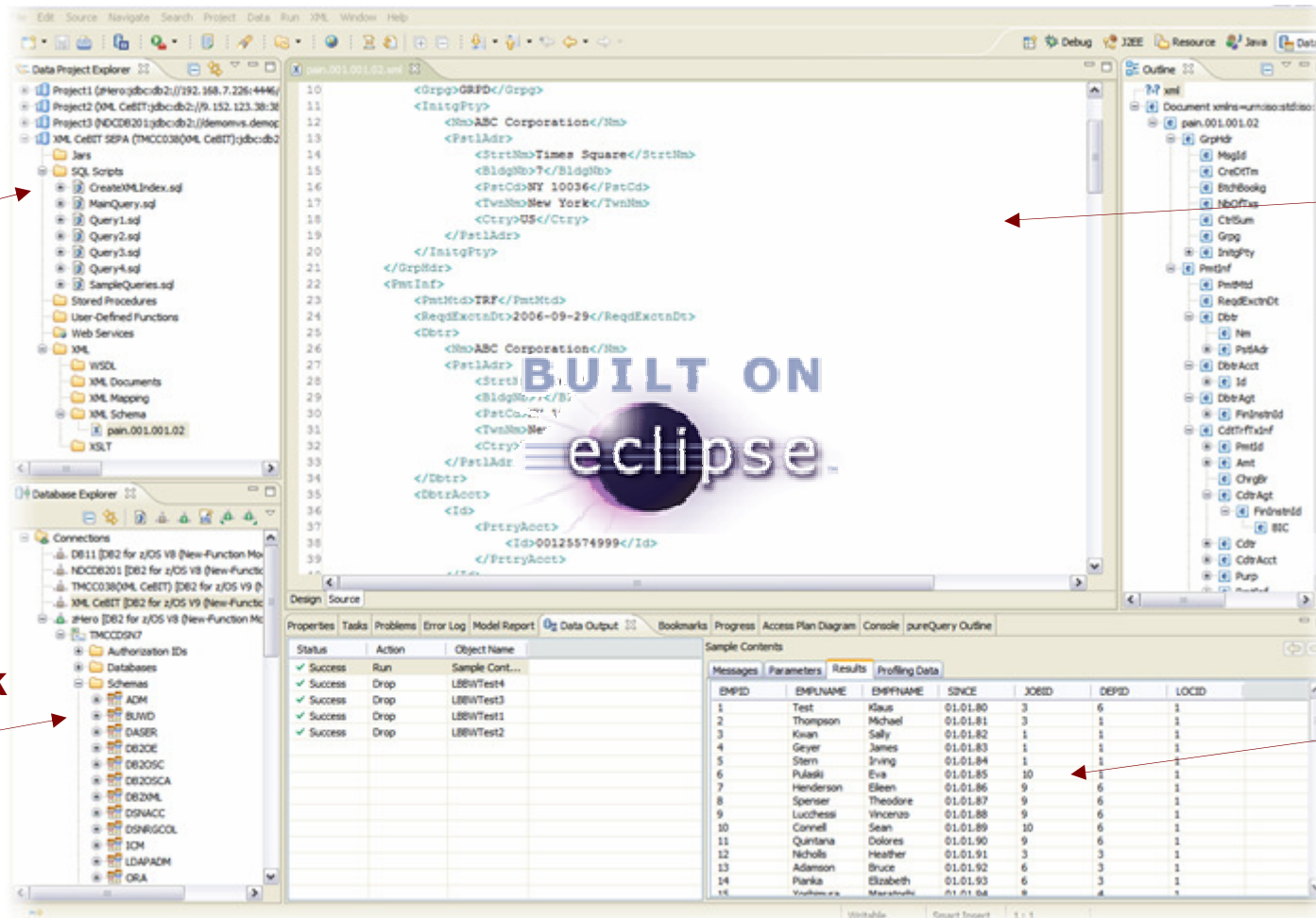




# Eclipse als Basis



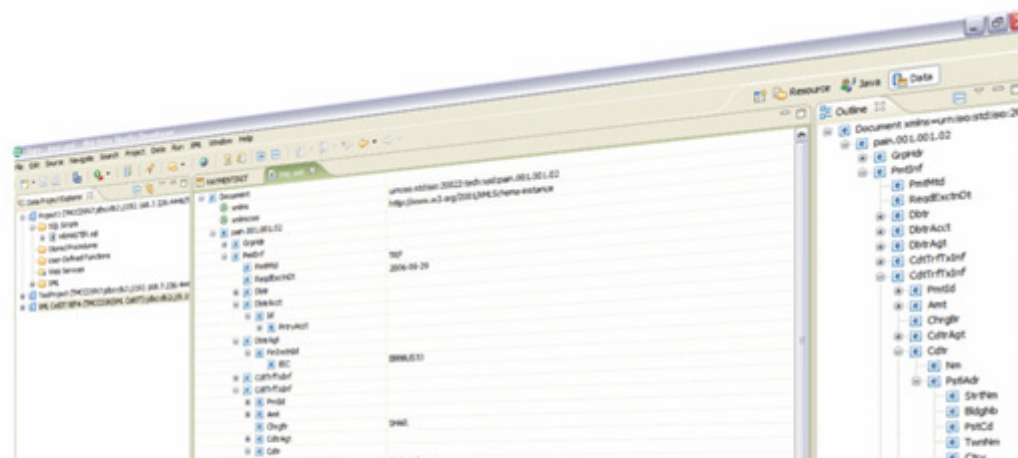
Projekt-Sicht

SQL oder XML Editor

Datenbank-Objekte

Output von Daten oder Anwendungen

## Data Studio Varianten ab Version 3.1.1



### Data Studio V3.1.1 Administration Client

**Zielgruppe: Datenbankadministratoren**  
**Reduzierter Funktionsumfang mit Fokus auf DB2-/Administrations-Funktionalitäten**  
**Größe: ~ 330 MB**  
**Direktinstallation ohne Installation Manager**  
**(bisher Stand-Alone Package)**

### Data Studio V3.1.1 Full Client

**Zielgruppe: Anwendungsentwickler**  
**Voller Funktionsumfang inkl. vollständigem Eclipse und Entwicklungs-Funktionalitäten**  
**Größe: ~ 1.200 MB**  
**erfordert IBM Installation Manager**  
**(bisher IDE Package)**

<http://www.ibm.com/developerworks/downloads/im/data/>

## Detaillierter Vergleich der wichtigsten Funktionalitäten in den Tools in 3.1.x

		Data Studio Admin Client	Data Studio Full Client
<b>Datenbanken</b>	DB2 Objektverwaltung	x	x
	SQL Editor & Builder	x	x
	DDL Generierung	x	x
	Visual Explain & Statistics Advisor	x	x
	Query Environment Capture (Service SQL)	x	x
	SQL Stored Procedures	x	x
<b>Entwicklung</b>	Java Stored Procedures & Data Web Services		x
	SQLJ Entwicklung		x
	SQL Unterstützung im Java Editor		x
	XML Editor		x
	pureQuery Runtime (beschränkt auf Eclipse)		x
	Oracle Unterstützung		x
	Mass Deployment & Eclipse Shell Sharing (z.b. Optim Query Tuner & InfoSphere Data Architect)		x

Details: <http://www-01.ibm.com/support/docview.wss?uid=swg27022147>

## **Fixpack 3.1.1 – ab 30.4.2012**

- DB2 10 für LUW Unterstützung
- BugFixes (e.g. DynamicStatementCache entladen)
- Eclipse 3.6
- Gemeinsame Installation für DataStudio und Optim QueryWorkloadTuner
- Bi-Temporal Tables
- Row and Column Access Control
- Diverse kleine Erweiterungen und Verbesserungen

# IDAA Administration und Monitoring als Plugin

Accelerator - Connection Profile: DWACDBNK - Accelerator: IODTEST1 - IBM DB2 Analytics Accelerator Studio

File Edit View Database Administration Search Project Window Help

Administration Data Project DWACDBNK IODTEST1

### Accelerator: IODTEST1

Acceleration: Started [Stop](#) Software version: 2.1.0.201110122025 [Transfer new](#) [Apply other](#)  
 Status: Online Netezza version: 6.0.5-0.F-1.P-0.Bld-19303 [Transfer files](#)  
 Used space: 0.0 B of 0.1 TB Credentials valid since: 10/13/11 11:36 AM [Update](#)  
 Active queries: 0 Trace: DEFAULT / OFF [Configure](#) [Save](#) [Clear](#)

▼ **Tables (0 of 8 loaded / 0 of 8 enabled for acceleration)**

[+ Add...](#) [Alter Keys...](#) [Remove](#) [Enable Acceleration](#) [Disable Acceleration](#) [Load...](#)

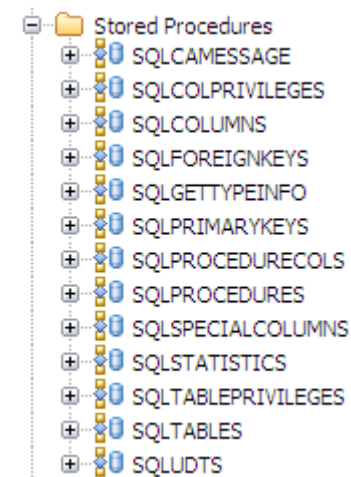
Name like:

Name	Size	Rows	Acceleration	Last Load
<b>IODTPCH</b>	<b>1 MB</b>	<b>-</b>	<b>0 of 8</b>	<b>0 of 8</b>
CUSTOMER	1 MB	1500	Disabled	Initial load in progress(1,500 rows...)
LINEITEM	-	-	Disabled	Initial load in progress(60,175 row...)
NATION	-	-	Disabled	
ORDERS	-	-	Disabled	



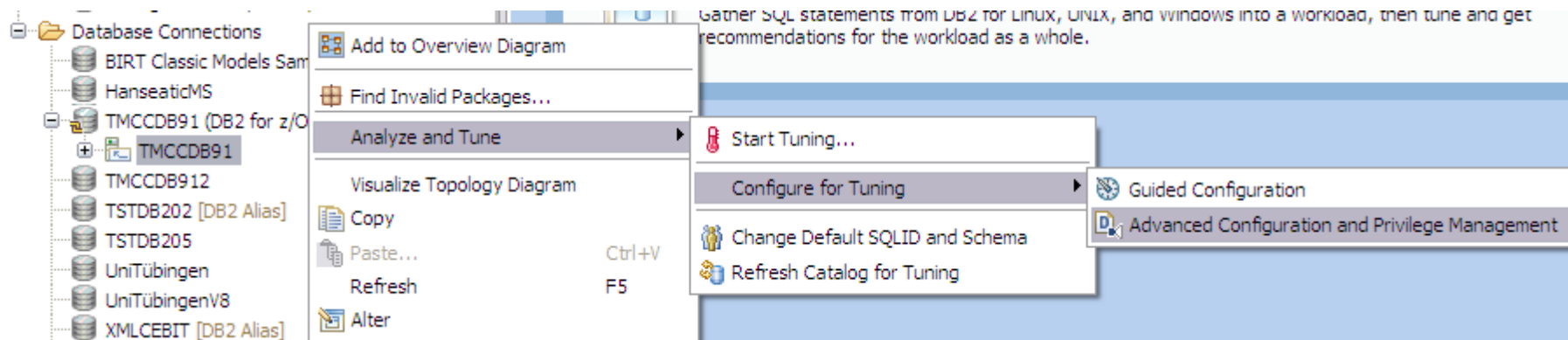
## Im Vorfeld klären

- DDF und TCP/IP einrichten
- WLM DDF Enclave Prioritäten
- Security Konzept
- GRANT Read on Catalog
- JDBC Treiber korrekt einrichten
  - Bind dynamic packages
  - DESCSTAT=YES
  - JDBC Stored Procedures (SQL\*...)
- System Stored Procedures
  - DSNUTILU, DSNWZP/ADMIN\_INFO\_SQL,  
DSNACCMD, WLM\_REFRESH
  - Admin Scheduler

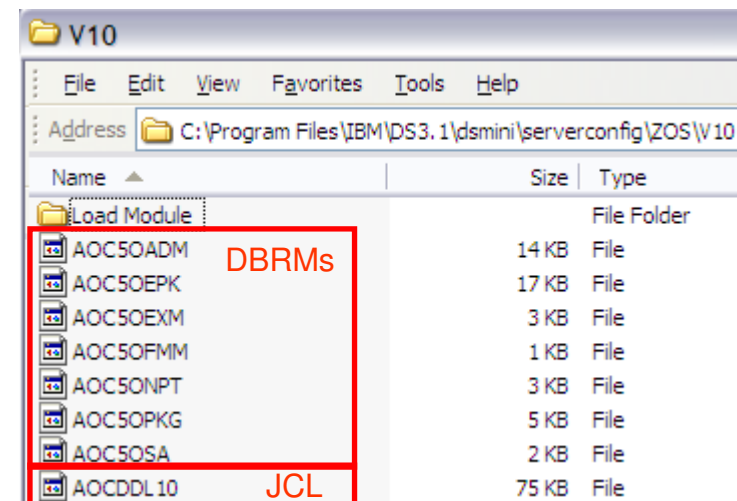


## Installation der Backendobjekte

- Option 1  
Installation über die DataStudio GUI



- Option 2 (empfohlen)  
Installation über JCL aus  
DataStudio Installationsverzeichnis





## Tipps und Tricks I

### Übertragen von JCL und DBRMs mittels FTP

```
ftp> bin
200 Representation type is Image
ftp> quote site lrecl=80 blksize=27920 recfm=fb primary=5 secondary=5
200 SITE command was accepted
ftp> mkd
Directory name 'HLQ.OQTDBRM'
257 'HLQ.OQTDBRM' created.
ftp> cd 'HLQ.OQTDBRM'
250 The working directory 'HLQ.OQTDBRM' is a partitioned data set
ftp> lcd V10
Local directory now serverconfig\v10

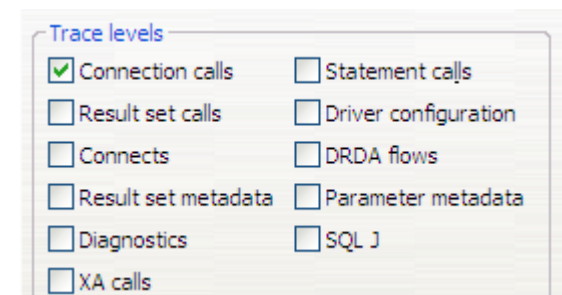
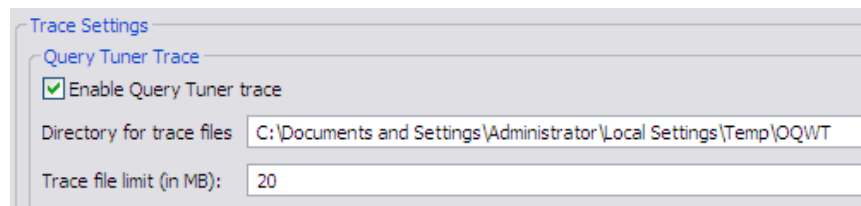
ftp> mput *
mput AOC5OADM? Y
mput AOC5OEPK? Y
mput AOC5OEXM? Y
mput AOC5OFMM? Y
mput AOC5ONPT? Y
mput AOC5OPKG? Y
mput AOC5OSA? Y
mput AOCDDL10? N
ftp> ascii
ftp> put AOCDDL10
```

## Tipps und Tricks II

- Englische Sprache erzwingen in C:\Program Files\IBM\DS3.1\eclipse.ini  
Die folgenden zwei Zeilen ans Ende einfügen  
*-Duser.language=en*  
*-Duser.country=US*
- JDBC Traces einschalten  
a) Komplettes DataStudio  
Rechts-Klick auf Connection → Properties → DriverProperties → Tracing

### b) Nur QueryTuning

Window → Preferences → DataManagement → QueryTuner



# Zentrale Einstellungen

Query Tuning - Task Launcher - IBM Data Studio

File Edit View Window Help

Task Navigator

Explorer

Task Launcher

Query Tuning [STLEC1 - DB2 for z/OS V10 (New-...)]

Test Workshop

Preferences

type filter text

- General
  - Adopter Usage Reports
- Ant
- Data Management
  - Administration Explorer
  - Administrative Options
  - Authorization Administration
- Connectivity
  - Data Bridge Server
  - Data Model Editor Options
- Data Object Compare
- Data Source Explorer
- Data Studio-Webkonsole
- DB2 Options
- DDL Generation
- Diagram
- Information Center Home
- Key Migration
- Label Decorations
- Logical Data Model
- Mapping Editor
- Multivariate Value Distributions Explorer
- Optim Performance Manager Profiles
- Performance Metrics
- Query Tuner**
- SQL Development
- Task Launcher
- Temporal
- Visual Explain
- Ecore Diagram
- Help
- Install/Update
- Java
- JavaScript
- JET Transformations
- JPA
- JViews License

### Query Tuner

Specify general settings for single-query and workload tuning. You can also specify Query Tuner trace options and a destination for trace output from DB2 for z/OS.

Statement delimiter:

Decimal scale for display data:

Maximum number of statements to display:

- Check user privileges before starting monitoring or scheduling snapshot for Monitor Profiles
- Estimate cost information before capturing SQL from catalog package plan
- Prompt to continue tuning if the database is partially configured
- Enable internal processes to use secondary authorization IDs for EXPLAIN tasks and "what-if" and
- Regularly check that the database connection is open (DB2 for z/OS only)

Interval in seconds:

#### Trace Settings

**Query Tuner Trace**

- Enable Query Tuner trace

Directory for trace files:

Trace file limit (in MB):

**DB2 z/OS Server Trace Output Destination**

- Generalized Trace Facility (GTF)
- System Management Facility (SMF)

**Explain Table Migration**

- Preserve EXPLAIN table content
- Preserve EXPLAIN table privilege



# Demo

## Wichtige Links

- Getting Started

[http://public.dhe.ibm.com/software/dw/db2/express-c/wiki/Getting\\_Started\\_with\\_IBM\\_Data\\_Studio\\_v31\\_p3.pdf](http://public.dhe.ibm.com/software/dw/db2/express-c/wiki/Getting_Started_with_IBM_Data_Studio_v31_p3.pdf)

- DataStudio Blog

<https://www.ibm.com/developerworks/mydeveloperworks/blogs/idm/?lang=en>

- DataStudio Forum

<http://www.ibm.com/developerworks/forums/forum.jspa?forumID=1086&categoryID=19>

- Dokumentation und Beispiele

<http://publib.boulder.ibm.com/infocenter/dstudio/v3r1/index.jsp>

- Download und Feature Comparison Full vs. Admin Client

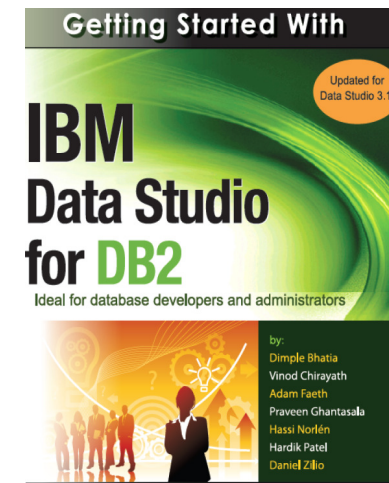
<http://www.ibm.com/developerworks/downloads/im/data/support.html>  
<http://www-01.ibm.com/support/docview.wss?uid=swg27022147>

- ShellSharing

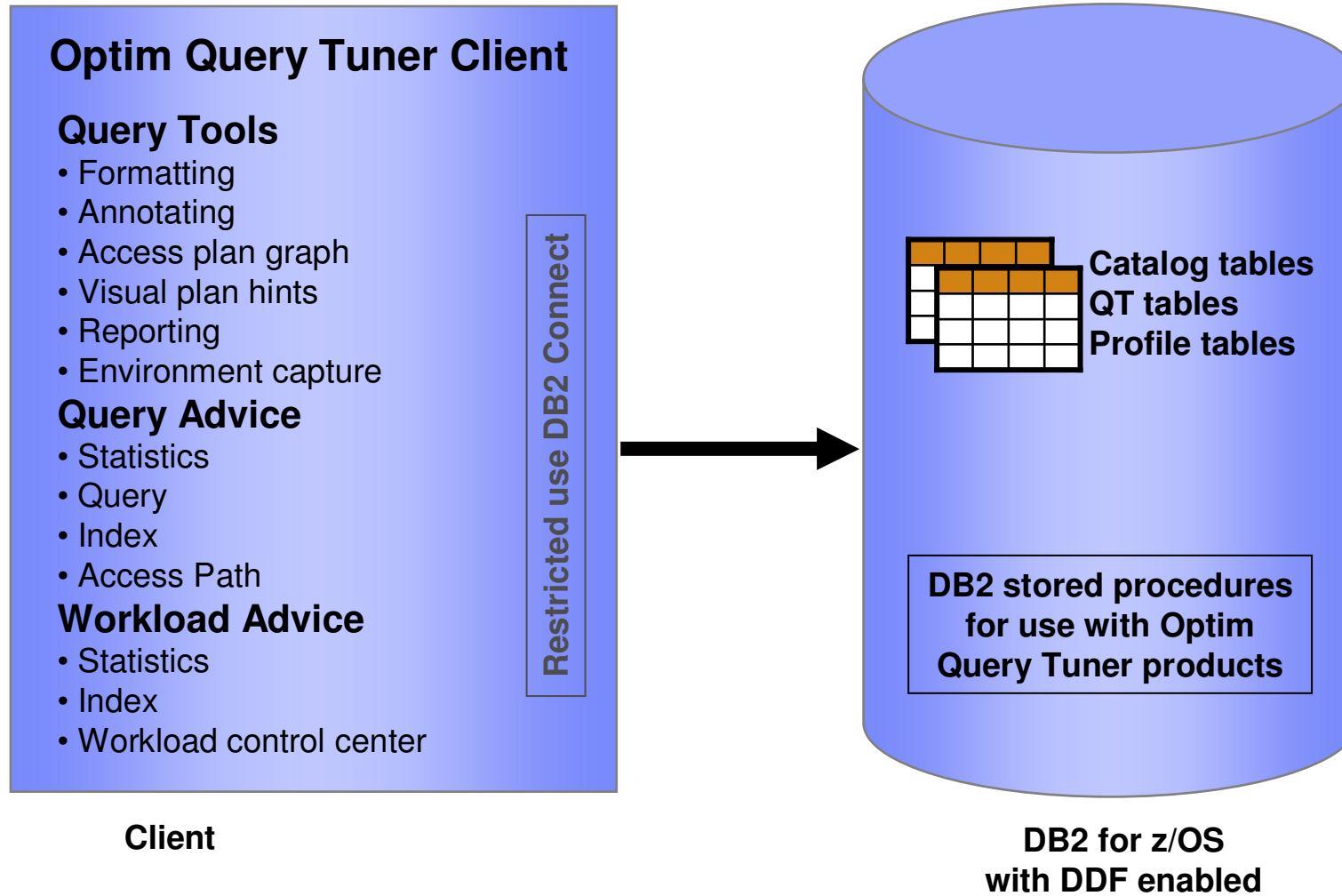
[http://publib.boulder.ibm.com/infocenter/dstudio/v3r1/topic/com.ibm.datatools.base.install.doc/topics/c\\_compatibility.html](http://publib.boulder.ibm.com/infocenter/dstudio/v3r1/topic/com.ibm.datatools.base.install.doc/topics/c_compatibility.html)  
<http://www-01.ibm.com/support/docview.wss?rs=2042&uid=swg21279139>  
<http://www-01.ibm.com/support/docview.wss?uid=swg27024923>  
<http://www-01.ibm.com/support/docview.wss?rs=3360&uid=swg27014124>

- Understanding Access Paths

<http://www.ibm.com/developerworks/data/library/techarticle/dm-1006optimquerytuner1/>



# Query Tuner und DataStudio Architektur



Properties | Capture SQL for Tuning | SQL Category | Workload List | Monitor List | SQL Results | Access Plan

Data Source Explorer

- Database Connections
  - S1D931 UniLe
  - S1D931 UniTu
  - STLEC1
  - TMCC038
  - TMCCDB91 (DB2 for z/OS V9.1 (Ne...))
    - TMCCDB91
    - TMCCDSN7

**General**  
View the status of database configuration for running tuning advisors, bind packages and create statistic profile table for DB2 z/OS and wor

Default SQLID:

Packages: Partially Bound

Workload tables: Tables Not Found

Statistics profile table: Available

**Enabled Advisors and Components**

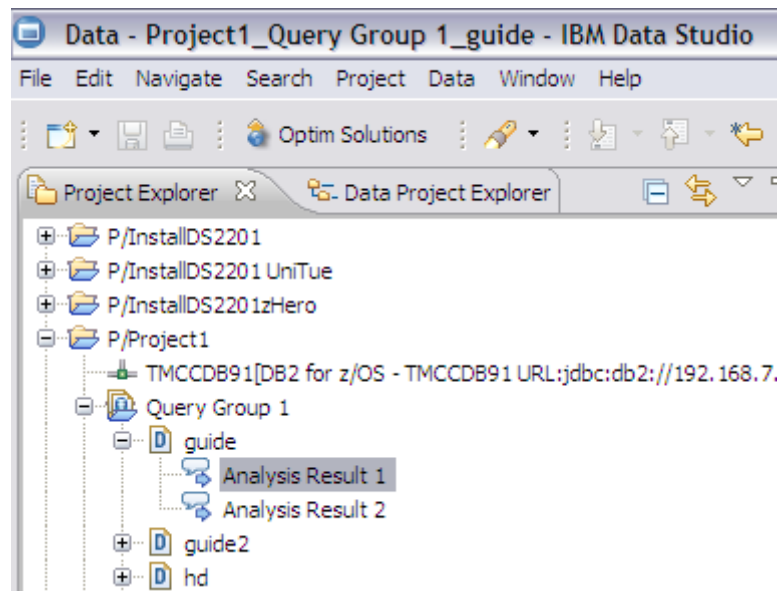
- Basic Query Tuner
- Query Annotation
- Statistics Advisor
- Query Advisor
- Index Advisor
- Access Plan Comparison

**EXPLAIN-enabled Authorization IDs**

EXPLAIN enabled: DASER is enabled

Authorization ID	EXPLAIN table status
DASER	Correct format

## QueryTuning projects





# Query aus dem Statement Cache – Data Studio

**Capture SQL Statements**

Database Connection: [S1D931 UniLe DB2 for z/OS \[V9 \(New-Function Mode\)\]](#)

Source: SQL Source Type: **Statement cache** | [Enable Cache Trace](#) | [Disable Cache Trace](#)

Filter Name: **ACCUM\_CPU\_DESC** | [New](#) | [Save](#) | [Save as](#) | [Edit](#) | [Delete](#)

Query: [Search](#) | [Save for Tuning](#)

All of the rows are displayed. The number of rows is 3905.

STMT_ID	STAT_EXEC	STAT_CPU	STAT_ELAP	STAT_GPAG	STMT_TEXT
4280	1	0,363485	11,437969	11813	SELECT STMT_ID, STMT_TOKEN, COLLID, PROGRAM_NAME
4322	1	0,019087	0,022325	6048	SELECT A.DELETERULE, A.RELNAME, A.COLCOUNT, B.COLS
4361	45	0,018577	0,019517	411	SELECT NAME, COLTYPE, LENGTH, NULLS, DEFAULT FROM S
632	2	0,015874	0,016778	180	SELECT DISTINCT CREATOR FROM SYSIBM.SYSTABLES UNIQ
4316	1	0,013925	0,017329	3043	Select * From (SELECT TBCREATOR,TBNAME, NAME, COLNC
4370	1	0,012918	0,013344	3024	SELECT R.RELNAME AS CONSTNAME,R.CREATOR AS CREAT
4308	1	0,012176	0,012678	3024	SELECT CREATOR, NAME,TBCREATOR,TBNAME FROM SYSIB
4324	1	0,010162	0,151053	525	SELECT S.CREATOR, S.NAME, S.UNIOUERULE, S.INDEXTYP

## Query aus dem Katalog - DataStudio

**Database Connection**

✓ [TMCCDB91\\_DB2 for z/OS \[V9 \(New-Function Mode\)\]](#)

**Source**

SQL Source Type:

Filter Name:  \* [New](#) [Save](#) [Save as](#)

**Query**

[Search](#) [Save for Tuning](#)

All of the rows are displayed. The number of rows is 5.

STMTNO	QU...	NAME	PR...	P..	STMT_TEXT
1	1	DSN5OPKG	0	0	DECLARE DB2JCCCURSOR1 CURSOR WITH HOLD FOR SELECT NAME FROM SYSIBM.SYSPACKA
2	2	DSN5OPKG	0	0	DECLARE DB2JCCCURSOR2 CURSOR WITH HOLD FOR SELECT A.GRANTEE FROM SYSIBM.SYSI
3	3	DSN5OPKG	0	0	DECLARE DB2JCCCURSOR3 CURSOR WITH HOLD FOR SELECT GRANTEE, SELECTAUTH, INSE
4	4	DSN5OPKG	0	0	DECLARE DB2JCCCURSOR4 CURSOR WITH HOLD FOR SELECT DISTINCT VERSION FROM SYSI
5	5	DSN5OPKG	0	0	DECLARE DB2JCCCURSOR5 CURSOR WITH HOLD FOR SELECT NAME from SYSIBM.SYSROUTIN

## Query aus Stored Procedure - DataStudio

The screenshot displays the IBM Data Studio interface. On the left, the 'Data Source Explorer' shows a tree view of the database structure. The 'Stored Procedures' folder is expanded, and 'NATIVEPROC:VERSION1 (Active)' is selected. On the right, the 'Source' panel shows the 'SQL Source Type' set to 'Data Studio database stored procedure DASER.NATIVEPROC'. Below this, the 'Query' panel shows the execution results, including the number of rows and a table of statement numbers and their corresponding SQL text.

**Source**

SQL Source Type: Data Studio database stored procedure DASER.NATIVEPROC

**Query**

[Search](#) [Save for Tuning](#)

The number of rows is 6.

STMT_NO	STMT_TEXT
0	SELECT SCHEMA, NAME FROM SYSIBM.SYSROUTINES
1	SELECT NAME FROM SYSIBM.SYSTABLES
2	CASE whichQuery WHEN 0 THEN OPEN cursor1
3	WHEN 1 THEN OPEN cursor2
4	END CASE
5	END P1

# Tune SQL

## Optim Query Tuner

### ▼ Query Text

Specify the query text for query tuner.

```
DECLARE DB2JCCCURSOR2 CURSOR WITH HOLD FOR SELECT A.GRANTEE FROM SYSIBM.SYSPACKAUTH A,
SYSIBM.SYSPACKAGE B WHERE A.LOCATION = " AND A.COLLID = :H:H AND A.NAME = :H:H AND B.LOCATION = "
AND B.COLLID = :H:H AND B.NAME = :H:H AND A.GRANTEE <> B.OWNER
```

- [Tune Query](#)
- [Generate Summary Report](#) [Upgrade](#)
- [Choose Tuning Activities...](#)
- [Generate Access Plan Report](#)
- [Query Environment Capture](#)
- [Test Candidate Indexes...](#) [Upgrade](#)
- [Create Plan Hint](#) [Upgrade](#)

EXPLAIN options:  Re-capture EXPLAIN information  Use existing server EXPLAIN information

### ▼ Context

#### EXPLAIN Options

Query Number:

SQLID:

Optimization hint:

Group member:

#### Application Environment

Schema:

Current Degree:

Current Refresh Age:

Current Maintained Table Types:

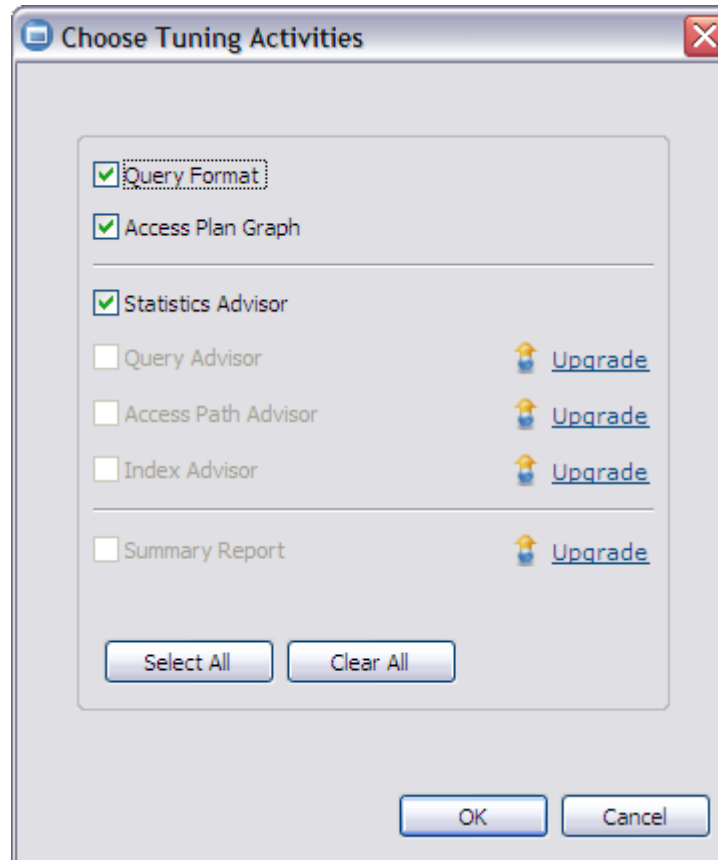
Use the following stored procedure to issue the EXPLAIN statement:

Schema:

Procedure schema:

Procedure name:

## Choose Tuning activities





# Optimizer Transformations

Original Transformed

Annotation to display: All

Expand All Collapse All Customize Save Print

Formatted Query

```

SELECT A.EMPNO
      , A.FIRSTNAME
      , A.LASTNAME
      , A.JOB
      , A.SALARY
      , A.BONUS
      , A.COMM
      , B.LOCATION
      , C.PROJNAME
FROM DSN8910.DEPT AS B
      , DSN8910.EMP AS A
      , DSN8910.EPROJ AS C
WHERE ( A.EMPNO IN ( SELECT DSN8910.DEPT.MGRNO
                    FROM DSN8910.DEPT
                    WHERE DSN8910.DEPT.MGRNO IS NOT NULL
                  )
      AND A.WORKDEPT = B.DEPTNO
      AND B.DEPTNO = C.DEPTNO
      )
ORDER BY A.EMPNO ASC
      , A.FIRSTNAME ASC
      , A.LASTNAME ASC
    
```

Original Transformed

Annotation to display: All

Expand All Collapse All Customize Save Print Clear Highlights

Formatted Query

```

SELECT A.EMPNO
      FROM DSN8910.DEPT AS B
      , DSN8910.EMP AS A
      , DSN8910.EPROJ AS C
WHERE ( A.WORKDEPT = B.DEPTNO
      AND A.WORKDEPT = C.DEPTNO
      AND B.DEPTNO = C.DEPTNO
      AND A.EMPNO = SYSADM."DSNWFQB(02)".MGRNO
      DB2 creates a virtual table, SYSADM.DSNWFQB(02), to process the following correlated subquery
          SELECT DSN8910.DEPT.MGRNO
          FROM DSN8910.DEPT
          WHERE ( DSN8910.DEPT.MGRNO IS NOT NULL
                AND A.EMPNO = DSN8910.DEPT.MGRNO
                )
      End of the subquery for the SYSADM.DSNWFQB(02) virtual table.
      )
ORDER BY A.EMPNO ASC
      , A.FIRSTNAME ASC
      , A.LASTNAME ASC
    
```

# Visual Explain/OSC

**Overview of Diagram**

**Basic Information**  
 Information that identifies the diagram.  
 Database Platform: ZOS  
 Database Version: DSN09015  
 Explain Timestamp: 2009-10-12T16:57:51.62

**Diagram Overview**  
 Display the selected diagram overview.

**Node (4) IXSCAN 1 Details:**

- Node Type : Index[5]
- Name : XEMP1
- Creator Name : DSN8910
- Table Name : EMP
- Fullkeycard : 42
- Cluster Ratio : 1
- <primary index>
- <partitioning index>

**Description of Selected Node**  
 Displays information about the node that is highlighted in the diagram.

**Attributes**

Name	Value
Input RIDs	42
Index Leaf Pages	2
Matching Predicates	Filter Factor
DSN8910.EMP.EMPNO='000010'	0.0238
Scanned Leaf Pages	1
Output RIDs	1
Total Filter Factor	0.0238
Matching Columns	1





# Descriptor

Configure Subsystems | View Queries | View Workloads | View Monitors | \* SI

**Node Descriptor**

Table: EMP

- table(EMP)
  - Columns
  - Indexes
    - index(XEMP1)
      - Indexkeys
        - @ indexkey(XEMP1 key1:EMPNO)
      - index(XEMP2)
        - Indexkeys
          - @ indexkey(XEMP2 key1:WORKDEPT)
    - Tablespace
      - @ tablespace(DSN8S91E)
    - Table\_Partitions

APG Palette

Show attribute explanation Views: cost\_estimal

Name	Value
Table Name	EMP
Name	XEMP2
Creator	DSN8910
Unique Rule	D
Clustering	N
Cluster Ratio	0.7381
First Key Cardinality	8
Full Key Cardinality	8
Leaf Pages	1
Levels	2
Clustered	N
Type	2

Attribute explanation:

Save as ... | Print ... | Suggestions | Help

Search Node

```

    graph TD
      Q1((@QUERY 41)) --> Q2((@QB1 41))
      Q2 --> Q3{{@WFSCAN 42}}
      Q3 --> Q4{{@WORK FILE 42}}
      Q4 --> Q5{{@GORT 42}}
      Q5 --> Q6{{@NLJOIN 42}}
      Q6 --> Q7{{@FETCH 14}}
      Q6 --> Q8{{@FETCH 3}}
      Q7 --> Q9{{@IXSCAN 14}}
      Q7 --> Q10{{@DEPT 14.0}}
      Q8 --> Q11{{@IXSCAN 3}}
      Q8 --> Q12{{@EMP 42.0}}
      Q9 --> Q13{{@XDEPT1 14}}
      Q11 --> Q14{{@XEMP2 8}}
  
```

## Access Graph Buttons

- Open saved XML file
- Save graph as XML file
- Look at SQL text
- Overview of access path graph
- Zoom in / out
- Reverse graph vertically / horizontally
- Print graph, SQL and PLAN\_TABLE information
- Generate Report

The screenshot displays the IBM Access Path Graph (APG) interface. The main window shows a query plan graph with nodes representing various database operations. A red arrow points to the 'Save as ...' button in the Node Descriptor panel.

**Node Descriptor**

Query: QUERY  
@ query

Show attribute explanation Views: cost\_estimal

Name	Value
Type	SELECT
CPU Cost (ms)	1
CPU Cost (su)	2
Cost Category	A
Reason	
Timestamp	2008-11-24 10:44:12.63

Attribute explanation:

Buttons: Save as ... Print ... Suggestions Help

Search Node Bookmarks and History

Graph Plan Table

Project Query Access Plan Graph Advisors

**Access Path Graph (APG) Structure:**

```

graph TD
    QUERY((QUERY)) --> QB1((QB1))
    QB1 --> INLJOIN1((INLJOIN))
    INLJOIN1 --> INLJOIN2((INLJOIN))
    INLJOIN1 --> IXONLYSCAN1((IXONLYSCAN))
    INLJOIN2 --> IXONLYSCAN2((IXONLYSCAN))
    INLJOIN2 --> FETCH((FETCH))
    IXONLYSCAN2 --> DSNDX03((DSNDX03))
    IXONLYSCAN2 --> DSNDX01((DSNDX01))
    IXONLYSCAN2 --> DSNDX01_2((DSNDX01))
    IXONLYSCAN1 --> SYSCOLUMNS((SYSCOLUMNS))
  
```

**Node Details (from tooltip):**

- Node Type : Index[12]
- Correlation Name : D
- Table Name : SYSCOLUMNS
- Index Name : DSNDX01
- Creator Name : SYSIBM
- Fullkeycard : 49238
- Cluster Ratio : 0.971
- < primary index >

# Search Node

Configure Subsystems | View Queries | View Workloads | View Monitors | \* SQL Procedure | \* SQL from File | Dynamic Statement Cache Test1

**Node Descriptor**  
**Search Node**  
 Search for a specific node or a set of nodes

Search Criteria

Node type  
 Nested Loop Join

Node value  
 %  Case-sensitive  
 (% = any string, \_ ...or literals: % ? \)  Regular expression

**Find**

Search Result

- ✓ Nested Loop Join: NLJOIN
- ✓ Nested Loop Join: NLJOIN
- ✓ Nested Loop Join: NLJOIN

APG Palette

```

    graph TD
      Q[QUERY] --> QBT[QBT 0]
      QBT --> NLJOIN1[NLJOIN 0.6828]
      NLJOIN1 --> NLJOIN2[NLJOIN 1.0312]
      NLJOIN1 --> XONLYSCAN1[XONLYSCAN 1]
      NLJOIN2 --> XONLYSCAN2[XONLYSCAN 1.0108]
      NLJOIN2 --> FETCH[FETCH 1]
      XONLYSCAN2 --> DSNDX03[DSNDX03 3166]
      XONLYSCAN2 --> DSNDX01_2[DSNDX01 6419]
      XONLYSCAN1 --> XSCAN[XSCAN 1]
      XONLYSCAN1 --> DSNDX01_1[DSNDX01 3891]
      XSCAN --> DSNDX01_3[DSNDX01 4928]
      XSCAN --> SYSCOLUMNS[SYSCOLUMNS 49238.0]
    
```

Bookmarks and History

Graph | Plan Table

Project | Query | Access Plan Graph | Advisors

# Plan Table

Configure Subsystems | View Queries | View Workloads | View Monitors | \* SI X

Select Format: Short

QUERYNO	QB...	PLANNO	PARENT_Q...	PAR...	METHOD	MER...	CREATOR	TNAME	TABNO	ACC...	MATCHCOLS	ACCESSCF
114	1	1	0	0	0		DSN8910	DEPT	1	I	0	DSN8910
114	1	2	0	0	1		DSN8910	EMP	2	I	1	DSN8910
114	1	3	0	0	3				0		0	

Qt\_Query Group 1\_Query 1

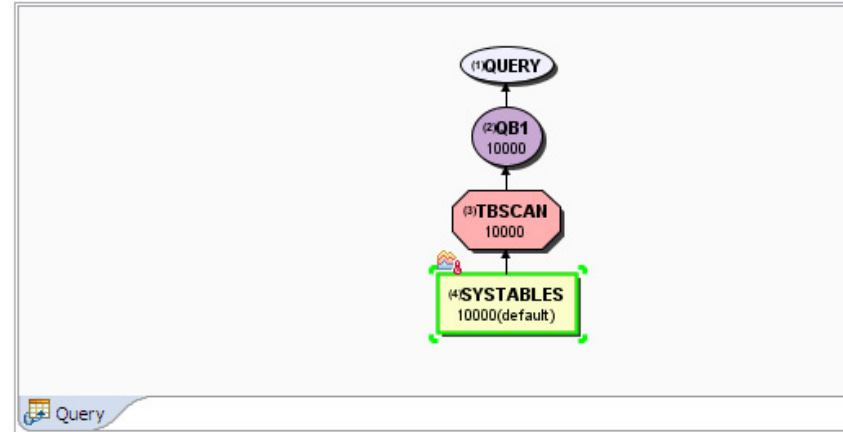
**Query Format**

Original | Transformed

Annotation to display: All

Formatted Query	Annotation	Additional Information
SELECT * FROM SYSIBM.SYSTABLES		

**Access Plan Graph**



**Advisor Recommendation Overview**

Advisor	Priority	Description
Recommendations		
Statistics Advisor	HIGH	Repair statistics problems for this query. Gather missing statistics. Recollect conflicting st...
Statistics Advisor	MAINTENANCE	Gather and recollect all of relevant statistics for this query.

- [Choose Tuning Activities...](#)
- [Generate Access Plan Report](#)
- [Query Environment Capture](#)
- [Create Plan Hint](#)

**Context**

Query Analysis Result 1

- Properties
- Capture SQL for Tuning
- SQL Category
- Workload List
- Monitor List
- SQL Results
- Advisor Detail

**Statistics Recommendation Detail**

**Recommendations**

```

RUNSTATS TABLESPACE "DSNDB06", "SYSDBASE"
INDEX("SYSIBM", "DSNDTX01",
      "SYSIBM", "DSNDTX02" KEYCARD,
      "SYSIBM", "DSNDTX03")
SHRLEVEL CHANGE REPORT YES UPDATE ALL HISTORY NONE
  
```

Previous RUNSTATS

# Improve Statistics Quality and Collection

- Provides advice on
  - Missing statistics
  - Conflicting statistics
  - Out-of-date statistics
  
- Results
  - Accurate estimated costs
  - Better query performance
  - Less CPU consumption
  - Improved maintenance window throughput

### Statistics Recommendation Detail

**Recommendations**

RUNSTATS Control Statements

```

RUNSTATS INDEX(SYSADM.PXS@SKNK FREQVAL NUMCOLS 1 COUNT 15)
SHRLEVEL CHANGE REPORT YES UPDATE ALL HISTORY NONE

RUNSTATS TABLESPACE DB4LINEI.TSLINEI
TABLE(SYSADM.LINEITEM) SAMPLE 40
COLUMN(L_SHIPMODE)
COLGROUP(L_SHIPDATE) HISTOGRAM NUMQUANTILES 25
COLGROUP(L_RECEIPTDATE) FREQVAL COUNT 15 HISTOGRAM NUMQUANTILES 25
COLGROUP(L_SHIPMODE) FREQVAL COUNT 15
COLGROUP(L_RETURNFLAG) FREQVAL COUNT 15
SORTDEVT SYSDA SORTNUM 4
INDEX(SYSADM.SXL@PKSKOKEPDSQN KEYCARD,
                    
```

**Table, index, column, and column group details**

<p><b>O_ORDERKEY</b>                      Cardinality: 4,5E7                      Uniform statistics collection time: 0001-01-01 00:00:00.0                      Uniform statistics status: conflicting                      Frequency statistics collection time: 2001-10-04 13:01:28.076475                      Frequency statistics status: conflicting                      Histogram statistics collection time: null                      Histogram statistics status: missing                      Possibly point skewed: No                      Possibly range skewed: No</p>	<p><b>O_ORDERPRIORITY</b>                      Cardinality: 5,0                      Uniform statistics collection time: 0001-01-01 00:00:00.0                      Uniform statistics status: OK                      Frequency statistics collection time: null                      Frequency statistics status: missing                      Histogram statistics collection time: null                      Histogram statistics status: missing                      Possibly point skewed: Yes                      Possibly range skewed: No</p>
---	--

**Conflicts detail**

TABLE SYSADM.LINEITEM  
 One of the frequency records (-1.0) of the L\_ORDERKEY column group is out of range [0,1]  
 Tolerance: 0.0010

The maximum frequency of the column group or column (L\_ORDERKEY), (0.0), is less than the average frequency, or 1 divided by the greater than the average unless only least-frequently occurring values are being collected.  
 Tolerance: 0.0010

**Generates RUNSTATS control statements**

**Indicates conflicting and missing statistics**

**Conflicting statistics explanation**

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## ***Statistics Advisor***

- **High**

- Recommendations of this type indicate that important statistics are missing, obsolete, or that conflicts exist among the statistics. The recommendation includes a RUNSTATS command that you can run to capture and repair the relevant statistics.

- **Medium**

- Recommendations of this type advise you to rebind the application and specify the REOPT option because the query contain host variables or parameter markers. No RUNSTATS job is provided with this type of recommendation.

- **Maintenance**

- Recommendations of this type have the lowest priority, and indicate that the catalog statistics are complete and accurate. The recommendation provides a RUNSTATS job that you might want to include periodically in your maintenance cycle to maintain the health of the relevant statistics.

## Run Statistics Advisor

- Issues RUNSTATs via SYSPROC.DSNUTILU

```

Return Code = 0
1DSNU000I 038 17:39:17.20 DSNUGUTC - OUTPUT START FOR UTILITY, UTILID = RUNSTATS
DSNU1045I 038 17:39:17.38 DSNUGTIS - PROCESSING SYSIN AS UNICODE UTF-8
0DSNU050I 038 17:39:17.38 DSNUGUTC - RUNSTATS TABLESPACE RACFDB2.IRRADU00 SHRLEVEL CHANGE REPORT YES
DSNU613I -DB91 038 17:39:17.39 DSNUSUTP - SYSTABLEPART CATALOG STATISTICS FOR RACFDB2.IRRADU00 PARTITION 0
CARD          = 0
CARDF         = 0.0E0
NEARINDREF    = 0
FARINDREF     = 0
PERCACTIVE    = 0
PERCDROP      = 0
PAGESAVE      = 0
SPACE         = 20416
SPACEF        = 2.0416E+04
PQTY          = 5000
SQTY          = 128
DSNUM         = 1
EXTENTS       = 1
DSNU610I -DB91 038 17:39:17.39 DSNUSUTP - SYSTABLEPART CATALOG UPDATE FOR RACFDB2.IRRADU00 SUCCESSFUL
DSNU604I -DB91 038 17:39:17.40 DSNUSEF2 - TABLESPACE IS EMPTY
DSNU614I -DB91 038 17:39:17.40 DSNUSUTB - SYSTABLES CATALOG STATISTICS FOR DASER.WAS
CARD          = 0
CARDF         = 0.0E0
NPAGES        = 0
NPAGESF       = 0.0E0
PCTPAGES      = 0
PCTROWCOMP    = 0
AVGROWLEN     = 0
SPACEF        = 0.0E0
DSNU610I -DB91 038 17:39:17.40 DSNUSUTB - SYSTABLES CATALOG UPDATE FOR DASER.WAS SUCCESSFUL
DSNU612I -DB91 038 17:39:17.41 DSNUSUTS - SYSTABLESPACE CATALOG STATISTICS FOR RACFDB2.IRRADU00
NACTIVE       = 360
NACTIVEF      = 3.6E+02
DSNU610I -DB91 038 17:39:17.41 DSNUSUTS - SYSTABLESPACE CATALOG UPDATE FOR RACFDB2.IRRADU00 SUCCESSFUL
DSNU620I -DB91 038 17:39:17.41 DSNUSEF2 - RUNSTATS CATALOG TIMESTAMP = 2010-02-07-17.39.17.391751
DSNU010I 038 17:39:17.42 DSNUGBAC - UTILITY EXECUTION COMPLETE, HIGHEST RETURN CODE=0

```



# Query report

TableReport - Mozilla Firefox

file:///C:/Program%20Files/IBM/OSC/TableReport2010-02-07%2008-43-38.796.html

TABLE_SPACE	NACTIVEF	PARTS	SEGSIZE	PG_SIZE						
DSNDB06.SYSPKAGE	-1.0	1	4	4						
		TABLE	CARDF	NPAGESF	TABNO	QUALROWS				
		SYSIBM.SYSPACKAGE	-1	-1	2	16.921692				
		INDEX	CLU	UR	NLEAF	NLEVEL	CR	KEYCOLNAME	COLCARDF	MCARDF
		SYSIBM.DSNKXX01	Y	U	-1	-1	0.0	LOCATION	-1	-1
								COLLID	-1	-1
								NAME	-1	-1
								VERSION	-1	-1
		SYSIBM.DSNKXX02	N	P	-1	-1	0.0	LOCATION	-1	-1
								COLLID	-1	-1
								NAME	-1	-1
								CONTOKEN	-1	-1
		COLUMN_GROUP	MCARDF							
TABLE_SPACE	NACTIVEF	PARTS	SEGSIZE	PG_SIZE						
DSNDB06.SYSPKAGE	-1.0	1	4	4						
		TABLE	CARDF	NPAGESF	TABNO	QUALROWS				
		SYSIBM.SYSPACKSTMT	-1	-1	1	6.3061666				
		INDEX	CLU	UR	NLEAF	NLEVEL	CR	KEYCOLNAME	COLCARDF	MCARDF
		SYSIBM.DSNKSX01	Y	U	-1	-1	0.0	LOCATION	-1	-1
								COLLID	-1	-1
								NAME	-1	-1
								CONTOKEN	-1	-1
								SEQNO	-1	-1

Looks like someone forgot to run RUNSTATS...

# Table Report

TABLE_SPACE	NACTIVEF	PARTS	SEGSIZE	PG_SIZE					
DB4ORDER.TSORDER	43200.0	60	0	4					
		TABLE	CARDF	NPAGESF	TABNO	QUALROWS			
		SYSADM ORDER	1500000	42417	1	57114.59			
		INDEX	CLU	UR	NLEAF	NLEVEL	CR	KEYCC	
		SYSADM PXO@OKODCKSPOP	Y	U	15954	3	1.0	O_ORI	
								O_ORD	
								O_CU	
								O_SHIP	
								O_ORDE	
		COLUMN_GROUP	MCARDF						
		O_CLERK,O_CUSTKEY	1499815.0						
		O_ORDERKEY,O_ORDERDATE	1500000.0						
		O_CLERK,O_CUSTKEY,O_ORDERDATE	1500000.0						
		O_ORDERKEY,O_ORDERDATE,O_CUSTKEY	1500000.0						
		O_CLERK,O_CUSTKEY,O_ORDERDATE,O_ORDERSTATUS	1500000.0						
		O_ORDERKEY,O_ORDERDATE,O_CUSTKEY,O_SHIPPRIORITY	1500000.0						
TABLE_SPACE	NACTIVEF	PARTS	SEGSIZE	PG_SIZE					
DB4LINEI.TSLINEI	174420.0	60	0	4					
		TABLE	CARDF	NPAGESF	TABNO	QUALROWS			
		SYSADM LINEITEM	4254339	141743	2	1418111.0			
		INDEX	CLU	UR	NLEAF	NLEVEL	CR	KEYCC	

# Index Report

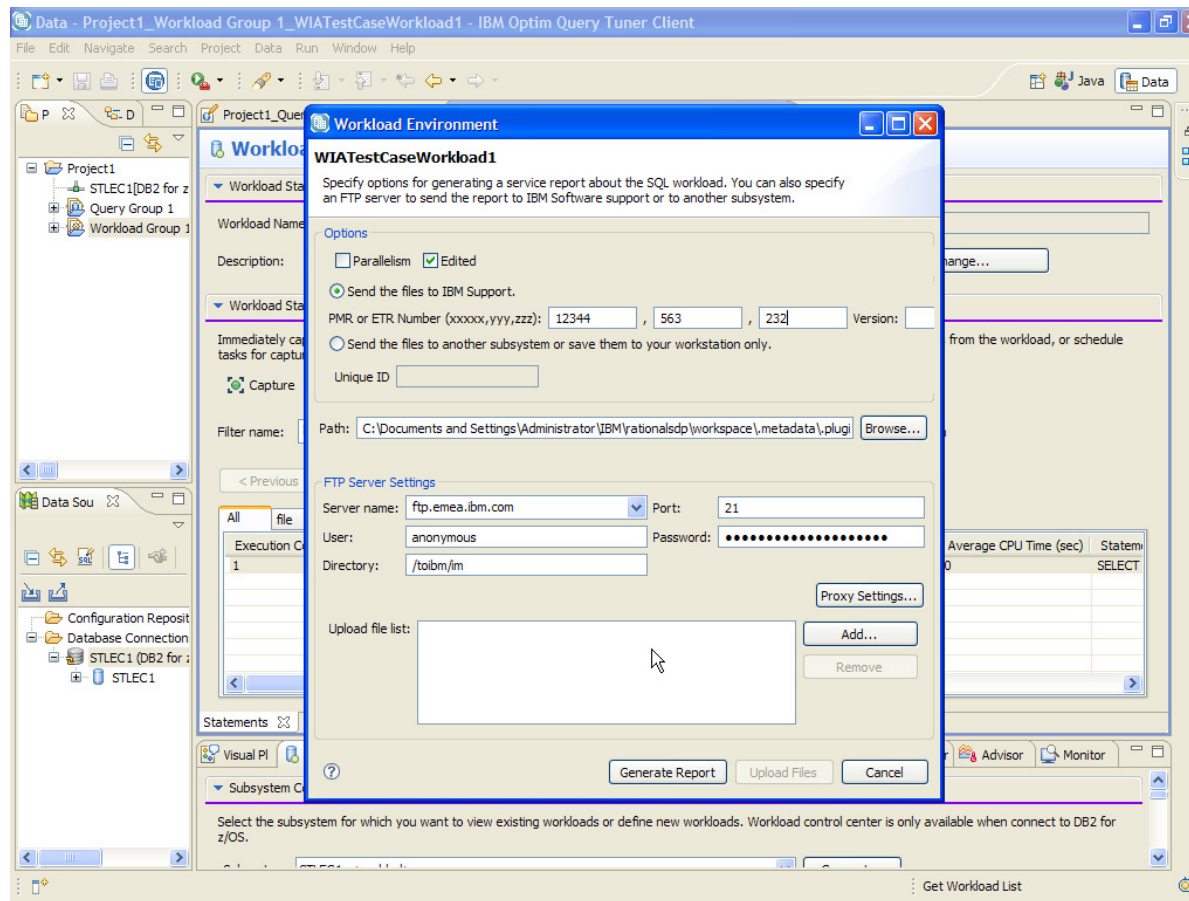
QB:1 PLAN:1					
TABLE	CORR_NAME				
SYSADM ORDER	O				
	INDEX	INDEX_ONLY	ONE_FETCH	EQUAL_UNIQUE	GB_OB_DISTINCT
	SYSADM PXO@OKODCKSPOP	N	N	N	N
	KEYCOL	ORDER	COLUMN_CARD	MULTI_COL_CARD	PRED
	O_ORDERKEY	ASCENDING	4.5E7	4.5E7	L.L_ORDERKEY=O.O_ORDERKEY (FF:2.2222220508183455E-8)
	O_ORDERDATE	ASCENDING	2304.0	-1.0	O.O_ORDERDATE<=(EXPR) (FF:0.03333333507180214)
	O_CUSTKEY	ASCENDING	3000000.0	-1.0	
	O_SHIPPRIORITY	ASCENDING	1.0	-1.0	
	O_ORDERPRIORITY	ASCENDING	5.0	4.5E7	O.O_ORDERPRIORITY IN ('1-URGENT','2-HIGH') (FF:0.3999999761581421)
	INDEX	INDEX_ONLY	ONE_FETCH	EQUAL_UNIQUE	GB_OB_DISTINCT
	SYSADM UXO#CLOKOD	N	N	N	N
	KEYCOL	ORDER	COLUMN_CARD	MULTI_COL_CARD	PRED
	O_CLERK	ASCENDING	30000.0	30000.0	
	O_ORDERKEY	ASCENDING	4.5E7	-1.0	L.L_ORDERKEY=O.O_ORDERKEY (FF:2.2222220508183455E-8)
	O_ORDERDATE	ASCENDING	2304.0	4.5E7	O.O_ORDERDATE<=(EXPR) (FF:0.03333333507180214)
	INDEX	INDEX_ONLY	ONE_FETCH	EQUAL_UNIQUE	GB_OB_DISTINCT
	SYSADM UXO@CKOKODSP	N	N	N	N
	KEYCOL	ORDER	COLUMN_CARD	MULTI_COL_CARD	PRED
	O_CUSTKEY	ASCENDING	3000000.0	3000000.0	
					L.L_ORDERKEY=O.O_ORDERKEY

# Predicate Report

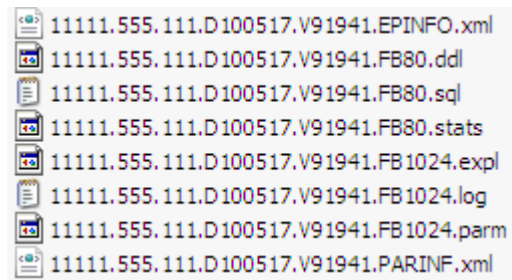
TABLE	TABNO	COLNAME	COLNO	COLCARDF	HIGH2KEY	LOW2KEY	MAX_FREQ	TYPE	OTH_TABLE	OTH_TABNO	OTH_COLN	
SYSADM LINEITEM	2	L_ORDERKEY	1	1063455	59494	2	1.6453554829551663E-6	EQUAL	SYSADM ORDER	1	O_ORDER	
		L_SUPPKEY	3	10112	9999	2		EQUAL	SYSADM SUPPLIER	3	S_SUPPK	
									RANGE		0	VALUE
		L_RETURNFLAG	9	3	N	N		EQUAL		0	VALUE	
SYSADM ORDER	1	O_ORDERKEY	1	1500000	5999975	2	0.006665999999999999	EQUAL	SYSADM LINEITEM	2	L_ORDER	
		O_ORDERDATE	5	2304	1998-08-01	1992-01-02	4.14E-4	RANGE		0	VALUE	
									RANGE		0	VALUE
SYSADM SUPPLIER	3	S_SUPPKEY	1	10000	9999	2	0.9998999999999999	EQUAL	SYSADM LINEITEM	2	L_SUPPK	
									RANGE		0	VALUE
		S_NATIONKEY	4	25	23	1	0.0421	IN		0	VALUE	

# Environment Capture Facilitates Collaboration

- Enable environment reproduction
- Speed up service process



## Created Files



11111.555.111.D100517.V91941.EPINFO.xml  
11111.555.111.D100517.V91941.FB80.ddl  
11111.555.111.D100517.V91941.FB80.sql  
11111.555.111.D100517.V91941.FB80.stats  
11111.555.111.D100517.V91941.FB1024.expl  
11111.555.111.D100517.V91941.FB1024.log  
11111.555.111.D100517.V91941.FB1024.parm  
11111.555.111.D100517.V91941.PARINF.xml

# Contents of Eclipse-based Query Tuning offerings

	Data Studio	InfoSphere Optim Query Tuner for z/OS	Infosphere Optim Query Workload Tuner for z/OS
Queries from all sources	✓	✓	✓
Reports	✓	✓	✓
Query Formatter	✓	✓	✓
Access Plan Graph	✓	✓	✓
Query Statistics Advisor	✓	✓	✓
Query Annotation		✓	✓
Visual Plan Hint		✓	✓
Query Index Advisor		✓	✓
Query Advisor		✓	✓
Access Path Advisor		✓	✓
Workload Statistics Advisor			✓
Workload Index Advisor			✓
Workload Query Advisor			✓