

Optimize your SQL workloads for greater performance and reduced costs



Saghi Amirsoleymani
WW Solution Architect

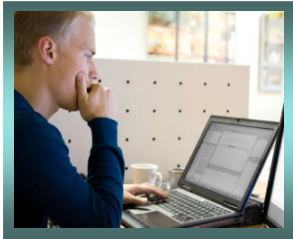
Technical Enablement Specialist

amirsole@us.ibm.com

Agenda

- The challenges of performance tuning
- DB2 Analytics Accelerator for z/OS Overview
- Optimizing the workload with Optim Query Workload Tuner
 - How to improve accelerated queries/workload
 - Additional Benefits for non-accelerated queries/workload
- Summary

Performance tuning challenges across the organization



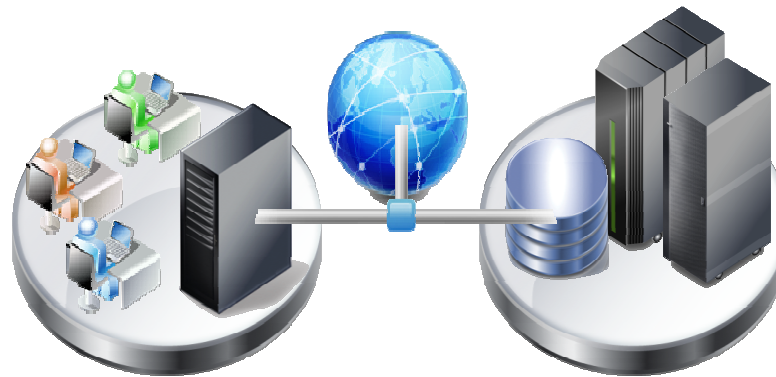
"I don't have time to hone my SQL skills. I need to focus on developing core application functionality."

Application Developer



"It is very challenging to aggregate performance data across our complex data environment."

DBA



"I don't understand why our developers aren't focused on creating better performing SQL."

"I need to get my business results fast and accurate. What's going on?"

LOB Manager



IT Manager

"Performance problems seem to appear without warning and deep technical skills are hard to find."

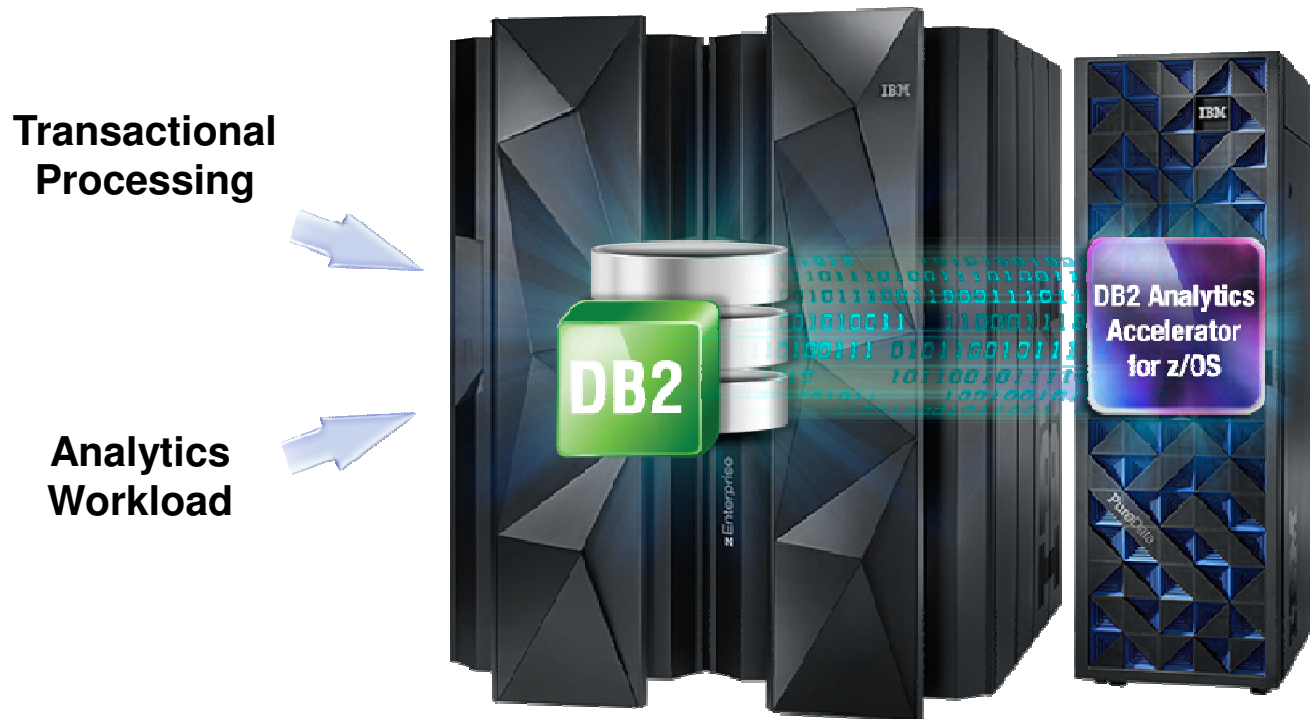


QA Manager

"We can't adequately test for peak workload since we don't have enough human or IT resources."

IBM zEnterprise and DB2 Analytics Accelerator

Driving revolutionary change



The hybrid computing platform on zEnterprise

- *Supports transaction processing and analytics workloads concurrently, efficiently and cost-effectively*
- *Delivers industry leading performance for mixed workloads*

DB2 Analytics Accelerator and DB2 for z/OS

A self-managing, hybrid workload-optimized database management system that runs query workloads in the most efficient way, so that queries are executed in the optimal environment for greatest performance and cost efficiency

DB2 Analytics Accelerator

What customers are saying. . .

IBM says queries can run up to 2000x faster with the Accelerator, we had one query run 4800x faster – from 4 hours to 3 seconds

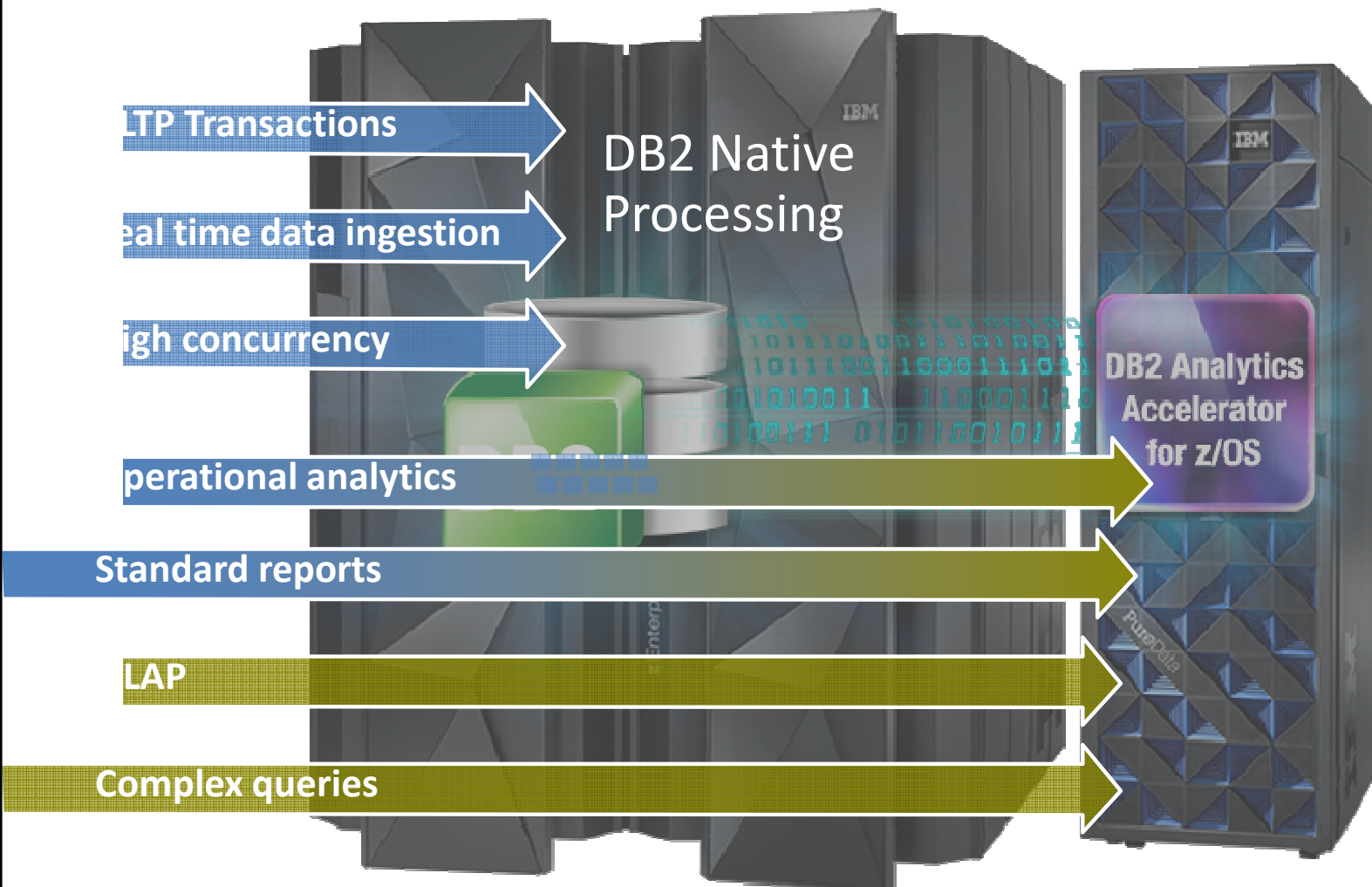
Our users call DB2 Analytics Accelerator the Magic Box

It is unbelievable that there are still DB2 z/OS shops out there without IBM DB2 Analytics Accelerator

Whatever you paid for this, it was well worth it!

Without acceleration, queries would take from several minutes to never returning – with acceleration, queries return in less than 1 minute (usually 15 seconds)

DB2 11 for z/OS and IBM DB2 Analytics Accelerator



- CPU savings benefit DB2 query workloads including short running operational analytics, and reporting

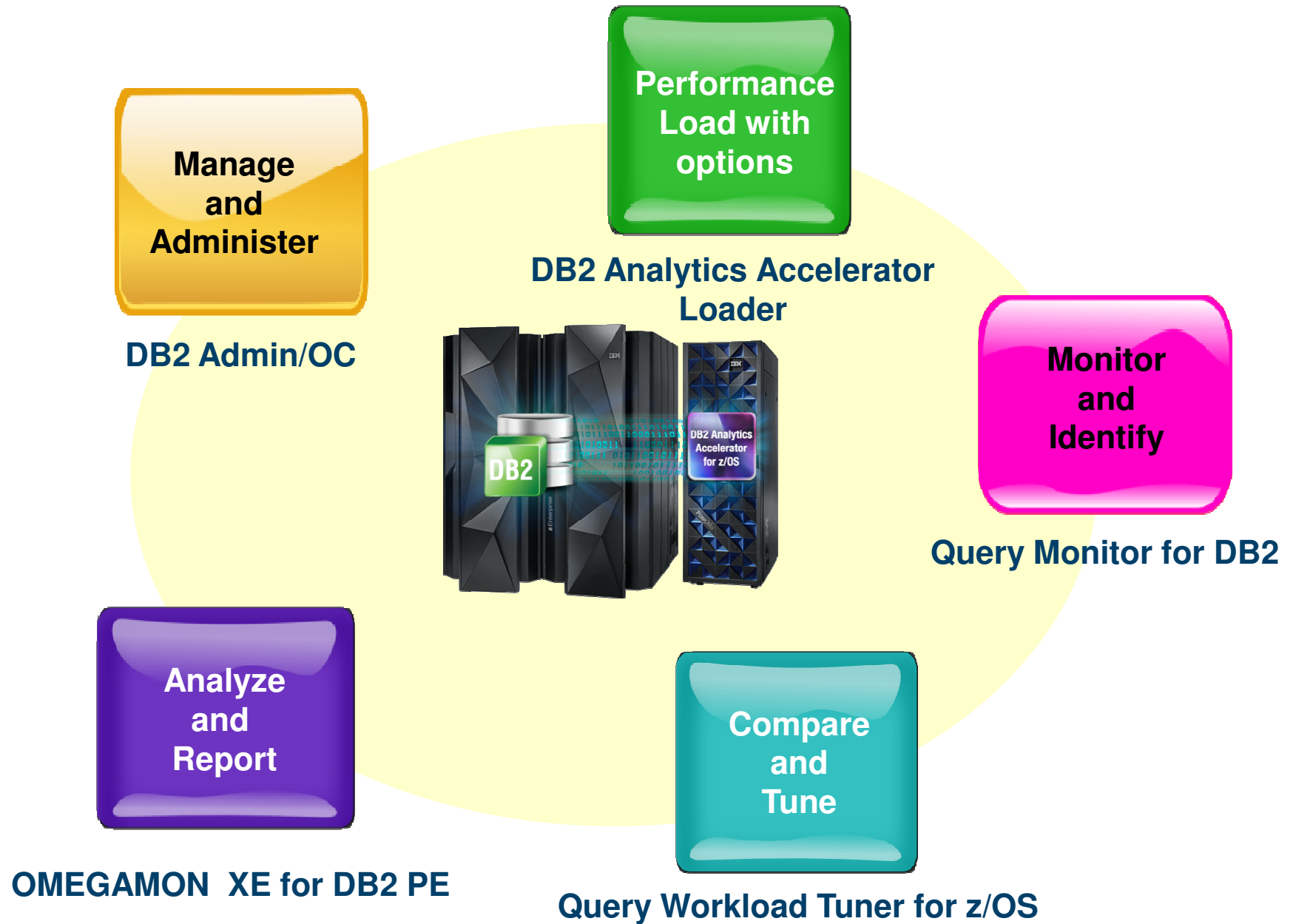
- DB2 Analytics Accelerator benefits data warehouse, OLAP, and complex query workloads

How IBM DB2 tools can maximize Accelerator value

- Customers want to learn more about their investment in the Accelerator and maximize its use in their environment
- Three different areas where DB2 tools can provide value
 - Assessment
 - Do I have a workload that would benefit from the Accelerator?
 - Optimization
 - Can I optimize the workload to take advantage of the Accelerator?
 - Administration
 - Can I manage the Accelerator more effectively?



IBM DB2 Tools: Maximizing your Analytics Accelerator Investment



Value of Tuning for Accelerated Workloads

- Can I determine which queries would benefit from being routed to the Accelerator?

- Which objects are candidates for optimization?
 - Do I have the right set of objects for query consideration?
 - How do I know which objects to add/delete?

- Which queries are eligible or ineligible for Accelerator consideration?
 - How can I improve a query so that it is routed to the Accelerator?
 - Can a query be rewritten to take advantage of the Accelerator?

- If I make changes to the workload:
 - How do I know if there has been improvement?
 - Can I get an estimate of the savings before and after a change without incurring additional costs?

Expert-Enabled Query Tuning Out of the Box

- **Identify query candidates from numerous sources**
 - DB2 catalog
 - Dynamic statement cache
 - Data Studio hot spots
 - Query or performance monitors

- **Facilitate analysis**
 - Query formatting
 - Query annotation
 - Access path visualization and annotation

- **Get expert tuning advice**
 - Improve query design
 - Improve statistics quality
 - Improve database design

 **Improve accelerated queries**

Query Tuner Workflow Assistant

Review Access Plan Graph

View the graph of the access plan for your query. If an advisor issued a warning for an operation in the access plan, an icon of that advisor type is shown above the node that represents the operation in the graph. Hover over or right-click a node for details.

Database connection: ✔ TUTORIAL_ZOS

Overview of Diagram

Description of Selected Node

Displays information about the node that is highlighted in the diagram.

```

graph TD
    QUERY[QUERY] --> QB1[QB1 6584]
    QB1 --> NLJOIN[NLJOIN 8584.5588]
    NLJOIN --> FETCH1[FETCH 1]
    NLJOIN --> QB2[QB2 8]
    NLJOIN --> FETCH2[FETCH 42]
    QB2 --> XSCAN1[XSCAN 1]
    QB2 --> XSCAN2[XSCAN 9.3333]
    QB2 --> EMP[EMP 42]
    XSCAN1 --> XDEPT1[XDEPT1 14]
    XSCAN2 --> XDEPT2[XDEPT2 9]
    EMP --> XEMP1[XEMP1 42]
    
```

Name	Value
Output Cardinality	8.0
Cumulative Total Cost	N/A
Cumulative IO Cost	N/A
Cumulative CPU Cost	N/A
Query Block Number	2
Type	CORSUB
Context	PREDICATE
Parent Query Block Number	1

Attributes

Search for Node

Diagram: PLAN_TABLE

Optimizing the Selection, Tuning and Access Plan Analysis of Accelerated Workloads

Workload Analytics Accelerator Advisor

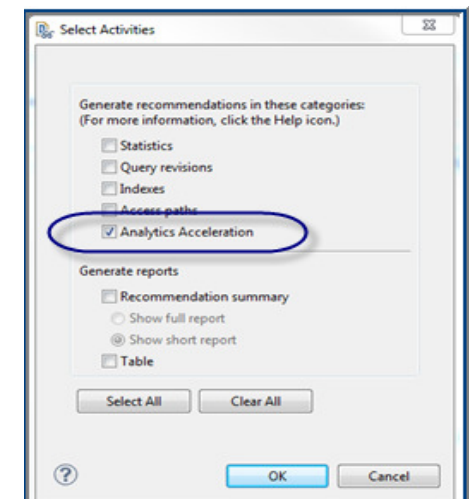
- Identify candidate queries and tables to be routed to the accelerator
- Identify candidate tables to be routed to the accelerator
- Implement advisor-based tuning recommendations for mixed workloads of accelerated and un-accelerated queries
- Diagram accelerated queries in Access Plan Graphs
- Integrates with Query Monitor and OMPE for capturing query workloads for complete analysis
- Enable “what if” analysis



Benefits

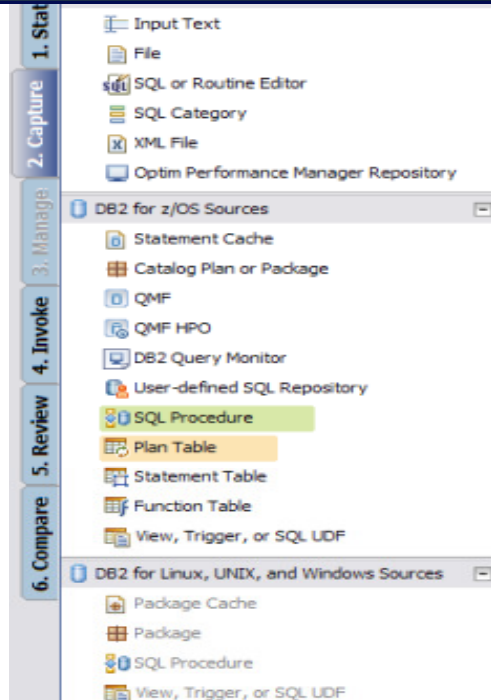
- Shorten the process of selecting tables to be accelerated
- Visualize access paths of accelerated queries
- Increase productivity by working with accelerated queries through a unified interface
- Increase overall system capacity

- Demo Video <http://youtu.be/pQYMRHJW7NU>

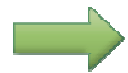
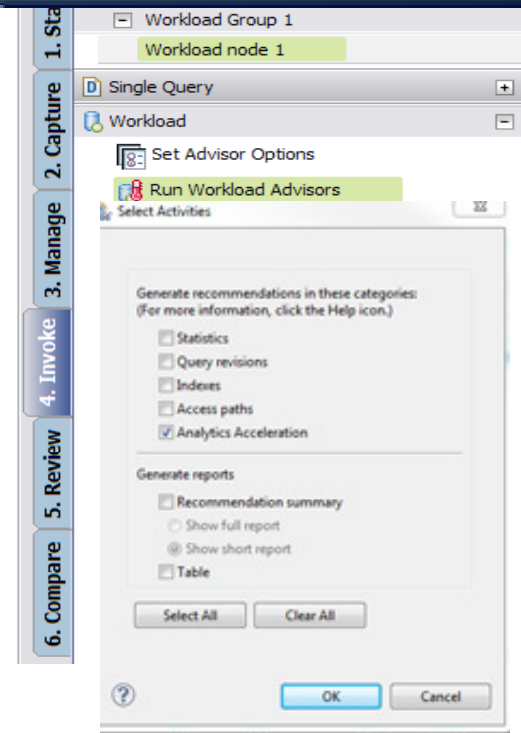


Streamlined Performance Analysis

1 Define or select a workload



2 Execute Advisors



3 Drill Down into advice

Summary - 1 Initial



Recommendation	Number	Description
▲ Shown		
Statistics	1	Repair statistics problems for this query. Gather missing statistics...
Query revision	2	Provide a join predicate based on the referential constraint betw...
Query revision	3	Provide a predicate on column WORKDEPT.
Access path	4	Avoid reading all index keys on an index scan (QBLOCKNO = 1, P...
Index	5	Index recommendations found.



4 Validate improvement

Name	Summary Status	Owner	Execution Time
WorkloadWithTypicalStats	ANALYZING	B3OSC12	CPU time: 97.32 (second...
WorkloadTunedWithStatsAdvisor	ANALYZING	B3OSC12	CPU time: 53.19 (second...
WorkloadTunedWithIndexAdvisor	ANALYZING	B3OSC07	CPU time: 40.67 (second...
AbsoluteCPUTimeExceptionMonitor	ENABLED/STARTED	SYSADM	N/A
NormalMonitor	ENABLED/STARTED	SYSADM	N/A

Gather Queries and Workloads

DB2

- Plan table
- Statement table
- Catalog plan or package
- Statement cache

QMF and QMF HPO

DB2 Query Monitor

OMEGAMON XE for DB2

File, text, or exported workload

User defined SQL Repository



Define or select workload

1. Status

2. Capture

3. Manage

4. Invoke

5. Review

6. Compare

Non-DB2 Sources

- Input Text
- File
- SQL or Routine Editor
- SQL Category
- XML File
- Optim Performance Manager Repository

DB2 for z/OS Sources

- Statement Cache
- Catalog Plan or Package
- QMF
- QMF HPO
- DB2 Query Monitor
- User-defined SQL Repository
- SQL Procedure
- Plan Table
- Statement Table
- Function Table
- View, Trigger, or SQL UDF

DB2 for Linux, UNIX, and Windows Sources

- Package Cache
- Package
- SQL Procedure
- View, Trigger, or SQL UDF

Customize Query Workloads

Filtering Options

Filter name: Maximum number of statements to capture: SYSADM

Use the SYSPROC.OPT_RUNSQL stored procedure to run the EXPLAIN statement
 Exclude dynamic queries issued by the capture process

Name	Operator	Value	Description
PRIMAUTH	=		The primary authorization ID that did the initial PREPARE of the statement.
CURSQLID	=		The CURRENT SQLID that did the initial PREPARE of the statement.
STMT_TOKEN	=		The statement token; Provide this value as an identification string.
PROGRAM_NAME	=	DSNTEP4	The name of the package or DBRM that performed the initial PREPARE for the statement.
STMT_TEXT	LIKE		The text of the SQL statement.
COLLID	=		The collection ID.
SCHEMA	=		The value of the CUF
BIND_QUALIFIER	=		The BIND qualifier. F
BIND_ISO	=		The value of the ISOI
BIND_CDATA	=		The value of the CUF
BIND_DYNRL	=		The value of the DYN
BIND_DEGRE	=		The value of the CUF
BIND_SQLRL	=		The value of the CUF
BIND_CHOLD	=		The value of the WIT
STAT_EXECB	=		The number of time:
STAT_GPAGB	=		The number of getp:
STAT_SYNRB	=		The number of syncl
STAT_WRITB	=		The number of buffe
STAT_EROWB	=		The number of rows
STAT_PROWB	=		The number of rows
STAT_SORTB	=		The number of sorts
STAT_INDXB	=		The number of inde
STAT_RSCNB	=		The number of table
STAT_PGRPB	=		The number of paral
STAT_RIDLMTB	=		The number of time:
STAT_RIDSTORB	=		The number of time:
AVG_STAT_GPAG	=		The average number
AVG_STAT_SYNR	=		The average number
AVG_STAT_WRIT	=		The average number
AVG_STAT_EROW	=		The average number
AVG_STAT_PROW	=		The average number
AVG_STAT_SORT	=		The average number
AVG_STAT_INDX	=		The average number
AVG_STAT_RSCN	=		The average number
AVG_STAT_PGRP	=		The average number
AVG_STAT_RIDLMT	=		The average number
AVG_STAT_RIDSTOR	=		The average number
STAT_ELAP	=		The accumulated ela
STAT_CPU	=		The accumulated CP

Captured Statements

Step 3: Tune a single statement, or create a query workload from the captured statements and then tune the new query workload.

The number of captured statements is 37.

STMT_ID	STMT_TEXT	STMT_TOKEN	COLLID	PROGR
233	SELECT PS_SUPPLYCOST FROM TPC.PARTSUPP WHERE PS_SUPPLYCOST BETWEEN 600 A...	-	DSNDYNAMICSQLCACHE	DSNTE
243	SELECT O_YEAR, SUM(CASE WHEN NATION = 'UNITED KINGDOM' THEN VOLUME ELSE 0 ...	-	DSNDYNAMICSQLCACHE	DSNTE
242	SELECT SUPP_NATION, CUST_NATION, L_YEAR, SUM(VOLUME) AS REVENUE FROM (SELE...	-	DSNDYNAMICSQLCACHE	DSNTE
161	SELECT C_CUSTKEY FROM TPC.CUSTOMER WHERE C_ADDRESS IN ('BJ', 'SH', 'KR') FOR FE...	-	DSNDYNAMICSQLCACHE	DSNTE
241	SELECT SUM(L_EXTENDEDPRI * L_DISCOUNT) AS REVENUE FROM TPC.LINEITEM WHER...	-	DSNDYNAMICSQLCACHE	DSNTE
249	SELECT 100.00 * SUM(CASE WHEN P_TYPE LIKE 'PROMO%' THEN L_EXTENDEDPRI * (1 - ...	-	DSNDYNAMICSQLCACHE	DSNTE
239	SELECT O_ORDERPRIORITY, COUNT(*) AS ORDER_COUNT FROM TPC.ORDER WHERE O_O...	-	DSNDYNAMICSQLCACHE	DSNTE
255	SELECT S_NAME, COUNT(*) AS NUMWAIT FROM TPC.SUPPLIER, TPC.LINEITEM L1, TPC.O...	-	DSNDYNAMICSQLCACHE	DSNTE
227	SELECT PS_SUPPLYCOST FROM TPC.PARTSUPP WHERE PS_SUPPLYCOST BETWEEN 600 A...	-	DSNDYNAMICSQLCACHE	DSNTE
260	SELECT O_ORDERPRIORITY, COUNT(*) FROM TPC.ORDER, TPC.LINEITEM WHERE O_ORDE...	-	DSNDYNAMICSQLCACHE	DSNTE
252	SELECT SUM(L_EXTENDEDPRI) / 7.0 AS AVG_YEARLY FROM TPC.LINEITEM, TPC.PART ...	-	DSNDYNAMICSQLCACHE	DSNTE
247	SELECT L_SHIPMODE, SUM(CASE WHEN O_ORDERPRIORITY = '1-URGENT' OR O_ORDERP...	-	DSNDYNAMICSQLCACHE	DSNTE
257	SELECT * FROM TPC.LINEITEM L, TPC.ORDER O, TPC.SUPPLIER S WHERE L.L_RECEIPTDAT...	-	DSNDYNAMICSQLCACHE	DSNTE
278	SELECT S_SUPPKEY, S_NAME, SUM(L_EXTENDEDPRI*(1-L_DISCOUNT)) AS REVENUE FRO...	-	DSNDYNAMICSQLCACHE	DSNTE

- Accelerate analysis, reduce downtime

2

Execute Advisors

Query Tuner Workflow Assistant

Run Workload Advisors

Run advisors to get recommendations for tuning the workload, or right-click a statement and run single-query advisors on it.

Database connection: TUTORIAL_ZOS

Workload Status and Description

Select What To Run...

Select Activities

Generate recommendations in these categories:
(For more information, click the Help icon.)

- Statistics
- Query revisions
- Indexes
- Access paths
- Analytics Acceleration

Generate reports

- Recommendation summary
- Show full report
- Show short report
- Table

Select All Clear All

OK Cancel

STAT_EXEC	SOURCE	STAT_EL	AVG_STAT_GPAG	STI				
5	CACHE	20.3560	0.000000	SEL				
5	CACHE	122.8508	296.000000	SEL				
5	CACHE	47.0441	2,952.000000	SEL				
5	CACHE	0.0024	3.000000	SEL				
5	CACHE	27.1646	0.000000	SEL				
5	CACHE	433.5364	100.000000	SEL				
5	CACHE	38.9916	2,662.000000	SEL				
9	CACHE	6.8656	66.444440	SEL				
9	CACHE	43.5331	0.000000	SEL				
11	CACHE	118.3904	1,869.000000	SEL				
11	CACHE	165.8415	296.000000	SEL				
11	CACHE	26.9447	0.000000	SEL				
11	CACHE	127.6104	0.000000	SEL				
11	CACHE	30.397251	2.763386	2.375510	0.215955	0	0.000000	SEL
11	CACHE	48.690983	4.426453	0.008926	0.000811	0	0.000000	SEL
13	CACHE	150.829834	11.602295	7.886175	0.606629	48529	3,733.000000	SEL
13	CACHE	285.119202	21.932247	4.574241	0.351865	3942	303.230770	SEL
16	CACHE	0.219881	0.013743	0.036937	0.002309	96	6.000000	SEL
16	CACHE	0.322130	0.020133	0.019210	0.001201	0	0.000000	SEL
16	CACHE	11.466077	0.716697	0.000000	0.007557	0	0.000000	SEL

- **Statistics**

- Get recommendations on the best statistics to capture to influence access path selection

- **Query**

- Get recommendations regarding how to rewrite the query for better efficiency

- **Index**

- Get recommendations on indexes changes that can reduce database scans

- **Analytics Accelerator**

- Get recommendations on optimizing and managing accelerated analytic queries and applications

3 Drill down to advice for accelerated workload

- Determine tables to be routed the Accelerator
- Simplify use
 - Consolidate tables, queries to provide a single recommendation
 - Enable what-if analysis
 - Run immediately or save

Estimated cost savings from query acceleration (sec): 2,042,249.71
 Cumulative CPU time (STAT CPU) savings from Query Offloading (sec): 1,704.02

Buttons: Add Recommended Tables to Accelerator | Test Candidate Analytics Acceleration | Tables Recommended for Accelerator

Table	Creator	On Accelerator?	Recommendation	Cardinality	References To Table	Cumulative Estimated Cost	IUDM Statement ...	NPAGES	Partitioning Method
ORDER	TPC	No	Add to Accelerator	1,500,000.00	21	74,986,426.78	0	16,547.00	-
LINEITEM	TPC	No	Add to Accelerator	6,001,215.00	33	2,001,885,689.53	0	79,771.00	R
CUSTOMER	TPC	No	Add to Accelerator	150,000.00	12	46,630,692.38	0	2,954.00	-
REGION	TPC	No	Add to Accelerator	5.00	6	1,206,397.04	0	1.00	-
PART	TPC	No	Add to Accelerator	200,000.00	9	1,966,652,211.39	0	2,548.00	-
NATION	TPC	No	Add to Accelerator	25.00	14	28,712,771.69	0	1.00	-
SUPPLIER	TPC	No	Add to Accelerator	10,000.00			0	385.00	-
PARTSUPP	TPC	No	Add to Accelerator	1,000,000.00			0	11,233.00	-

Context menu options:

- Show SQL Statements That Reference the Highlighted Table...
- List Accelerators Hosting the Selected Table...
- Add Recommended Tables to Accelerator
- Test Candidate Analytics Acceleration
- Export...

Eligible Statements | Ineligible Statements | Rewritable Statements

Statement Text	Execution Count	Estimated Cost	Total Estimated Cost	STAT_CPU	AVG_STAT_CPU	STAT_ELAP	AVG_STAT_ELAP
SELECT S_NAME ,COUNT(*) AS NUMWAIT FROM TPC.SUPPLIER ,TPC.LI...	2	11,859,559.26	23,719,118.52	71.15	35.57	75.38	37.65
SELECT N_NAME ,SUM(L_EXTENDEDPRI * (1 - L_DISCOUNT)) AS REVE...	2	280,655.95	561,311.91	4.94	2.47	14.45	7.22
SELECT P_BRAND ,P_TYPE ,P_SIZE ,COUNT(DISTINCT PS_SUPPKEY) AS S...	2	48,676.03	97,352.06	2.16	1.08	3.58	1.79
SELECT S_SUPPKEY ,S_NAME ,SUM(L_EXTENDEDPRI*(1-L_DISCOUNT)...	1	125,319.58	125,319.58	1.56	1.56	3.76	3.76
SELECT 100.00 * SUM(CASE WHEN P_TYPE LIKE 'PROMO%' THEN L_EXT...	2	190.383.58	380.767.16	5.10	2.55	13.17	6.58

3

Drill down to advice for accelerated workload

Show Tables referenced by statement

The screenshot displays the IBM DB2 Performance Advisor interface. At the top, there are tabs for 'Eligible Statements', 'Ineligible Statements', and 'Rewritable Statements'. The main area shows a list of SQL statements with columns for 'Statement Text', 'Execution Count', and 'Estimated Cost'. A callout window titled 'Tables Referenced by the Selected SQL Statements' is overlaid on the right, showing a table with columns: Table, Creator, On Accelerator?, Recommendation, and Accelerators. Below the main list, there is a table with columns: S_STAT_ELAP, Package, COLLID, STMTNO, and Reason for Ineligibility. A second callout window titled 'Rationale' points to the 'Reason for Ineligibility' column. At the bottom, another table provides a detailed view of the ineligibility reasons, including columns for 'Execution Count', 'Estimated Cost', 'Total Estimated Cost', 'STAT_CPU', 'AVG_STAT_CPU', 'STAT_ELAP', 'AVG_STAT_ELAP', 'Package', 'COLLID', 'STMTNO', and 'Reason for Ineligibility'. A third callout window titled 'Recommendation and rationale' points to the 'Reason for Ineligibility' column in this bottom table.

Table	Creator	On Accelerator?	Recommendation	Accelerators
ORDER	TPCD	No	Add to Accelerator	-
LINEITEM	TPCD	No	Add to Accelerator	-
REGION	TPCD	No	Add to Accelerator	-
PARTSUPP	TPCD	No	Add to Accelerator	-
SUPPLIER	TPCD	No	Add to Accelerator	-
NATION	TPCD	No	Add to Accelerator	-
PART	TPCD	No	Add to Accelerator	-
CUSTOMER	TPCD	No	Add to Accelerator	-

S_STAT_ELAP	Package	COLLID	STMTNO	Reason for Ineligibility
1.73	-	-	0	The query is not read-only.
0.76	-	-	0	DB2 classified the query as a short-running query, or DB2 determined that sending the query to an accelerator server provided no performance adva...
0.15	-	-	0	The query contains a reference to a recursive common table expression.
0.51	-	-	0	The query contains an unsupported expression. The text of the expression is in QI_DATA.
0.14	-	-	0	DB2 classified the query as a short-running query, or DB2 determined that sending the query to an accelerator server provided no performance adva...
0.04	-	-	0	The query is not read-only.
~0.00	-	-	0	DB2 classified the query as a short-running query, or DB2 determined that sending the query to an accelerator server provided no performance adva...
~0.00	-	-	0	The query is not read-only.
~0.00	-	-	0	DB2 classified the query as a short-running query, or DB2 determined that sending the query to an accele...
0.51	-	-	0	The query is not read-only.
~0.00	-	-	0	The query contains an unsupported expression. The text of the expression is in OI_DATA.

Execution Count	Estimated Cost	Total Estimated Cost	STAT_CPU	AVG_STAT_CPU	STAT_ELAP	AVG_STAT_ELAP	Package	COLLID	STMTNO	Reason for Ineligibility
1	51,731.87	51,731.87	1.58	1.58	1.73	1.73	-	-	0	The query is not read-only.
1	5,836.92	5,836.92	0.04	0.04	0.04	0.04	-	-	0	The query is not read-only.
1	2.85	2.85	~0.00	~0.00	~0.00	~0.00	-	-	0	The query is not read-only.
1	29,880.64	29,880.64	0.30	0.30	0.51	0.51	-	-	0	The query is not read-only.

4

Test Candidate Analytics Acceleration

Query Tuner Workflow Assistant

Workload Test Candidate Analytics Acceleration

Invoke Workload Test Candidate Analytics Acceleration

Database connection: labec414 - sysadm - SQLID=sysadm (DB2 for z/OS V10 (New-Function Mode))

Candidate Tables

Table	Creator	On Accelerator?	Cardinality	References To Table	Cumulative CPU Cost	IUDM Statement Count	NPAGES	Partitioning Method
<input type="checkbox"/> NATION	TPCD	No	25.00	9	4,066,481.84	0	1.00	-
<input checked="" type="checkbox"/> CUSTOMER	TPCD	No	60,000.00	9	4,933,702.88	0	782.00	-
<input checked="" type="checkbox"/> ORDER	TPCD	No	425,464.00	17	9,121,179.68	0	3,276.00	R
<input checked="" type="checkbox"/> LINEITEM	TPCD	No	1,702,126.00	21	66,291,883.40	0	18,366.00	R
<input checked="" type="checkbox"/> SUPPLIER	TPCD	No	10,000.00	11	4,117,583.18	0	226.00	-
<input type="checkbox"/> PART	TPCD	No	200,000.00	8	61,243,899.59	0	1,934.00	-
<input type="checkbox"/> PARTSUPP	TPCD	No	173,217.00	5	410,996.36	0	1,195.00	-
<input type="checkbox"/> REGION	TPCD	No	5.00	3	176,686.48	0	1.00	-

Test before deployment

- Utilize virtual capabilities built into the DB2 engine run subset of candidate tables

4

Validate Analytics Acceleration Result

View analysis summary

Less CPU savings

Fewer Eligible Statements

Database connection: **labc414 - sysadm - SQLID=sysadm (DB2 for z/OS V10 (New-Function Mode))**

Estimated CPU savings from query acceleration (ms): **17,078,753.55**
 Cumulative CPU time (STAT CPU) savings from Query Offloading (sec): **216.25**

Table	Creator	On Accelerator?	Recommendation	Cardinality	References To Table	Cumulative CPU Cost	IUDM Statement Count	NPAGES	Partitioning M...
SUPPLIER	TPCD	No	Add to Accelerator	10,000.00	11	59,220,148.50	0	226.00	-
ORDER	TPCD	No	Add to Accelerator	425,464.00	17	130,688,402.53	0	3,276.00	R
CUSTOMER	TPCD	No	Add to Accelerator	60,000.00	9	70,277,941.79	0	782.00	-
LINEITEM	TPCD	No	Add to Accelerator	1,702,126.00	21	1,046,663,550.64	0	18,366.00	R

Statement Text	Execution Count	Estimated CPU Cost	Total Estimated CPU Cost	STAT_CPU	AVG_STAT_CPU	STAT_ELAP	AVG_STAT_ELAP	Package	COLLID	STMTNO
SELECT S_SUPPKEY,S_NAME,SUM(L_EXTENDEDPRICE*(1-L_DISCOUNT))...	13	30,459.03	395,967.42	5.23	0.40	13.10	1.01	-	-	0
SELECT DISTINCT O_ORDERKEY FROM TPCD.LINEITEM,TPCD.ORDER W...	13	12,424.83	161,522.73	2.70	0.21	12.74	0.98	-	-	0
SELECT SUM(L_EXTENDEDPRICE * L_DISCOUNT) AS REVENUE FROM TP...	16	41,113.20	657,811.20	8.06	0.50	20.01	1.25	-	-	0
SELECT C_NAME,C_CUSTKEY,O_ORDERKEY,O_ORDERDATE,O_TOTAL...	13	496,134.89	6,449,753.59	25.63	1.97	29.81	2.29	-	-	0
SELECT L_SHIPMODE,SUM(CASE WHEN O_ORDERPRIORITY = '1-URGE...	9	45,482.41	409,341.67	5.27	0.59	12.54	1.39	-	-	0
SELECT O_ORDERPRIORITY,COUNT(*) AS ORDER_COUNT FROM TPCD...	12	15,547.33	186,567.90	3.29	0.27	10.62	0.89	-	-	0
SELECT L_RETURNFLAG,L_LINestatus,SUM(L_QUANTITY) AS SUM_Q...	9	240,481.27	2,164,331.39	66.44	7.38	73.95	8.22	-	-	0
SELECT L_ORDERKEY,SUM(L_EXTENDEDPRICE) AS REVENUE,O_ORDER...	13	89,550.83	1,164,160.78	11.73	0.90	18.83	1.45	-	-	0
SELECT * FROM TPCD.LINEITEM L,TPCD.ORDER O,TPCD.SUPPLIER S W...	11	42,820.61	471,026.67	4.62	0.42	13.24	1.20	-	-	0
SELECT O_ORDERPRIORITY,COUNT(*) FROM TPCD.ORDER,TPCD.LINEI...	11	381,863.45	4,200,497.99	75.07	6.82	88.08	8.01	-	-	0
SELECT L_ORDERKEY,SUM(L_EXTENDEDPRICE*(1-L_DISCOUNT)) AS R...	9	90,863.58	817,772.21	8.22	0.91	13.71	1.52	-	-	0

Hybrid Workloads

Query Tuner Workflow Assistant

1. Status

- Non-DB2 Sources
 - Input Text
 - File
- SQL or Routine Editor
- SQL Category
- XML File
- InfoSphere Optim Performance Manager

2. Capture

3. Manage

- DB2 for z/OS Sources
 - Statement Cache
 - Catalog Plan or Package
 - QMF
 - QMF HPO
- DB2 Query Monitor
- User-defined SQL Repository
- SQL Procedure
- Plan Table
- Statement Table
- Function Table
- View, Trigger, or SQL UDF

4. Invoke

5. Review

6. Compare

Input Text

Type an SQL statement that you want to tune. Then, click the Invoke A you want.

Database connection: ✔ STLEC1 (DB2 for z/OS V10 (New-Function

Invoke Advisors and Tools Clear SQL Statement Format SQL S

Text of SQL Statement

-- Enter an SQL statement here

Use this page to view or change the advisor options for workload tuning.

Restore Global Preferences Save to Global Preferences

General Options

Workload Statistics Advisor | Workload Index Advisor | Workload Query Advisor | Workload Access Path Advisor | **Workload Analytics Acceleration Advisor**

Use this page to set the criteria for the Workload Analytics Acceleration Advisor and Workload Test Candidate Analytics Acceleration recommendations.

Current query acceleration: **ELIGIBLE**

Groups in this Project

- Workload Group 1
 - Workload node 1
- Single Query
- Workload
 - Set Advisor Options
 - Run Workload Advisors
 - Run Workload Test Candidate Indexes
 - Run Workload Test Candidate Analytics A
 - Show Workload Tasks

Removing Tables from the Analytics Accelerator

Statements Summary **Analytics Acceleration**

Recommendations

Estimated cost savings from query acceleration (sec): 11,859.56
 Cumulative CPU time (STAT CPU) savings from Query Offloading (sec): 0.00

Table	Creator	On Accelerator?	Recommendation	Cardinality	References To Table	Cumulative Estimated Cost	IJDM Statement Count	NPAGES	Partitioning M
REGION	TPC	Yes	Remove from Accelerator	5.00	1	2.09	1	1.00	-
PARTSUPP	TPC	Yes	Remove from Accelerator	800,000.00	2	81,612.51	0	11,233.00	-
PART	TPC	Yes	Remove from Accelerator	200,000.00	1	51,731.87	0	2,548.00	-
CUSTOMER	TPC	Yes	Remove from Accelerator	150,000.00	1	128,526.08	1	2,954.00	-

Name like:

Name	Size	Rows	Acceleration	Last Load	Distribution Key
TPC	-	-	0 of 8	0 of 8 tables	-
CUSTOMER	-	-	Disabled	Initial load pending	Random
LINEITEM	-	-	Disabled	Initial load pending	Random
NATION	-	-	Disabled	Initial load pending	Random
ORDER	-	-	Disabled	Initial load pending	Random
PART	-	-	Disabled	Initial load pending	Random
PARTSUPP	-	-	Disabled	Initial load pending	Random
REGION	-	-	Disabled	Initial load pending	Random
SUPPLIER	-	-	Disabled	Initial load pending	Random

- Analyze tables with existing accelerator as consideration

- Recommendation table to remove from Accelerator

Summary: Optim Query Workload Tuner provides expert tuning

Solve problems for all types and size of workloads

- **Reduces specialized skill requirements** for tuning queries
 - Provides actionable recommendations
 - Builds skill with rationale
- **Integrates** with developer and DBA tools
 - Lifecycle integration with developer and DBA tools
- **Improves** application performance
 - Improve query design
 - Improve statistics quality
 - Improve index value
 - Improve query acceleration
- **Balances** costs across workload
 - Considers entire workload



“IBM InfoSphere Optim Query Workload Tuner cuts the DBA’s workload in testing, making them at least 40 to 50 percent more productive.”
— He Yu, Senior Database Administrator

Analyze single queries or entire workloads

Thank
you

The image features the words "Thank you" in a large, 3D, light blue font. Each letter of the text is filled with a different photograph of a diverse group of people. The "T" shows a man in a white shirt and orange tie. The "h" shows a woman with dark hair. The "a" shows a man with a beard. The "n" shows a woman with dark hair. The "k" shows a man with glasses. The "Y" shows a man in a white shirt. The "o" shows a man in a white shirt. The "u" shows a woman with dark hair.

Resources



▪ Demo Videos

DB2 11 Using Statistics Collection Advisor

- <http://youtu.be/M9wV0oAFgpw>

IBM DB2 Analytics Accelerator for z/OS and the supporting DB2 and Optim Database tools

- <http://youtu.be/pQYMRHJW7NU>

▪ Database Magazine & Articles

Accelerating Analytics Queries

- <http://ibmdatamag.com/2013/12/accelerating-analytics-queries/>
- <http://www.ibm.com/developerworks/data/library/techarticle/dm-1403queryaccel/index.html>

▪ Pennsylvania Department of Transportation keeps construction costs down using QWT & QM

- http://www-01.ibm.com/software/success/cssdb.nsf/CS/RNAE-9363QC?OpenDocument&Site=default&cty=en_us

▪ Proactive Performance Tuning: A Day in the Life of a DBA at ADP

- <http://www.youtube.com/watch?v=1aYsZUWsyIq>

Resources

- Integrated Data Management Community
 - <http://www.ibm.com/developerworks/spaces/optim>

- IBM Optim Query Workload Tuner web page
 - <https://www-01.ibm.com/software/data/db2imstools/db2tools/opti-expert-zos/>

- Tuning SQL with IBM Optim Query Workload Tuner
 - Part 1 Understanding Access Paths
 - <http://www.ibm.com/developerworks/data/library/techarticle/dm1006optimquerytuner1/index.html>
 - Part 2 Tuning Individual Queries
 - <http://www.ibm.com/developerworks/data/library/techarticle/dm1006optimquerytuner1/index.html>
 - Part 3 Workload Capturing and Tuning
 - <http://www.ibm.com/developerworks/data/library/techarticle/dm-1207optimquerytuner3/index.html>

 - <http://www.ibm.com/developerworks/data/library/techarticle/dm-1403queryaccel/index.html>