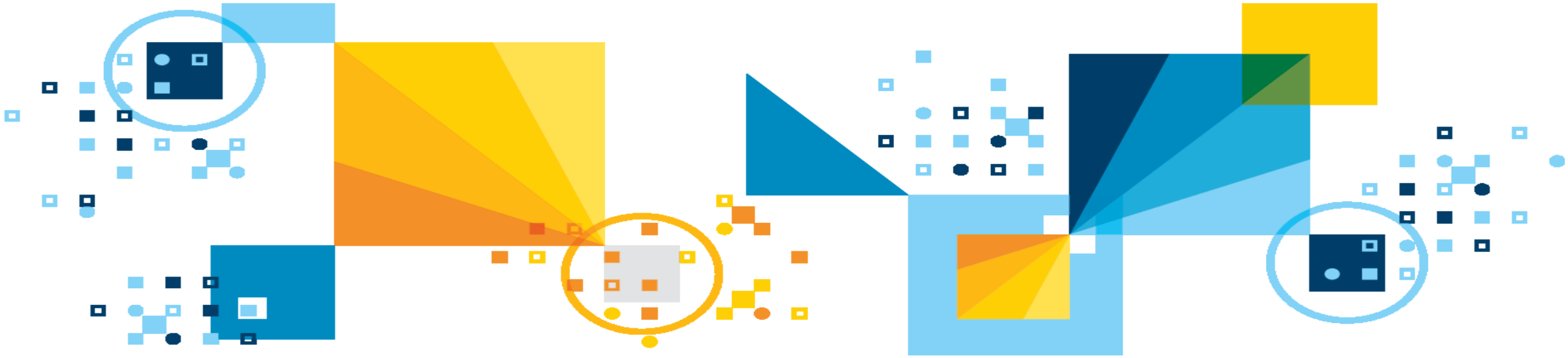
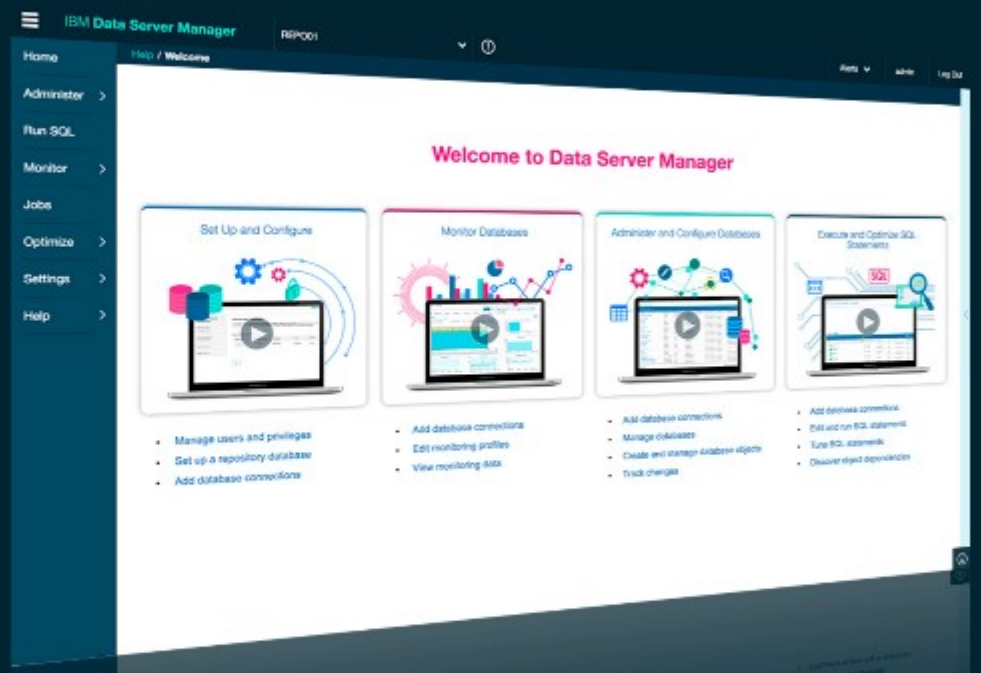
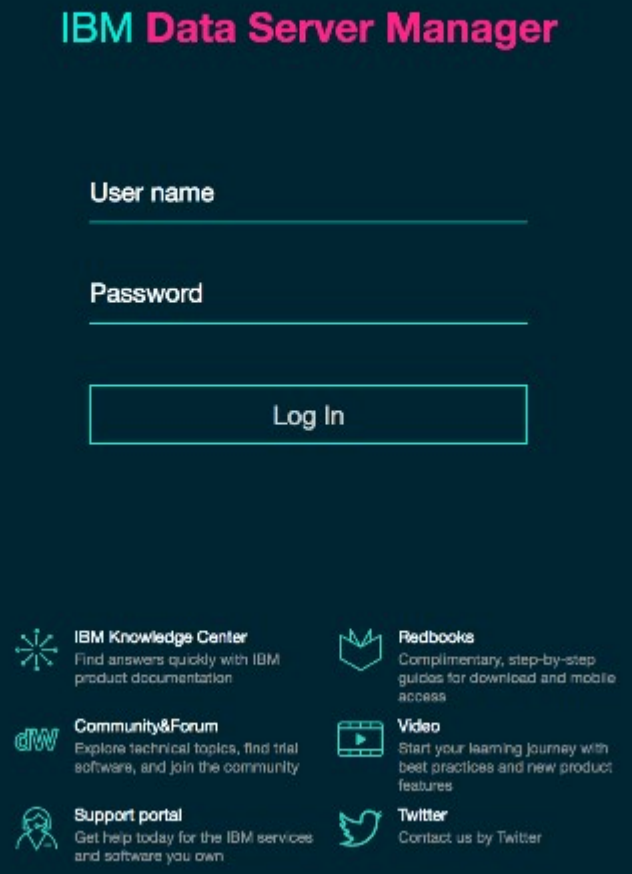
IBM Data Server Manager for z/OS

Saghi Amirsoleymani,
WW Principal Solution Advisor , IBM Champion







What Customers Keep Telling Us

IBM Data Server Manager

- ✓ *Simple*
- ✓ *Scalable*
- ✓ *Smart*

Too many tools, too many installs, too many repositories

Make it easier to use; provide workflow, diagnostic smarts, actionable recommendations

Provide better performance and scalability

Manage databases across the enterprise

Be competitive with other database vendors that provide one stop shop tooling

IBM Data Server Manager

Deliver a Simplified User Experience

- Single installer and integrated repository

Common integrated web console

- Provides enterprise view of your environment
- Guided workflow and analysis

Deliver familiar capabilities from the Database Tools

- Database Administration, Query Tuning and Configuration Management as extensible services

IBM Data Server Manager

- ✓ Simple
- ✓ Scalable
- ✓ Smart

Data Server Manger – Where DBAs Spend Time

Administration

- helps you manage, and maintain complex database environments for increased productivity and optimized use of system resources

Performance Tuning

- helps you develop and implement a performance strategy including providing expert recommendations to improve query workload performance

Identifying Environment changes

- offers centralized management of database and client configuration

Troubleshooting

- capture production application workloads then compare capture and enforce configuration settings

IBM Data Server Manager | tpcds | Alerts | admin | Log Out

- Home
- Administer
- Run SQL
- Monitor
- Jobs
- Optimize
- Settings
- Help

Help / **Welcome**

Welcome to Data Server Manager

Set Up and Configure

- Manage DSM users and privileges
- Set up a repository database
- Add database connections

Monitor Databases

- Add database connections
- Edit monitoring profiles
- View monitoring data

Administer and Configure Databases

- Add database connections
- Manage databases
- Create and manage database objects
- Track changes

Execute and Optimize SQL Statements

- Add database connections
- Edit and run SQL statements
- Tune SQL statements
- Discover object dependencies

Features of the Data Server Manager z/OS Based Tools - At A Glance

NO CHARGE

Data Server Manager Base

- Connect to DB2 for z/OS V10/ V11/V12
- Database object navigation, viewing object detail, and linking to related objects.
- Database object dependency display.
- Data browsing and editing.
- Basic database object operations, such as creation of tables, indexes, constraints, and tablespaces; dropping of tables, indexes and constraints; altering tables.
- Show system privilege from the perspective of Group/User, Role, or SQL object. Choose:
  -"Group/User" to see the role and the relative object privilege for a user account;
  - "Role" to see the role a user account belongs to and its relative object privilege;
  - "SQL object" to see a specific object and users or roles that have the relative authority.
- Single query tuning
  - Statistics Advisor
  - Query Environment **Capture**
  - Access Path Graph

DB2 Performance Solution Pack

IBM Query Workload Tuner

- Launch of visual explain and tune query on the SQL editor
- Tuning wizard to capture SQL statements from multiple sources
- Tuning advisors provide recommendations for:
  - Statistics Advisor
  - Index Advisor
  - IDAA Advisor
- Problem analysis of query or workload
  - Access plan graph
  - Query formatting and annotation
  - Tuning Report
  - Test Candidate Index
  - Access Plan Comparison
  - Index Impact Analysis
  - Query and Workload Environment Capture
  - Selectivity Override

IBM DB2 Query Monitor

- Launching of DSM from Query Monitor Web UI for end to end performance analysis
- Host variable collection

OMEGAMON XE for DB2 PE

- Key Performance Indicators (KPIs) displayed in Data Server Manager on the Subsystems

DB2 Admin Solution Pack

Configuration Manager for z/OS V5.1

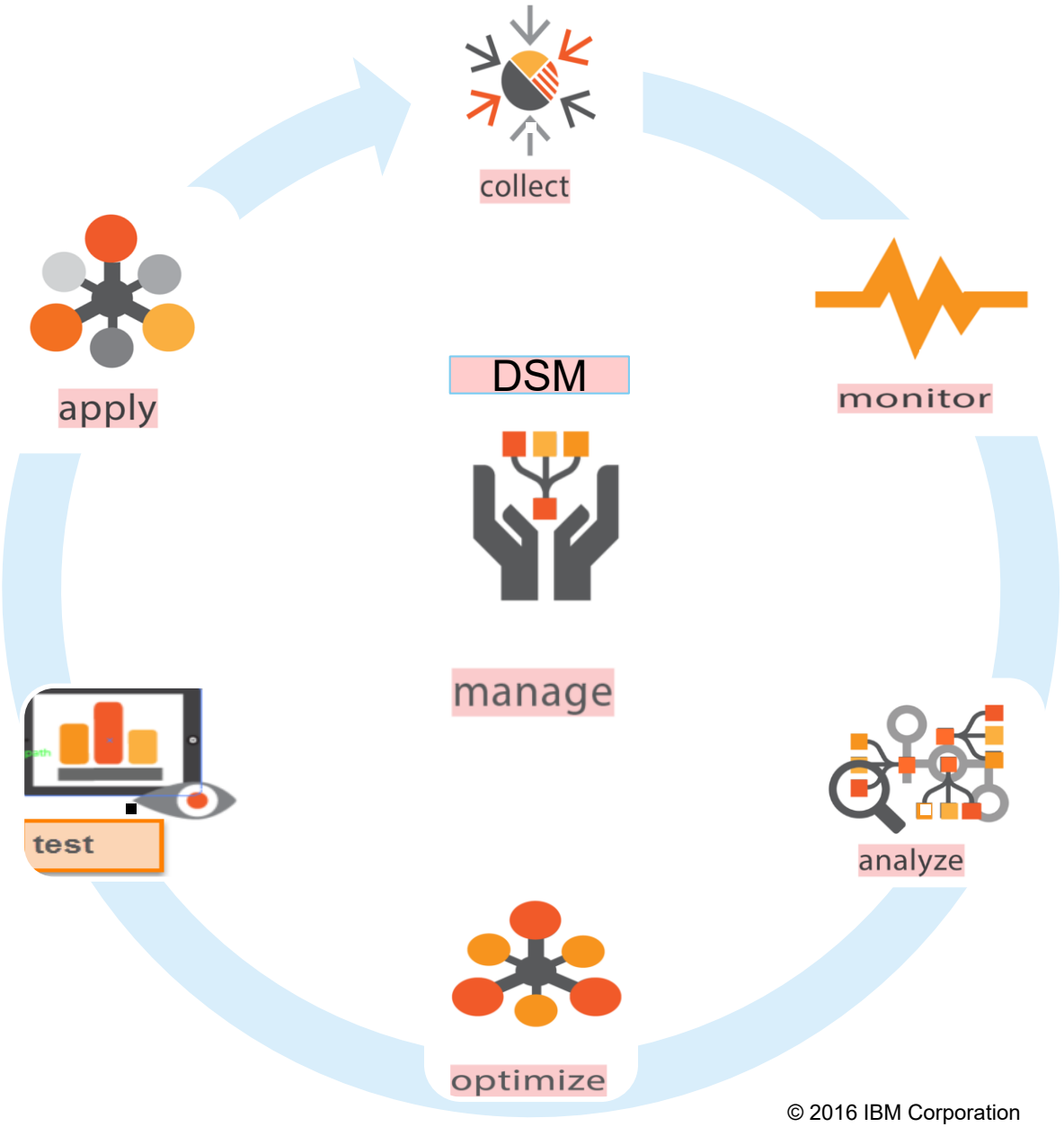
- Track configuration changes
- Configure zParm
- Compare and clone configurations
- Manage application profile
- Manage alias
- Manage and control clients

DB2 Utility Solution Pack V4.1

- Customizable profiles for performing conditional object evaluations and generating actions mapped to resolving utilities (reorg, copy, runstats, etc)
- Ability to control prioritization of objects, evaluation conditions and generated resolving actions.
- Ability to define maintenance windows for enabling autonomics, allowing DB2 to self manage utility runs
- Graphical trend analysis of historical RTS
- Capture of utility history, recording utility output, time, duration, etc.

IBM DB2 Performance Management Solution provides:

- ✓ Fast identification with automated alerts, proactive notification and 24x7 monitoring
- ✓ Tuning of queries and workloads proactively
- ✓ Expert advice with built-in advisors
- ✓ Diverse set of capabilities managed via Data Server Manager (DSM)
  - ✓ Easy-to-use integrated view of overall DB2 performance management
  - ✓ Seamless navigation and movement via functional capabilities versus individual products



Where do I start ?.....
Data Server Manager

http://ibm.biz/IWANTDSM

Simple 3-step setup

Step 1 of 3

Accept the terms of the license agreement to continue

International License Agreement for Ea

Part 1 - General Terms

BY DOWNLOADING, INSTALLING, CO
TO THE TERMS OF THIS AGREEMEN
HAVE FULL AUTHORITY TO BIND LIC

* DO NOT DOWNLOAD, INSTALL, CO

* PROMPTLY RETURN THE UNUSED
PROGRAM.

1. Definitions

"Authorized Use" - the specified level a
service units ("MSUs"), Processor Value

"Early Release" - a release of a Progran
potentially unreliable.

"IBM" - International Business Machine

☑ I accept the terms of the

Step 2 of 3

Specify credentials and port numbers

Specify a us

User name:

Password:

Re-enter passwor

Change port

HTTP port for acce

HTTPS port for ac

Port used internall

Step 3 of 3

Setup is complete

The server is registered as a Windows service

You can open the IBM Data Server Manager web console by using the following URLs:

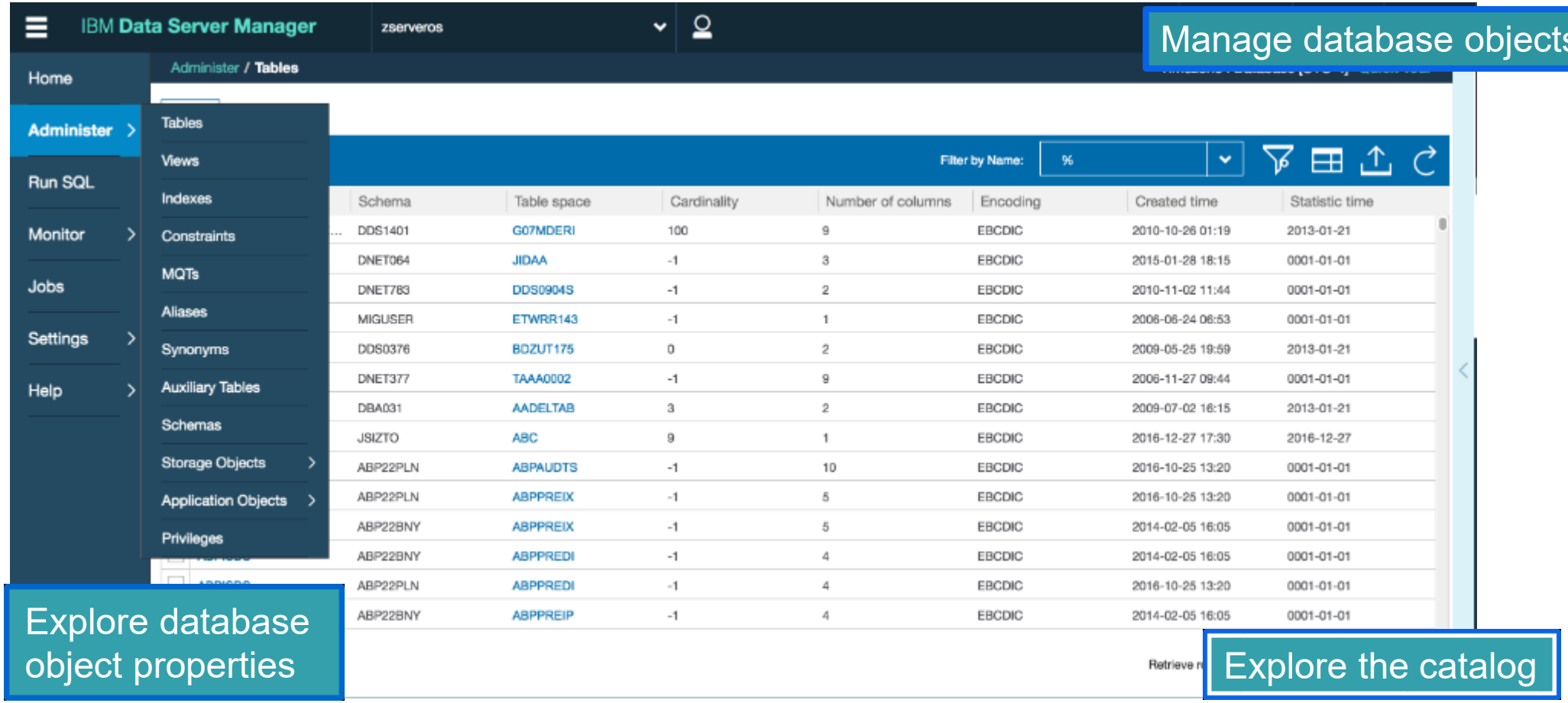
http://localhost:11080

https://localhost:11081 (secure)

Record the URLs of the web console so that you can use them to log in later.

http://ibm.biz/IWANTDSM

Manage Databases Using the Database Explorer



http://ibm.biz/IWANTDSM

Develop and Run SQL Scripts

Database Explorer | SQL Editor | Browse/Edit Data

Run | Format | Syntax Assist | Save | Explain | Tune | Learn mo | Options

```
1 SELECT * FROM DSN8B10.ACT;
2 SELECT * FROM DSN8B10.EMP;
```

Validate SQL

- Manage scripts
- Explain SQL
- Tune SQL

Database c
User:ADM
* Statement terminator: ;
Current SQL ID: Enter the current SQL ID
Default schema: Enter the current schema
Run method: JDBC
Maximum row returned: 100

Saved Queries | Result

Status	Run time (second	Statement	Date	Report
Succeeded - EC_V11A	1.444		12/11/2015, 5:31:08	Download history
Succeeded	0.148	SELECT * FROM DSN8B10.ACT	12/11/2015, 5:31:09 PM	Download history | data

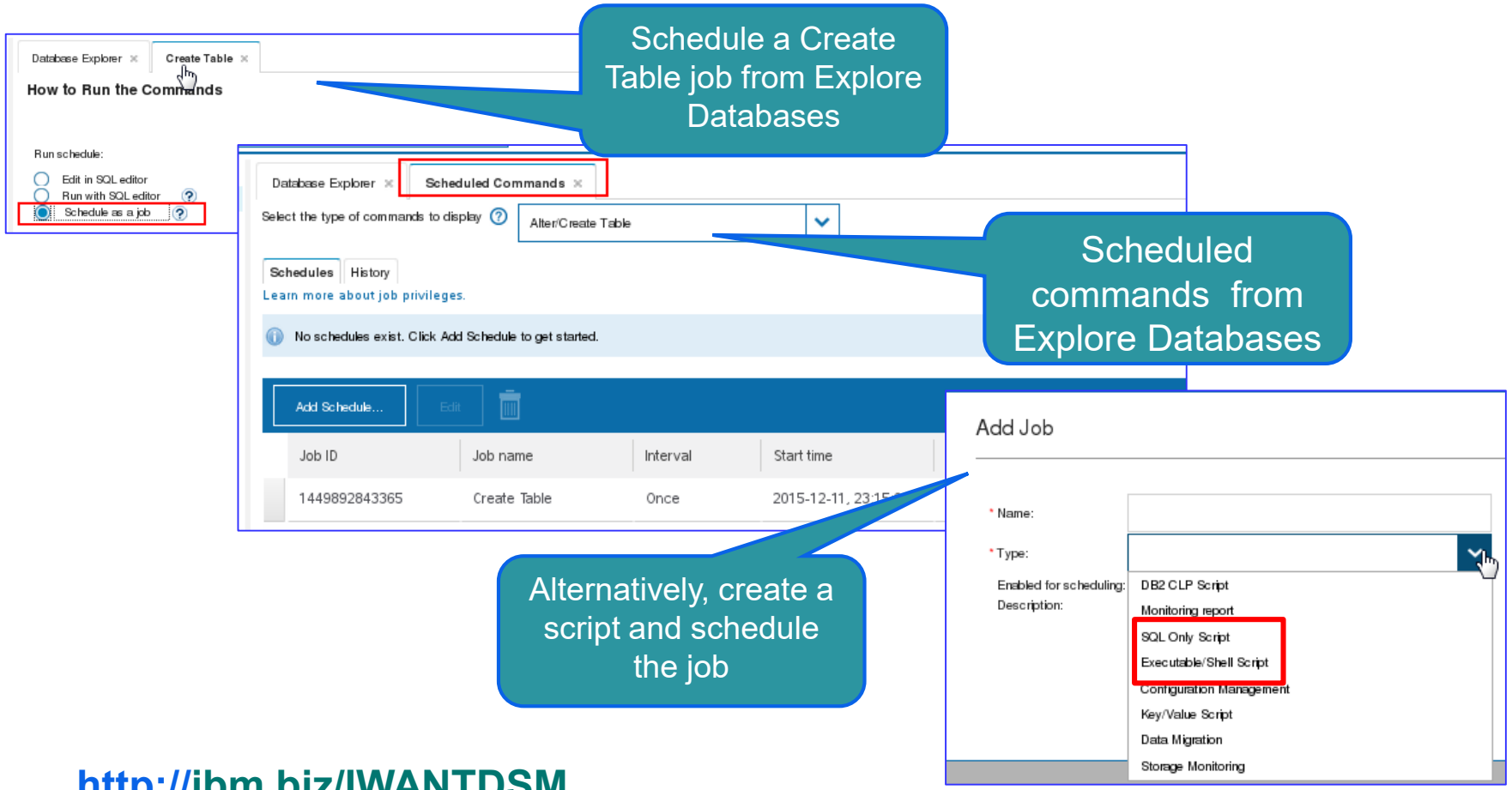
Log

ACTNO	ACTKWD
10	MANAGE
20	ECOST

- Customize and filter result output
- Save execution results

http://ibm.biz/IWANTDSM

Create and schedule jobs



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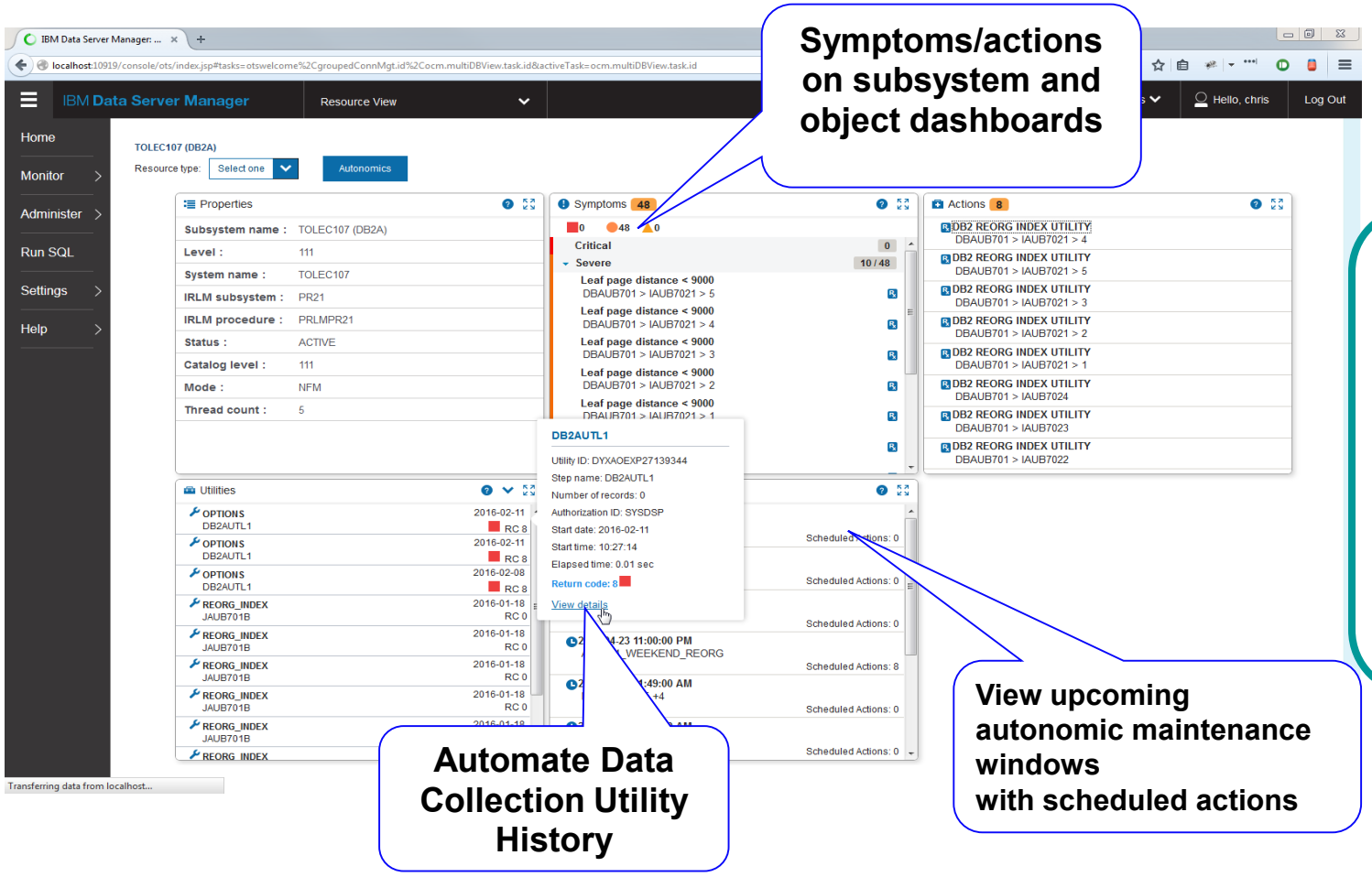
DB2 Utilities Solution Pack 2.2



Symptoms/actions on subsystem and object dashboards

View upcoming autonomic maintenance windows with scheduled actions

Automate Data Collection Utility History

"More integration, greater value"

Optimize, control manage & automate

Components:

DB2 Automation Tool

DB2 High Performance Unload for z/OS

DB2 Sort for z/OS

DB2 Utilities Enhancement Tool

Autonomics support

Data Server Manager

DB2 Utilities Solution

http://ibm.biz/IWANTDSM

Reactive vs. Proactive performance management

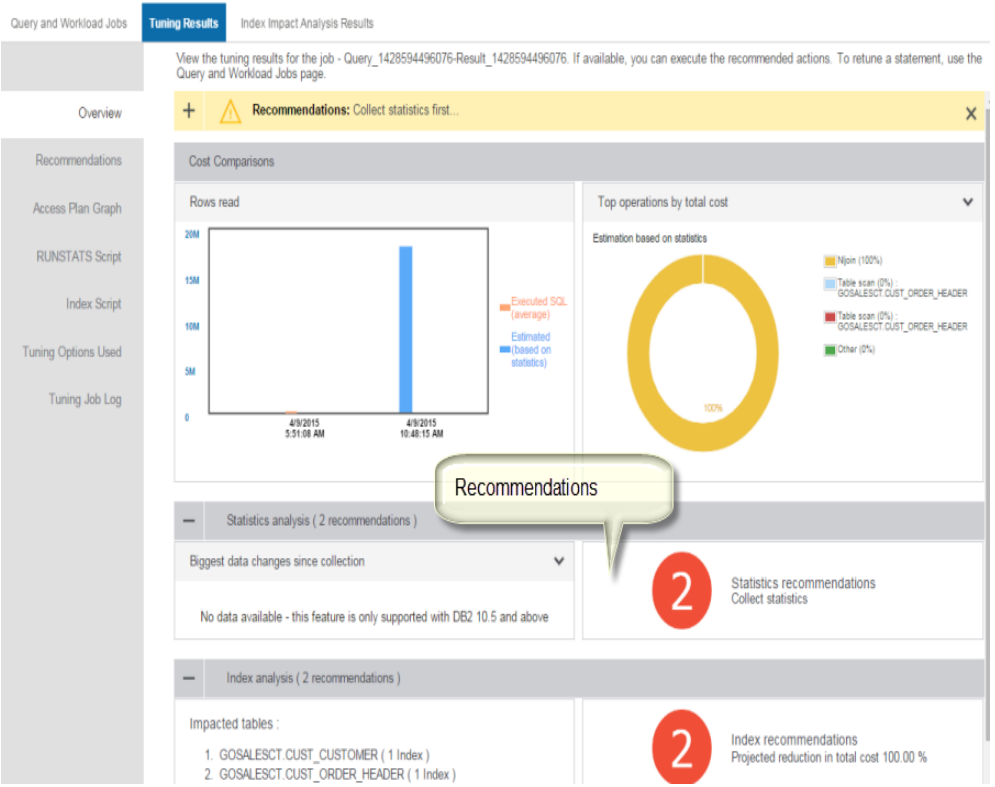
- Problems addressed after performance impact
- Measuring flashing light indicators
- Noticing either the very good or the very bad
- Takes longer to react to bad performance because of measuring lagging indicators

- Understanding what behavior is desired
- Measuring leading indicators
- Capture best practices and procedures
- Team responsible for creating the measurements understands the what and why

Traditional Reactive Tuning

Expert-Enabled Query Tuning Out of the Box

- **Identify query candidates from numerous sources**
  - DB2 catalog
  - Dynamic statement cache
  - User defined repository
- **Facilitate analysis**
  - Query formatting
  - Access path visualization and annotation
- **Get expert tuning advice**
  - Improve statistics quality



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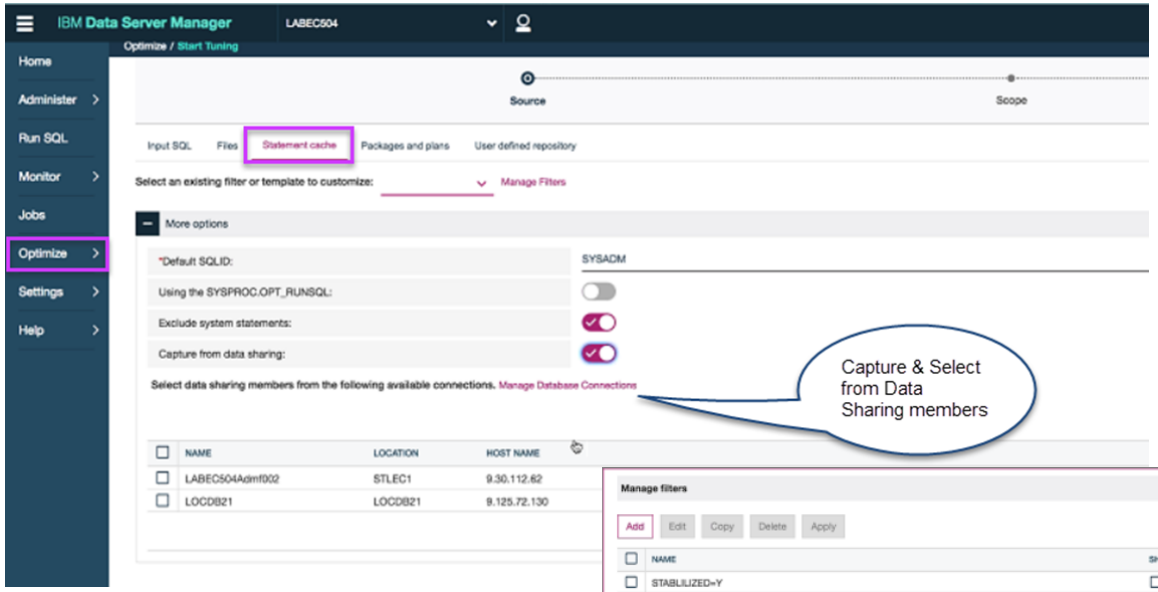
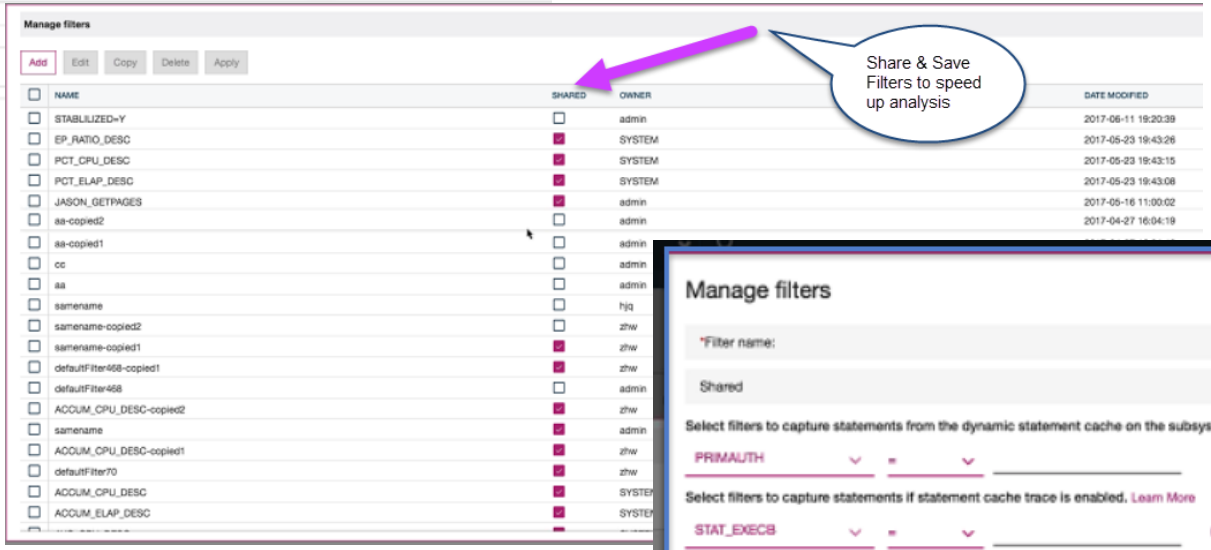
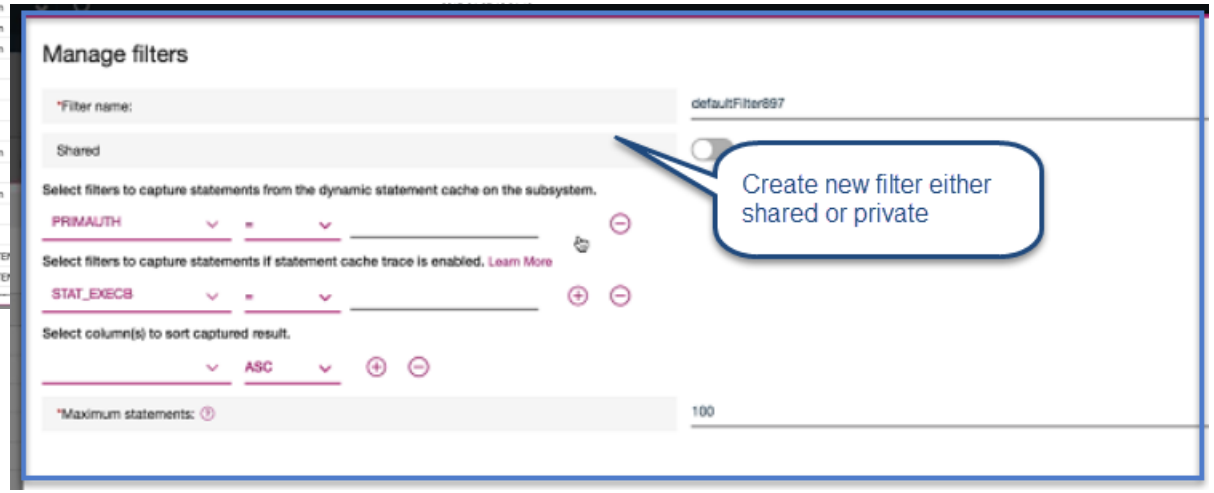
Capture from Statement Cache & customize collection

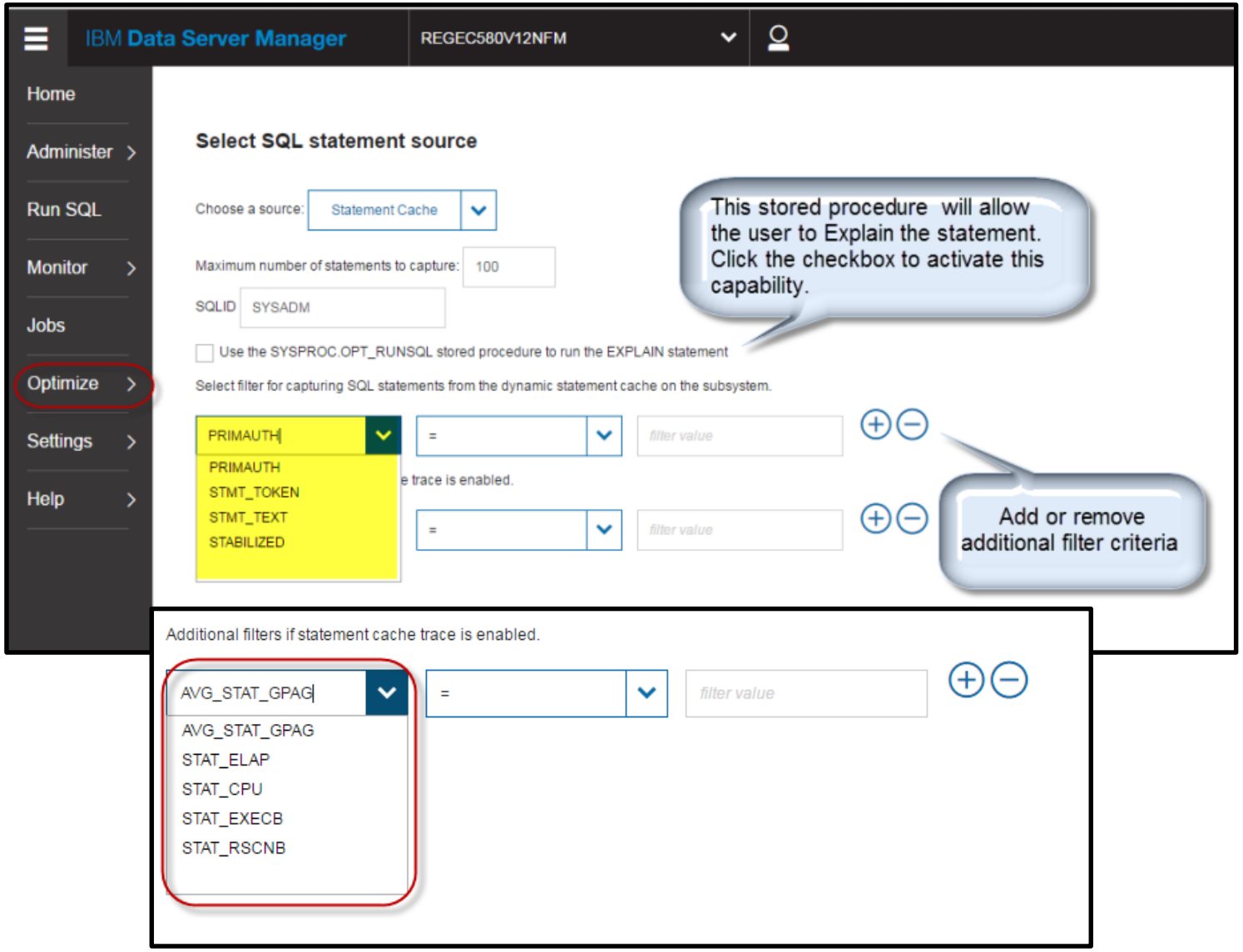






- Accelerate analysis, reduce downtime

Capture from Statement Cache



19

Capture from Statement Cache cont

Home
Administer
Run SQL
Monitor
Jobs
Optimize
Settings
Help

Review captured statements

Sort columns

Export

View Full Statement | View Runtime Access Plan Graph

STMT_ID	STMT_TEXT	SCHEMA	PRIMAUTH	STMT_TOKEN	STAT_ELAP	S
80	SELECT COUNT(*) FROM SYSIBM.SYSTABLES WHERE TYPE = 'V'	SYSADM	SYSADM		0	
21	SELECT CURRENT SCHEMA AS SCHEMA FROM SYSIBM.SYSDUMMY1	SYSADM	SYSADM		0.00445	
28	SELECT CURRENT SCHEMA AS SCHEMA FROM SYSIBM.SYSDUMMY1	TPCDS	SYSADM		0.000416	
102	SELECT CURRENT SCHEMA AS SCHEMA FROM SYSIBM.SYSDUMMY1	SYSADM	SYSADM		0.000252	
66	/* IBM_DSM */ DELETE FROM SYSADM.DSN_VIRTUAL_INDEXES	TPCDS	SYSADM		0	
132	/* IBM_DSM */ DELETE FROM SYSADM.DSN_VIRTUAL_INDEXES	SYSADM	SYSADM		0.000427	

Total: 100 Selected: 1

1 2 3 ... 10

10 | 25 | 50

Previous | Tune Highlighted Statement | Tune All Statements

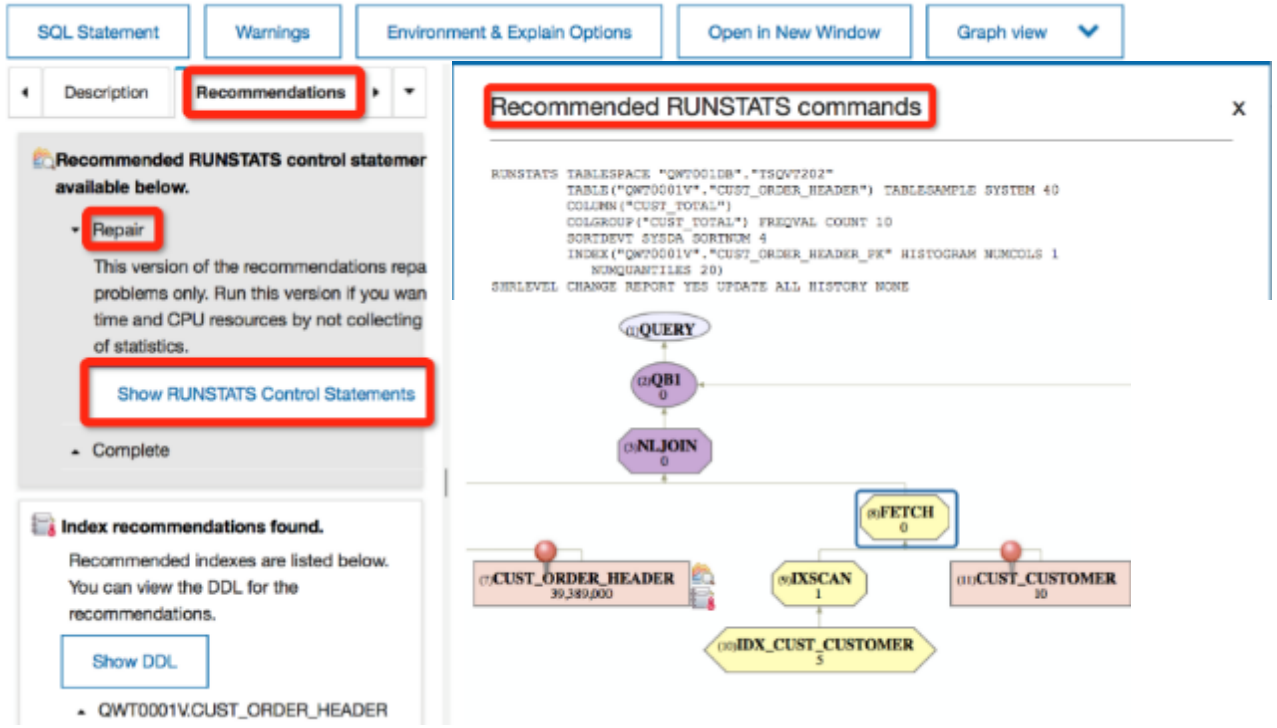
Create a workload tuning job to tune all the captured statements

Create a single-query tuning job to tune the highlighted statement

Analyze Access Plans

New Recommendation Integration

- **Visualize access path**
  - See flow of query processing
  - See indexes and operations
  - See optimizer rationale
- **Assess access path stability to reduce risk of performance regression**
  - Is the optimizer able to apply the filtering early?
  - Are there indexes that support an efficient path?
  - Do statistics allow distinction between the choices?



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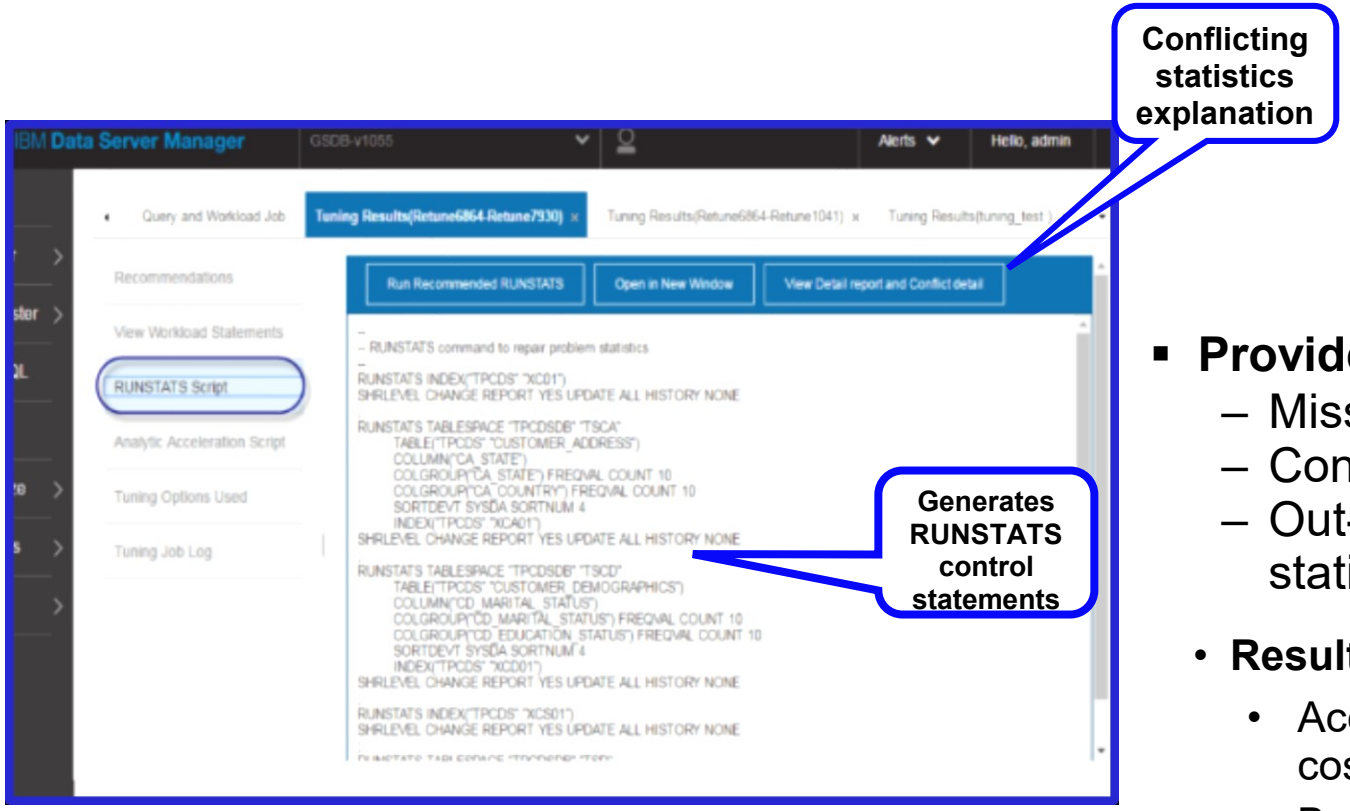
Improve Statistics Quality and Collection



Conflicting statistics explanation

Generates RUNSTATS control statements

- **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

"80 % of access path PMRs could be resolved by statistics advisor before calling IBM support." – IBM Support

What to do next …. Performance Tuning Using Data Server Manager : Query Workload Tuner 5.1

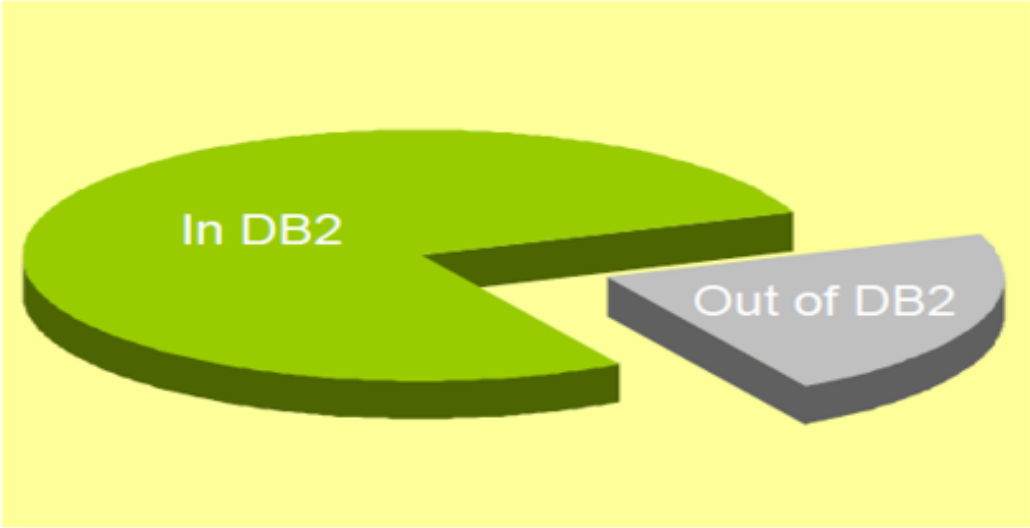
http://ibm.biz/IWANTDSM

Why is workload tuning important?

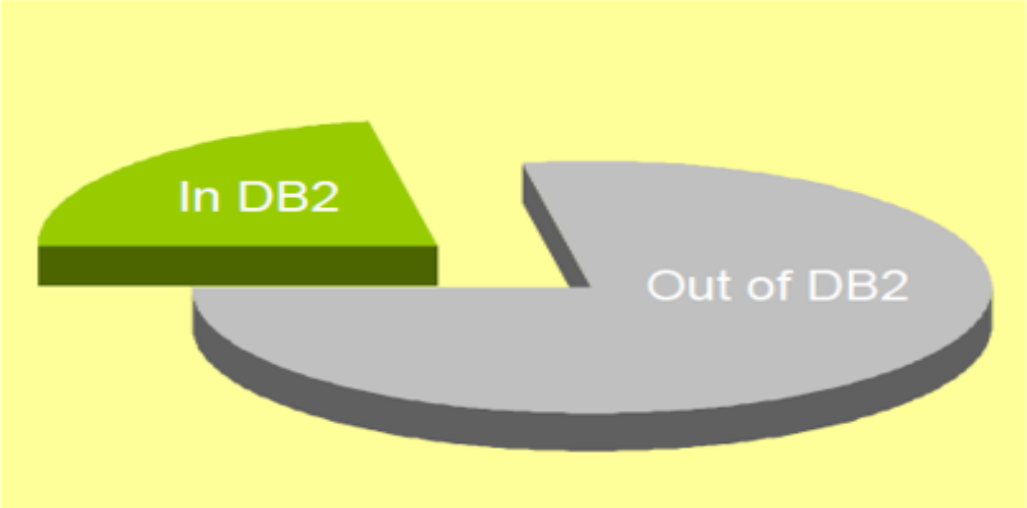
Workload: Multiple SQL statements defined by user

- The effort for tuning the whole application with good performance by evaluating every statement is overwhelming. Optimization decisions are based on trade offs:
  - Statistics – CPU costs vs. query savings
  - Indexing – query speed vs resource and transaction
- Sometimes performance improvement for one statement in an application may regress other statements in the application.
- When your application data grows, allows you to do proactive application health check periodically to find potential problems earlier before costly application outages
- Workload tuning speeds up analysis
  - Analyzes multiple queries at once
- Workload tuning consolidates and optimizes recommendation for overall workload
  - Statistics recommendations
  - Index recommendation

Where is the most time spent?



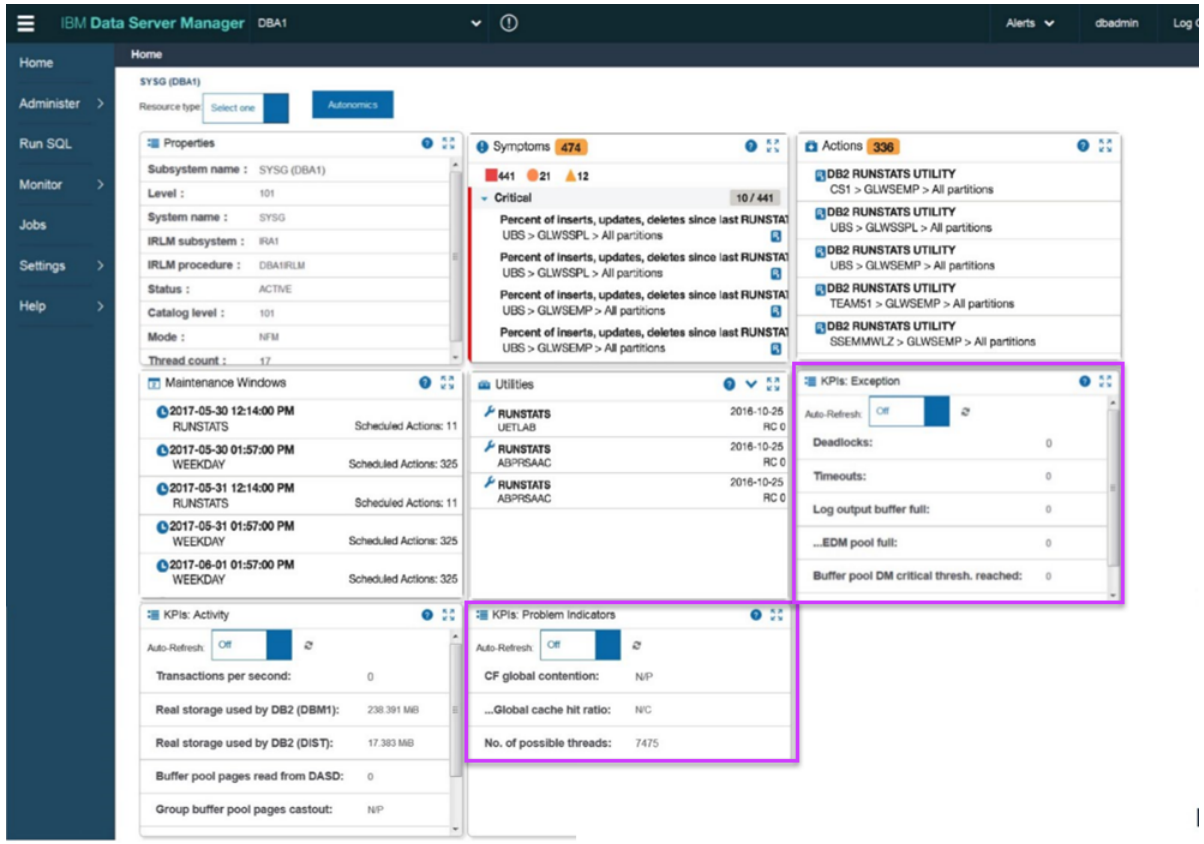
Need to analyze time distribution: where is the time really spent?



- Application logic inefficiency
  - often combined with Class 2 CPU << Class 1 CPU
- Network problems
- Class 2 not active all the time

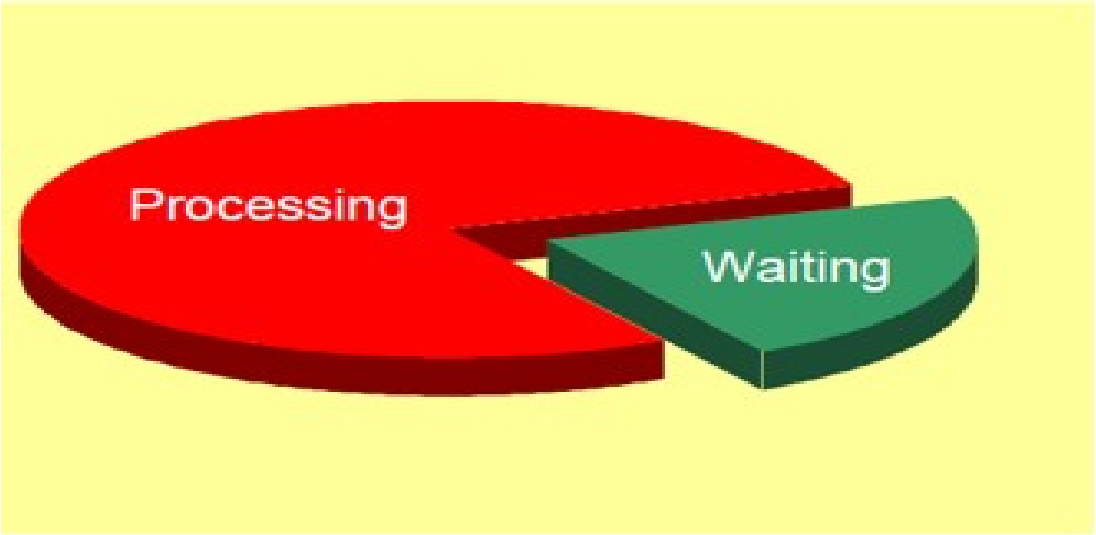
Improve Performance and Reduce Costs

- Improve end-user experience of performance
  - Monitor KPIs that better reflect end-user experience
    - i.e., transaction response time
  - Get early warning of degrading performance before users are affected
  - Isolate problems to correct area for fast response
  - Get expert advice for improving query and workload performance
- Reduce costs
  - Improve performance and govern system utilization to defer upgrades
  - Save hours of staff time and stress
    - Isolate problems to the right layer of the application stack, database component, even the line of code
  - Enable developers and novice DBAs to tune like an expert

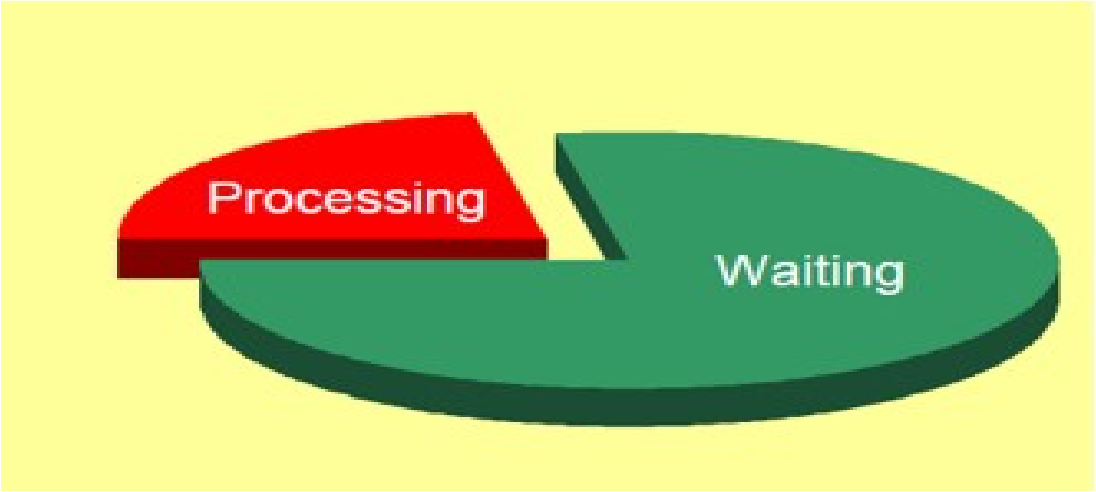


Accelerate analysis and reduce downtime for urgent situations

Where is the time spent within DB2?



- Turn off expensive traces
- Inefficient access paths
  - Explain



- What is the largest contributor
  - Class 3 and 8 analysis

What is your query tuning objective ……..

reduced CPU usage or reduced elapsed time ?

Common Scenarios & Collection

- Most expensive SQL statement in your DB2 subsystem
- Most expensive SQL within a PLAN
- All of the PLANS where a specific package is used
- All of the “exceptional SQL for a given plan”
- All of the objects accessed by a specific package
- All of the SQL which access a specific object
- Unnecessary negative SQLCODES

1 Determine what data needs to be collected

- Data available to be collected or viewed
  - SQL metrics
  - DB2 object access
  - SQL text and host variables
  - DB2 commands
  - Negative SQLCODES
  - Expanded and grouped Information about exceptions
  - Buffer Pool Statistics
  - Delays

- Three types of data
  - **Summary** – data summarized for each unique SQL statement executed in a particular interval of time
    - Plan + Program + Section + Statement # + Statement type
    - SQL Codes are not collected by default
  - **Exceptions** – individual SQL calls that have exceeded user defined thresholds
  - **Alerts** – events that require immediate attention; can be classified as exceptions

2 Identify workload for proactive tuning

- Identify the topN (50 , 200 , 250 …….) most expensive queries
- Drill down into results
- Save workload and/or start tuning

Sources CQM Subsystems | Targets :DBQM | Intervals 1/4/2017, 6:15:12 AM | 1/4/2017, 7:27:56 AM | RUN

Filter No Filter | TopN CPU time | Views | Show SQL | Tune All | Collect HostVars | Compare | Export | Chart | Details

Perspective Summaries | DB2 DBB1 | SQL

Command	Exec Count	CPU	zIIP CPU	Delay	Getpages	SQL Text	DB2
	120	1.212301	0.000000	3.511193	209,585	SELECT EMP_...	
	192	15.493578	0.000000	0.004839	1,790,887	DELETE FROM...	DBE
	570	1.368879	0.000000	0.000015	0	CQM145I - SQL...	DBE
	570	3.443662	0.000000	0.456599	108,655	DECLARE C1 C...	DBE
	193	1.793139	0.000000	24.144000	494,184	DELETE FROM...	DBE
	990	0.455963	0.000000	4.019060	160,020	UPDATE GLWT...	DBE
	976	0.004593	0.000000	0.000000	0	DECLARE C1 C...	DBE
	7,924	0.686005	0.000000	0.000004	71,233	UPDATE GLWT...	DBE
	0	3.569418	0.000000	41.238604	1,691,484	DECLARE C1 C...	DBE
	976	1.608397	0.000000	0.019863	315,366	SELECT MIN(D...	DBE
	976	1.815363	0.000000	4.998261	315,366	SELECT MIN(D...	DBE
	359	1.243767	0.000000	9.714349	625,217	DECLARE C1 C...	DBE

Range: 1-50 Total: 52 Selected: 1 | Page 1 of 2 | Page 1 | Rows 50

Analysis | SQL Text | HostVars | General

Elapsed Time
Value 4.939776

Total Delay Time
Value 3.511193
Overall 71.08%

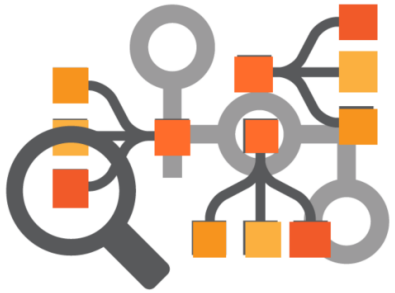
Total IO Delay
Value 3.511042
Overall 71.08% Percent 100.00%

Other Read Delay Time
Value 2.895085
Overall 58.61% Percent 82.46%

Synchronous I/O Delay Time
Value 0.615957
Overall 12.47% Percent 17.54%

Other Write Delay Time
Value 0.000000
Overall 0.00% Percent 0.00%

Archive Log Quiesce Delay Time
Value 0.000000
Overall 0.00% Percent 0.00%



analyze

2 Drill down into results

Tune or Tune all

Home | Alerts | Activity Browser | Configuration | Action Console

Sources: CQM Subsystems | Targets: ZT01:DBQM | Intervals: 1/4/2017, 6:15:12 AM – 1/4/2017, 7:27:56 AM | RUN

Filter: No Filter | TopN: CPU time | Views: Bootcamp 2017 | Show SQL | Tune All | Collect HostVars | Compare | Export | Chart | Details

Perspective: Summaries | DB2 | DBB1 | SQL

Command	Exec Count	CPU	zIIP CPU	Delay	Getpages	SQL Text	DB2
	90,504	25:52.661214	25 minutes 52.661214 seconds	22:37.039138	1,511,755,479	SELECT MIN(E...	DBE
	192	15.493578	0.000000	0.004839	4,790,887	DELETE FROM...	DBE
	1,911	12.570105	0.000000	1:57.671076	6,636,974	SELECT MIN(E...	DBE
	1,911	8.547753	0.000000	6.503590	690,358	INSERT INTO G...	DBE
	1,911	7.310767	0.000000	0.002798	567,567	DECLARE GLO...	DBE
	89,541	4.705117	0.000000	0.011513	55,419	INSERT INTO S...	DBE
	95,929	3.727368	0.000000	0.113124	0	CQM145I - SQL...	DBE
	0	3.569418	0.000000	41.238604	1,691,484	DECLARE C1 C...	DBE
	89,541	3.543430	0.000000	0.108491	0	CALL EMPSEL ...	DBE
	570	3.443662	0.000000	0.456599	108,655	DECLARE C1 C...	DBE
	23,131	2.800626	0.000000	0.118497	0	CALL : H USIN...	DBE
	1,911	2.477874	0.000000	0.109868	0	CQM145I - SQL...	DBE

Range: 1-50 Total: 52 Selected: 1 | Page 1 | Rows 50

Analysis | SQL Text | HostVars | General

Elapsed Time
Value 52:02.821881

CPU time
Value 25:52.661214
Overall 49.72%

Total Delay Time
Value 22:37.03
Overall 43.46%

Unaccounted Time
Value 3:33.121
Overall 6.82%

Specific Elapsed
Value 0.000000
Overall 0.00%

Delays | Locks | Buffer F

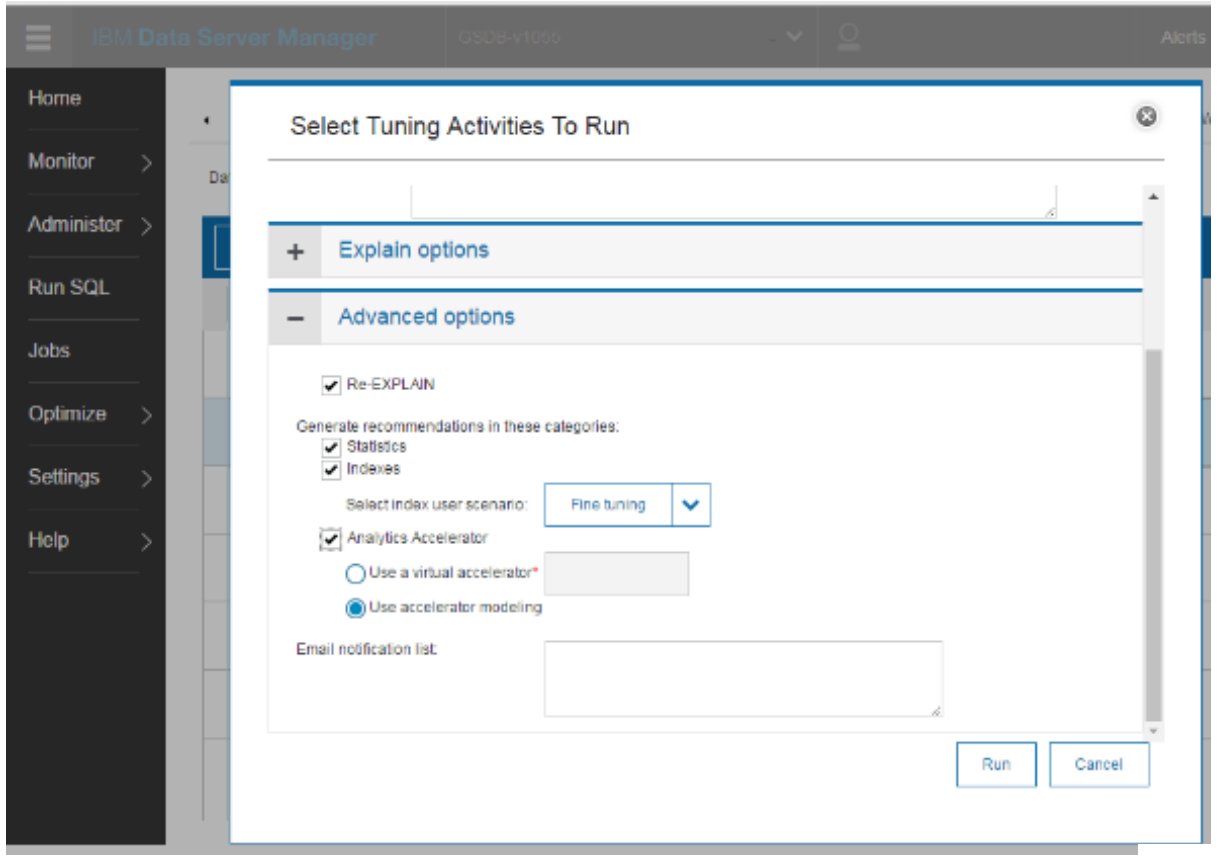
Show Charts

Delay Event	Event Count	Delay Time
Lock Latch Delay Time	27,526	0.113124
Synchronous I/O Delay Time	3,722,940	19:29.466114
Database I/O Delay Time	3,722,940	19:29.466114
Log Write I/O Delay Time	0	0.000000
Other Read Delay Time	353,348	3:07.459899
Other Write Delay Time	0	0.000000
Servtask Switch Delay Time	0	0.000000
Update Commit Delay Time	0	0.000000

analyze

3 Execute Advisors

- Statistics
  - Get recommendations on the best statistics to capture to influence access path selection
- Index
  - Get recommendations on indexes changes that can reduce database scans
- Analytics Accelerator
  - Get recommendations on optimizing and managing accelerated analytic queries and applications



optimize

Improve statistics quality and collection

Query and Workload Job | **Tuning Results(tpch60GB)** × | Tuning Results(Query_1449642937354-Result_1449642937354) ×

- Recommendations
- View Workload Statements
- RUNSTATS Script
- Index Script
- Analytic Acceleration Script
- Tuning Options Used
- Tuning Job Log

Run Recommended RUNSTATS | Open in New Window | View Detail report and Conflict detail

Conflicting statistics explanation

```
--
-- RUNSTATS command to repair problem statistics
--
RUNSTATS TABLESPACE "TPCH06DB"."TSCUS"
         TABLE("TPCH60"."CUSTOMER")
         COLUMN("C_ACCTBAL")
         COLGROUP("C_ACCTBAL") HISTOGRAM NUMQUANTILES 20
         COLGROUP("C_MKTSEGMENT") FREQVAL COUNT 10
         SORTDEVT SYSDA SORTNUM 4
         INDEX("TPCH60"."IXCUS01")
SHRLEVEL CHANGE REPORT YES UPDATE ALL HISTORY NONE
;
RUNSTATS TABLESPACE "TPCH06DB"."TSLI"
         TABLE("TPCH60"."LINEITEM")
         COLUMN("L_ORDERKEY")
         COLGROUP("L_QUANTITY") FREQVAL COUNT 10 HISTOGRAM
            NUMQUANTILES 20
         COLGROUP("L_ORDERKEY","L_SUPPKEY")
         COLGROUP("L_RETURNFLAG") FREQVAL COUNT 10
         COLGROUP("L_PARTKEY","L_SUPPKEY")
         COLGROUP("L_SHIPINSTRUCT") FREQVAL COUNT 10
         SORTDEVT SYSDA SORTNUM 4
         INDEX("TPCH60"."IXLI01",
               "TPCH60"."LINEITEM_VIRT_IDX_1449105274773403 14")
SHRLEVEL CHANGE REPORT YES UPDATE ALL HISTORY NONE
;
RUNSTATS TABLESPACE "TPCH06DB"."TSNTN"
         TABLE("TPCH60"."NATION")
         COLUMN("N_NAME")
         COLGROUP("N_NAME") FREQVAL COUNT 10
```

Statistics Advisor Detail Report

```
Statistics Advisor Detail Report
Analysis start time: 2015-12-02 18:31:48.504682
Analysis end time:   2015-12-02 18:31:50.455052

==========================================================================

TABLE TPCH60.CUSTOMER
    Table type:        Table
    Cardinality:       60000.0
    Collection time:   2015-11-17 01:30:26.468977
    Statistics status: OK


INDEXES:

TPCH60.IXCUS01 (C_CUSTKEY)
    First key cardinality:   60000.0
    Full key cardinality:    60000.0
    Data repetition factor: 1170.0
    Collection time:        2015-11-17 01:30:26.468977
    Statistics status:      conflicting


Interesting columns:

C_MKTSEGMENT
    Cardinality:                          5.0
    Uniform statistics collection time:   2015-11-17 01:30:26.468977
    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
    Symptom: Columns with low COLCARD (the number of distinct values in a column)
    Possibly range skewed:                No
```

"80 % of access path PMRs could be resolved by statistics advisor before calling IBM support." – IBM Support

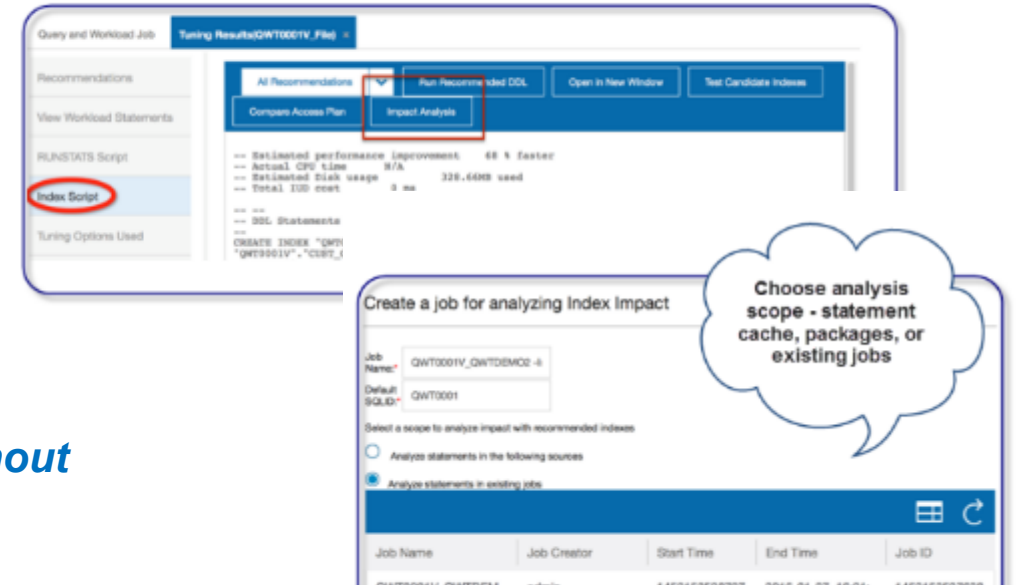
- Results
  - Accurate estimated costs
  - Better query performance
  - Less CPU consumption
  - Improved maintenance window throughput

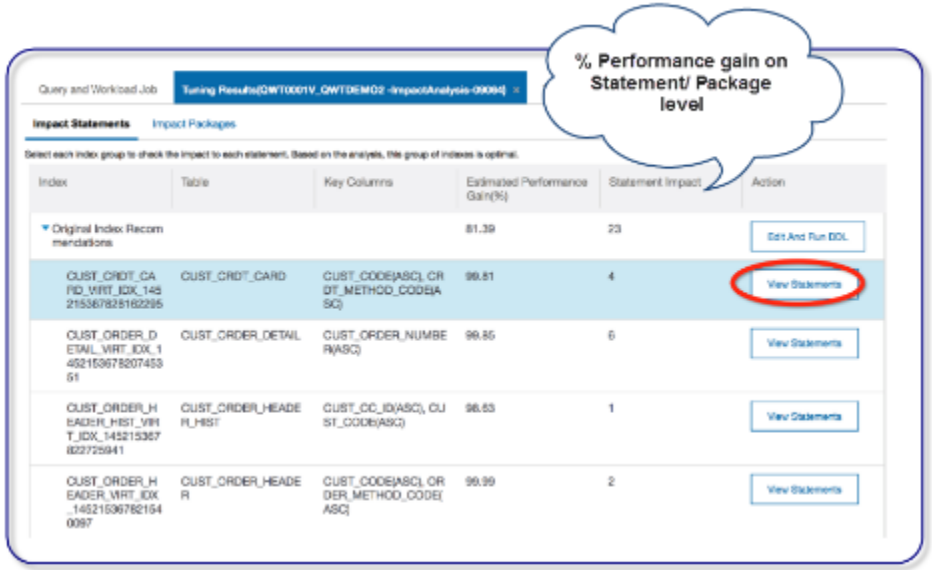
optimize

Indexing advice to improve database design

Workload Index Impact Analysis

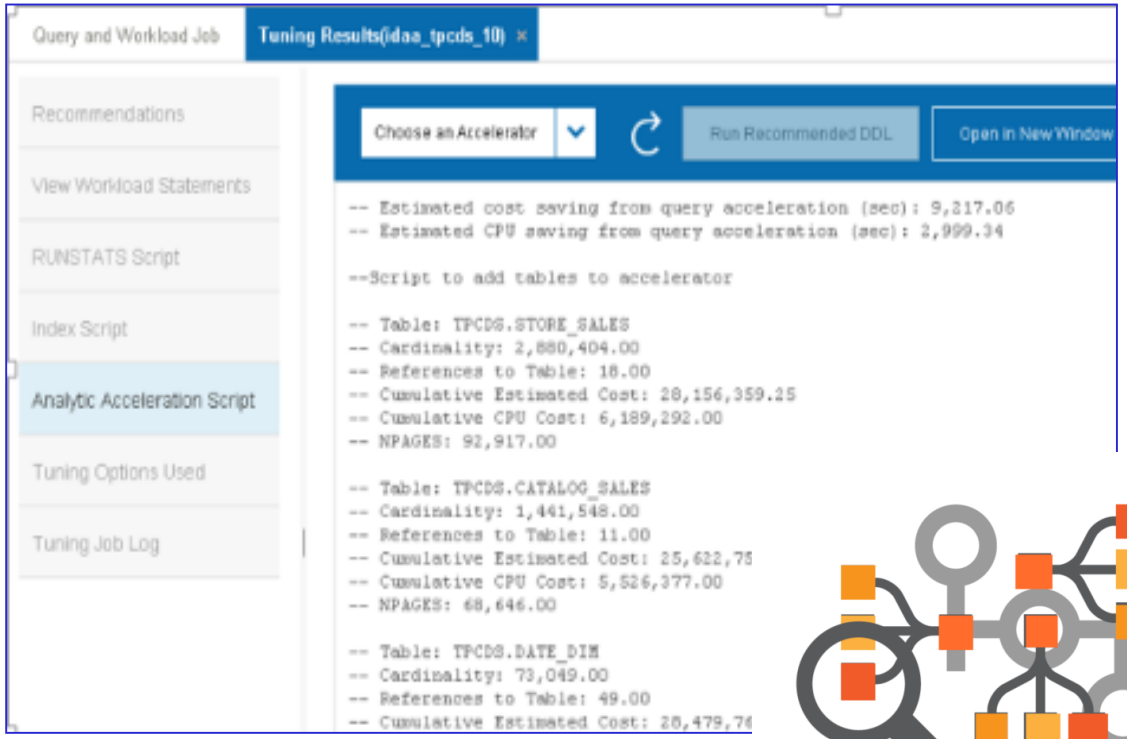
- Indexes are decided at design stage
  - Lot of effort is spent making SQL to use the provided indexes
  - But what if the SQL is "right" and it's the indexes that are "wrong“
  - Cost resources to maintain
  - ***How do you simply test your hypotheses without impacting production?***
- Removing obsolete indexes simplify use
  - Consolidate indexes and provide a single recommendation
  - Enables what-if analysis
  - Provides DDL to create indexes
  - Run immediately or save
- Test before deployment
  - Use virtual index capabilities built into the DB2 engine



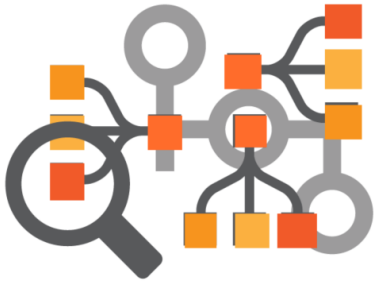


Optimizing the selection and tuning of accelerated workloads

- 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



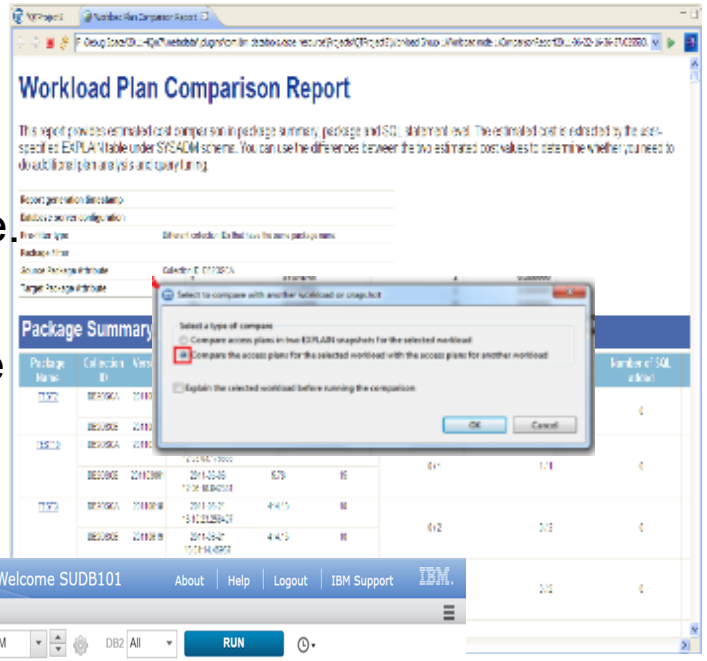
- Benefits
  - Shorten the process of selecting tables to be accelerated
  - Visualize access paths of accelerated queries
  - Increase productivity by working with accelerated queries through a unified interface
  - Increase overall system capacity



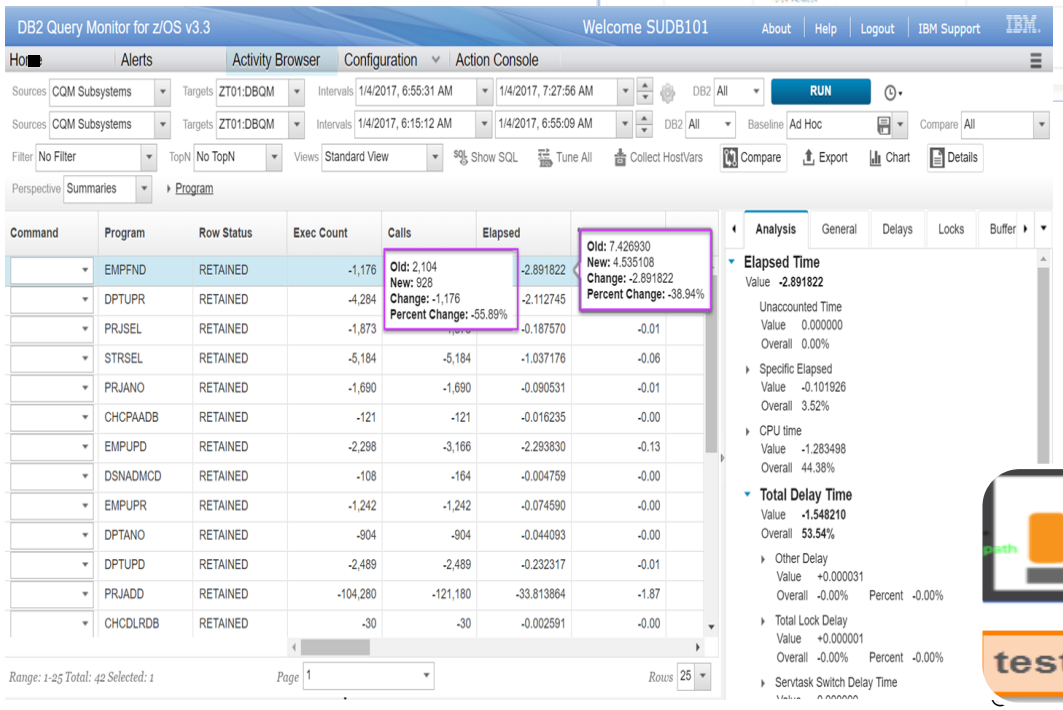
analyze

4 Prevent problems before they impact the business

- Optimize beyond the prior level of service
  - Determine whether the later version of the collection has degraded performance.
  - Determine whether any packages have errors.
  - Identify which packages have SQL statements that have degraded performance
- Available Actions
  - Apply filters and review Comparison result
  - Review comparison result
  - Generate HTML comparison report or in csv
  - Generate new query workload for tuning & perform analysis
- Enhancements
  - **Compare two different workloads**



Workload Comparison



Workload Access Plan Comparison

Host variable Collection & Selectivity Override

IBM Solution Exclusive!

- Why did the DB2 Optimizer choose that path?
- Helps users improve query access plans for dynamic queries with parameter markers
- The selectivity override feature utilizes parameter marker information
- Users can deploy a selectivity profile generated by this function to create better access plans.

```
SELECT * FROM
EMPLOYEES WHERE
SALARY BETWEEN ?
AND ?
```

1 Create a Baseline

- Run a test application now to get a baseline.
- Average execution time for this application is: 125ms
- *Note this query is well tune before selectivity override analysis*
- Remember this number

Execution Log

ID:	1484464703338
Name:	Appl_Ad_Hoc_4_min_01
Database Name:	WKLDDRVR01
Start Time:	1484600890461
End Time:	1484601132118
Result:	The job executed successfully.

Commands Executed:

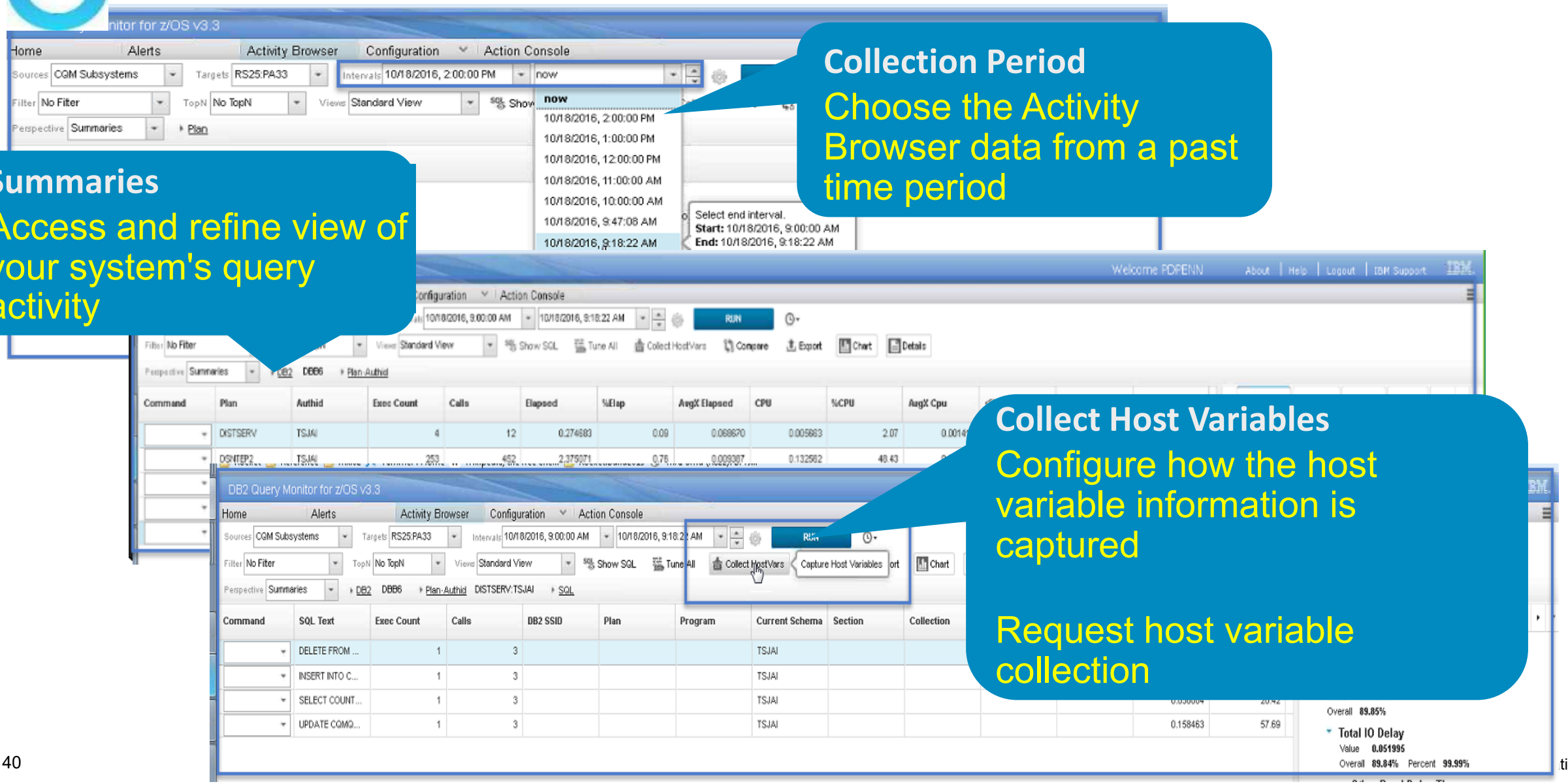
```
cd /tmp;
/usr/bin/java -jar /home/db2inst1/hol/queryTuning/Appl_Ad_Hoc_01.jar 4 0 01;
```

Output from executing:

```
Connected to DEMOMVS
Running program for: 4 minute(s)
Starting time: 13:08:11:925
.......................................................................
Ending time: 13:12:12:005

Execution count: 1908

Average execution time: 125ms
```


manage

2 Collect Activity



Summaries

Access and refine view of your system's query activity

Collection Period

Choose the Activity Browser data from a past time period

Collect Host Variables

Configure how the host variable information is captured

Request host variable collection

3 Analyze Hostvars details and identify candidate query

Tune or Tune all
For selectivity override analysis

- With parameter marker, high elapse time, CPU time, execution count etc.

Home | Alerts | Activity Browser | Configuration | Action Console

Sources: CQM Subsystems | Targets: DEMOMVS:CQ3 | Intervals: 1/23/2017, 6:00:00 AM | now | RUN

Filter: No Filter | TopN: No TopN | Views: Standard View | Show SQL | Tune All | Collect HostVars | Capture Host Variables | Details

Perspective: Summaries | DB2 | DSNC | SQL

Command	SQL Text	Elapsed	%Elap	AvgX Elapsed	CPU	%CPU	AvgX
	select count(*) fr...	1:35.081484	0.16	0.052357	27.691391	2.76	
	select count(*) fr...	2:04.443269	0.20	0.086000	0.073730	0.01	
	SELECT "ROW...	0.074840	0.00	0.000052	0.061881	0.01	
	DELETE FROM ...	0.148829	0.00	0.000104	0.145259	0.01	
	INSERT INTO S...	0.002227	0.00	0.000002	0.002166	0.00	
	SELECT COUN...	0.080895	0.00	0.000102	0.059895	0.01	
	SELECT ENCO...	0.008418	0.00	0.000010	0.008334	0.00	

Range: 1-200 Total: 1257 Selected: 1 Page 1 Rows 200

Slices

Analysis | SQL Text | HostVars | General

Show Raw SQL Text | Tune

```
select count ()

from GOSALESCT03.CUST_CUSTOMER CUST_CUSTOMER,
GOSALESCT03.CUST_ORDER_HEADER CUST_ORDER_HEADER,
GOSALESCT03.CUST_ORDER_DETAIL CUST_ORDER_DETAIL

where CUST_CUSTOMER.CUST_CODE =
CUST_ORDER_HEADER.CUST_CODE and
CUST_ORDER_HEADER.CUST_ORDER_NUMBER =
CUST_ORDER_DETAIL.CUST_ORDER_NUMBER and
CUST_CUSTOMER.GENDER_CODE = ? and
CUST_ORDER_HEADER.CRDT_METHOD_CODE = ? and
CUST_ORDER_DETAIL.CUST_QUANTITY = ?
```

Workload Viewer*

SQL Text	Plan	Collection	Program	Contoken	Section	Stmt Number	Statement ID	Current Schema	Exec Count	Elaps
SELECT "ROW...							0	TS5700	56	
INSERT INTO S...							0	TS5700	0	
DELETE FROM...							0	TS5700	56	
/* IBM_DSSNA...							0	TS5700	4	
/* IBM_DSSNA...							0	TS5700	4	
DECLARE DB_...									8	
DECLARE MSG...									8	
INSERT INTO S...									7,048	
DELETE FROM...									8	
DECLARE THR...									16	
DELETE FROM...									16	
DELETE FROM...									48	
DELETE FROM...	DISTSERV	DSNADM	DSNADMCD	0e4c9f2f06f2f6	13				24	
DECLARE DB2...	DISTSERV	DSNADM	DSNADMIZ	0e4c9f2f04f7f2f6	3				8	
INSERT INTO S...	DISTSERV	DSNADM	DSNADMIZ	0e4c9f2f04f7f2f6	2				2,768	
DELETE FROM...	DISTSERV	DSNADM	DSNADMIZ	0e4c9f2f04f7f2f6	1				8	
DECLARE GRO...	DISTSERV	DSNADM	DSNADMCD	0e4c9f2f06f2f3f6	6				28	
DECLARE MSG...	DISTSERV	DSNADM	DSNADMCD	0e4c9f2f06f2f3f6	1	316	183515			
INSERT INTO S...	DISTSERV	DSNADM	DSNADMCD	0e4c9f2f06f2f3f6	17	2118	183518			
INSERT INTO S...	DISTSERV	DSNADM	DSNADMCW	0e5f1f1d09f14040	1	289	4444			
DELETE FROM...	DISTSERV	DSNADM	DSNADMCD	0e4c9f2f06f2f3f6	13	1598	183517			

Range: 1-22 Total: 22 Selected: 1 Page 1

(*) Host variable collection ignores CURRENT SCHEMA. A result may contain host variable values collected when any value of CURRENT SCHEMA was in effect for the s

Tune SQL

Tuner Client: Data Server Manager (DSM) Configure DSM... / Query Workload Tuner

Tuner is not available. Please check configuration.

DB2 Subsystems: DBB6

Database Connection in DSM: CQM_RS27DDS6_PDS...

OK Close

Log in to Data Server Manager

In order to retrieve connection information, you need to provide your credentials for IBM Data Server Manager (DSM).

DSM User Name: admin

Password:

DSM: dsm:HTTP://nwt-vm-kjwin764:11080

Login Cancel

Show Raw SQL Text Tune

```
SELECT "ROWNUM", "TEXT"
FROM SYSIBM.SYSLOG ORDER
BY "ROWNUM"
```

Percent

No items to display

IBM Data Server Manager CQM_RS27DDS6_PDSOKO

Home
Administer
Run SQL
Monitor
Jobs
Optimize
Settings
Help

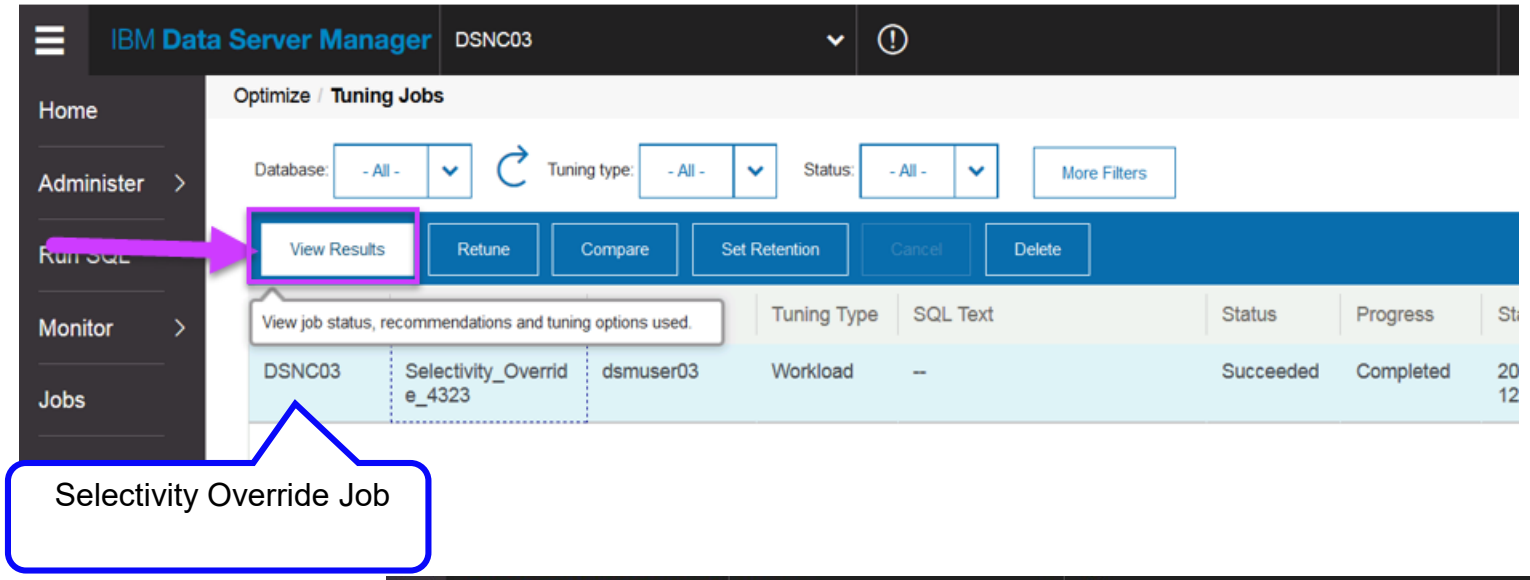
Query and Workload Job | Tuning Results(QM_6841) x

Database: - All - Tuning type: - All - Status: - All - More Filters...

View Results | Retune... | Compare | Set Retention... | Cancel

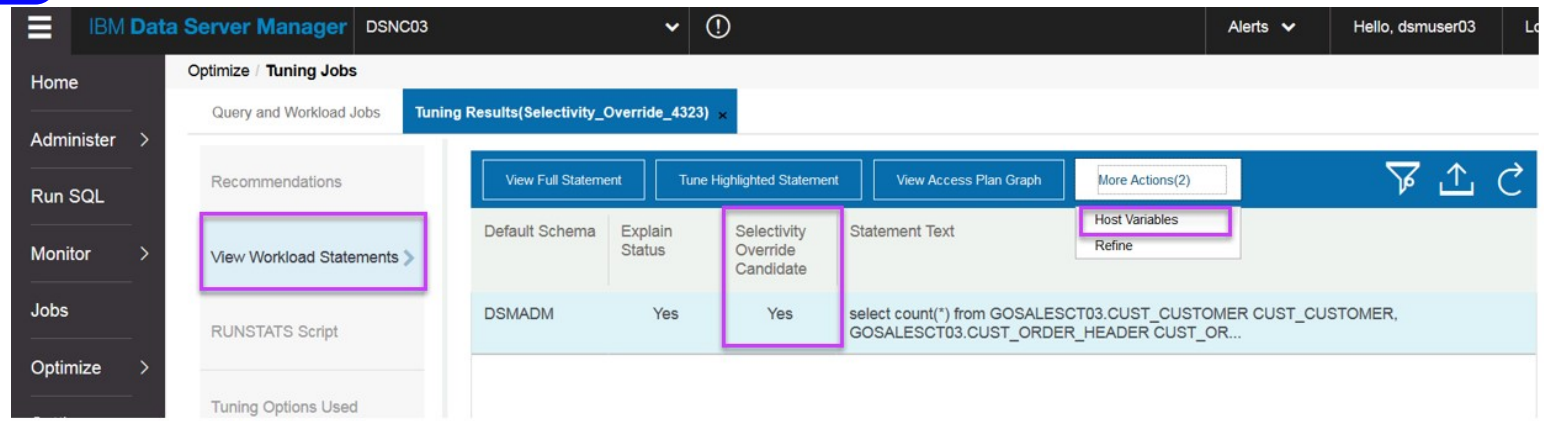
Database	Job name	Created by	Tuning Type	SQL Text	Status	Progress
CQM_RS27DDS6_PDSOKO	QueryMonitor6778	admin	Single-query	SELECT "ROWNUM","TEXT" FROM SYS IBM.SYSLOG ORDER BY...	Succeeded	Completed
CQM_RS27DDS6_PDSOKO	QueryMonitor4516	admin	Single-query	SELECT "ROWNUM","TEXT" FROM SYS IBM.SYSLOG ORDER BY...	Succeeded	Completed
CQM_RS27DDS6_PDSOKO	QM_6841	admin	Workload	--	Succeeded	Completed

4 Tune selectivity override



- Go to View Workload Statements, you can see the query is Selectivity Override Candidate

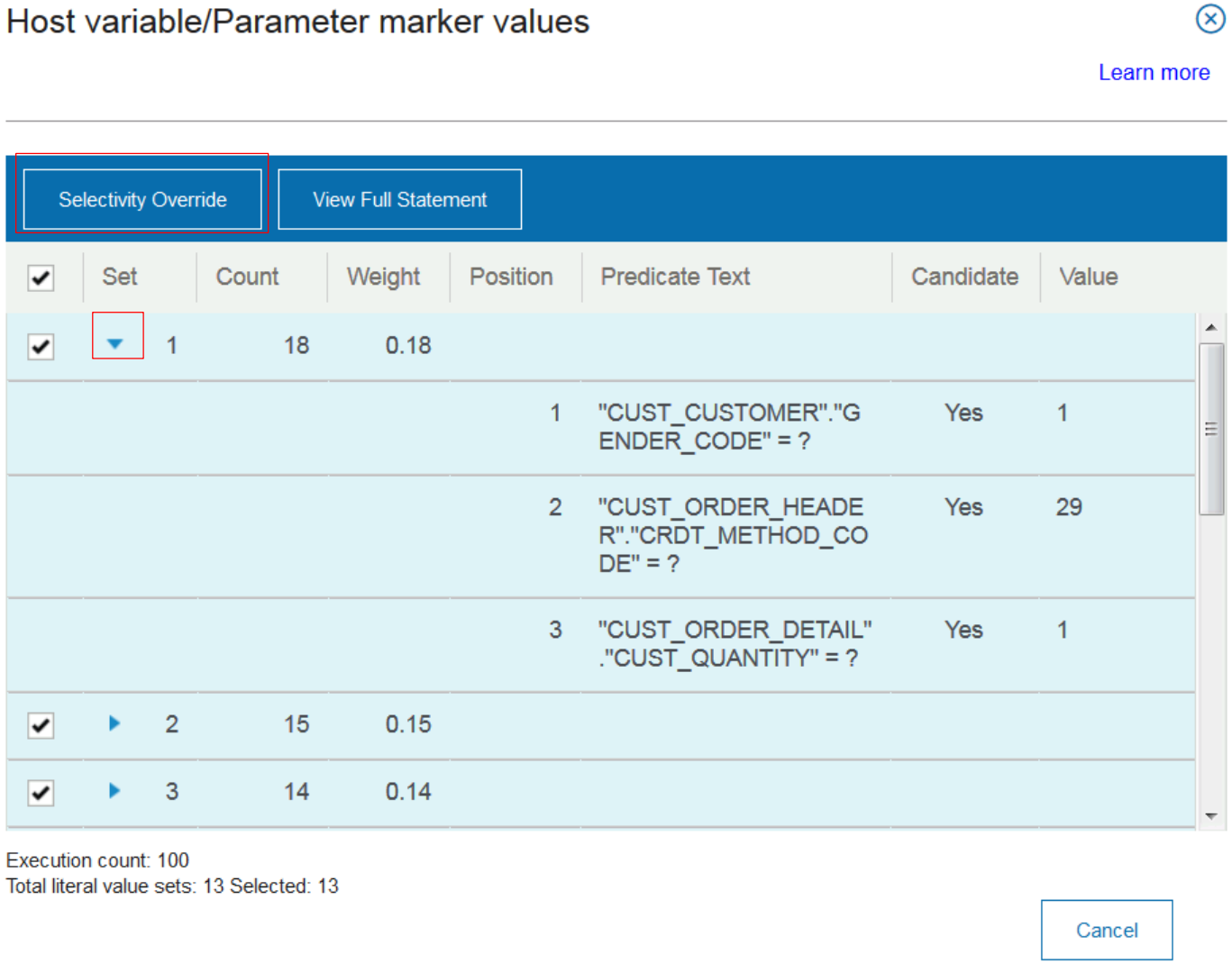
- Then, select Host Variables



optimize

Review analysis

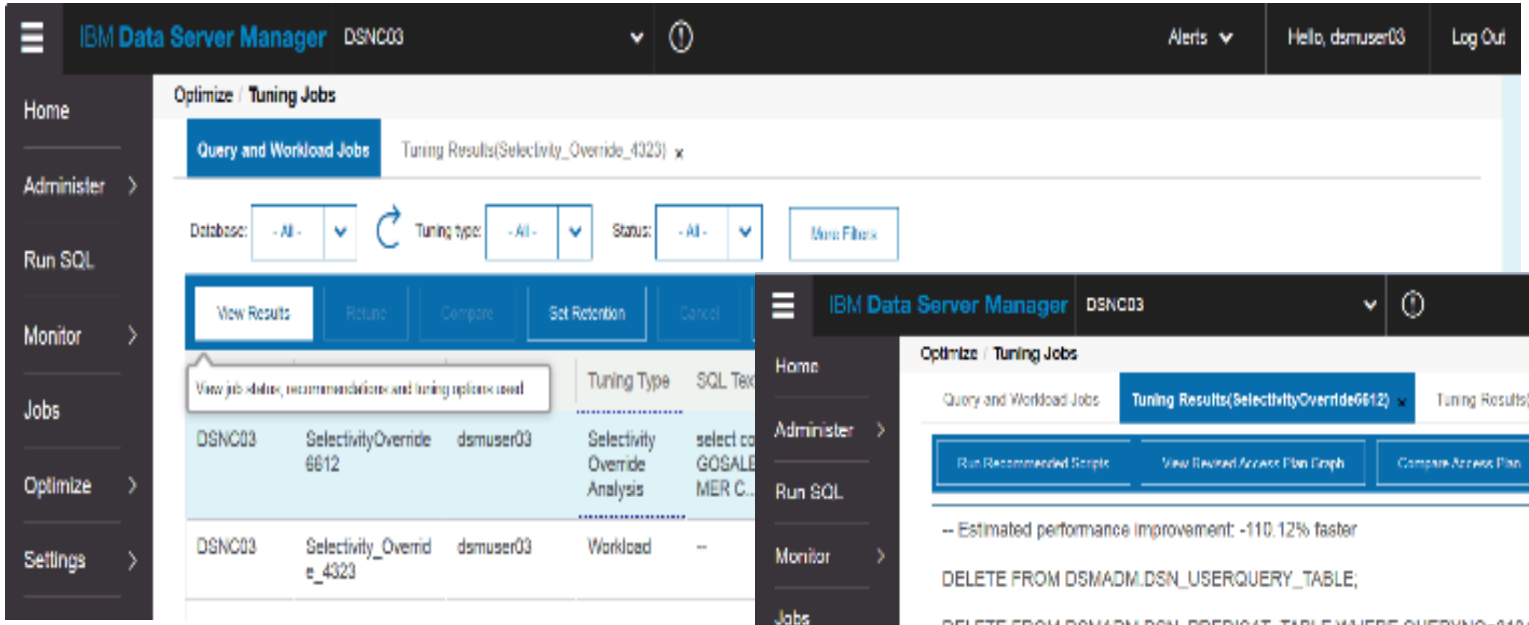
- In this dialog, you can see:
  - parameter markers distribution
  - Weight of each parameter marker value set
- Select the sets (all) for Selectivity Override analysis
- Click Selectivity Override



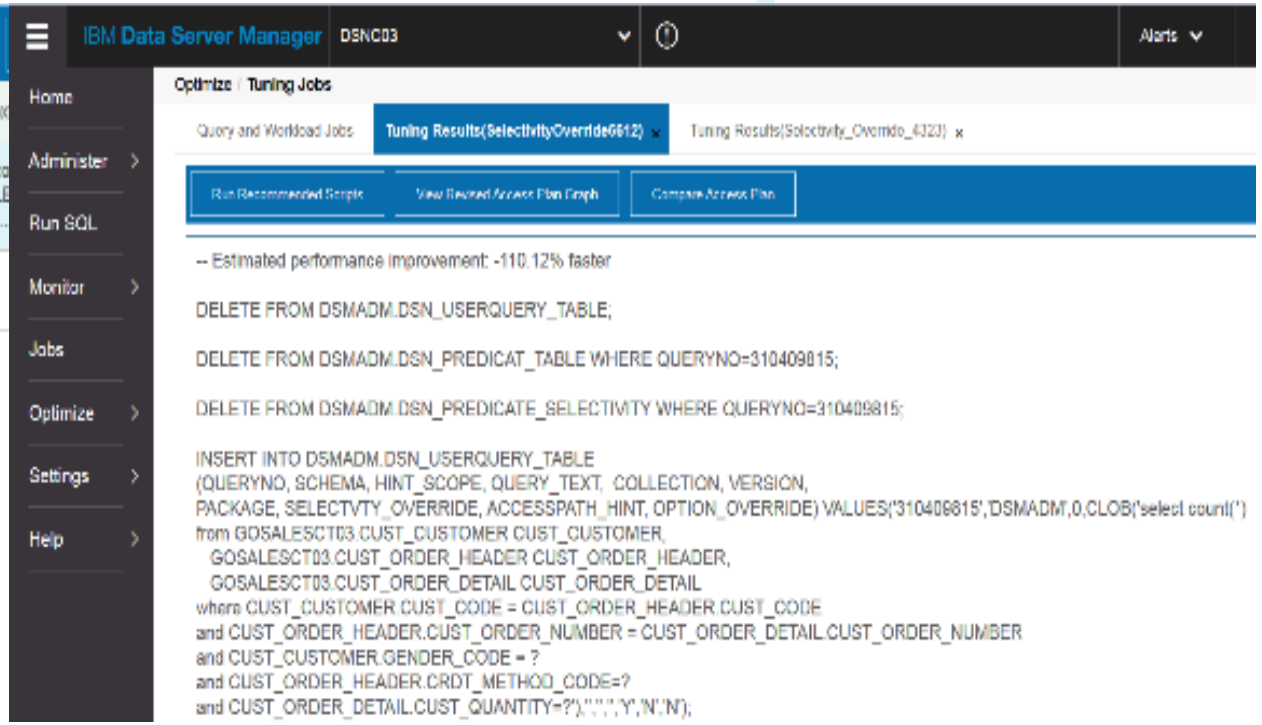
optimize

5 View results and deploy the selectivity profile

- A selectivity override analysis job is created
  - Click View Results when it is completed



- Run recommended scripts
- Flush the statement cache



6 Compare against baseline

- Run the test application again run after Selectivity Override analysis
- Average execution time for this application is: 92ms
- *Improvement of 26%*
- *On an already well-tuned query!!*

Execution Log

ID: 14 4703

Name: Appl

Database Name:

Start Time: 14

End Time: 148461

Result: The jo exec suc fully.

➢ **26% faster!!**

Commands Executed:

```
cd /tmp;
/usr/bin/java -jar /home/db2inst1/hol/queryTuning/Appl_Ad_Hoc_01.jar 4 0 01;
```

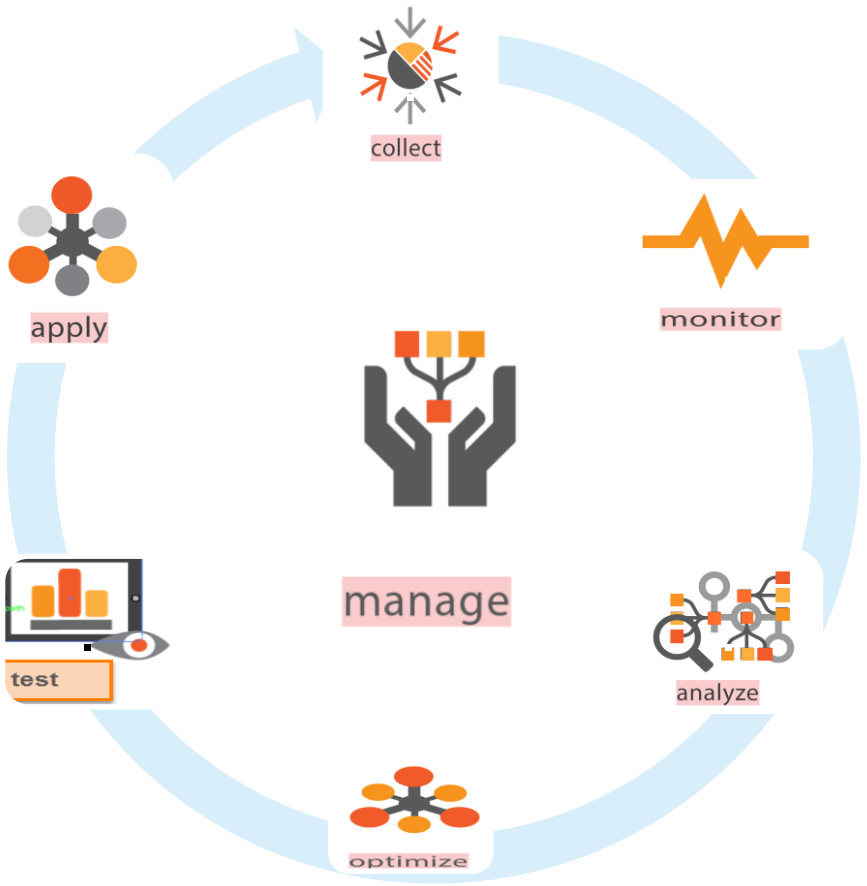
Output from executing:

```
Connected to DEMOMVS
Running program for: 4 minute(s)
Starting time: 18:17:01:823
.....................................................................
Ending time: 18:21:01:913

Execution count: 2595

Average execution time: 92ms
```

apply

IBM delivers complete DB2 performance management

- Reduce costs of DB2 for z/OS and applications
  - Improve performance of all package applications
  - Tune performance of query warehouse
- Identify and solve faster closing the loop on problem resolution
- Replace ad-hoc methods with integrated solutions for scalable, robust approach to performance management
- Improve performance and time to resolution by up to 50%
- Speed DB2 and application migration with comprehensive comparison capabilities



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Saghi Amirsoleymani

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For DB2® for z/OS®, Data Server Manager Base also offers advanced capabilities with centralized configuration management available in the DB2 Administration Solution Pack for z/OS. DB2 Query Workload Tuner for z/OS takes advantage of Data Server Manager Architecture either as an individual product or component of the DB2 Performance Solution Pack for z/OS.

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