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Optimize your SQL workloads for greater performance and reduced costs

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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

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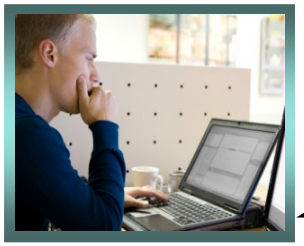
Performance tuning challenges across the organization

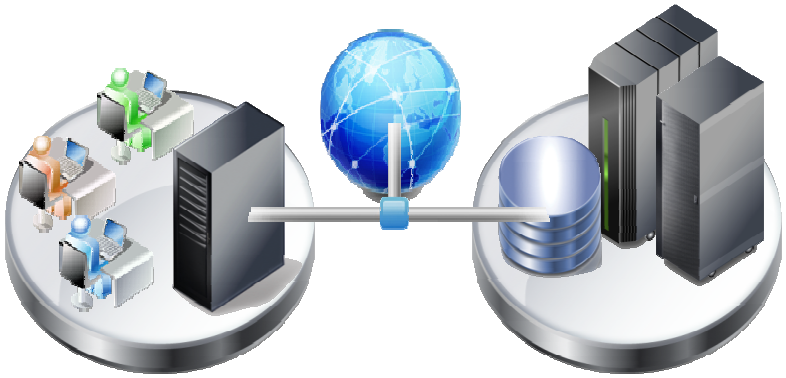


"I don't have time to hone my SQL skills. I need to focus on developing core application functionality."

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."

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IBM zEnterprise and DB2 Analytics Accelerator

Driving revolutionary change

Transactional Processing

Analytics Workload

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

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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)

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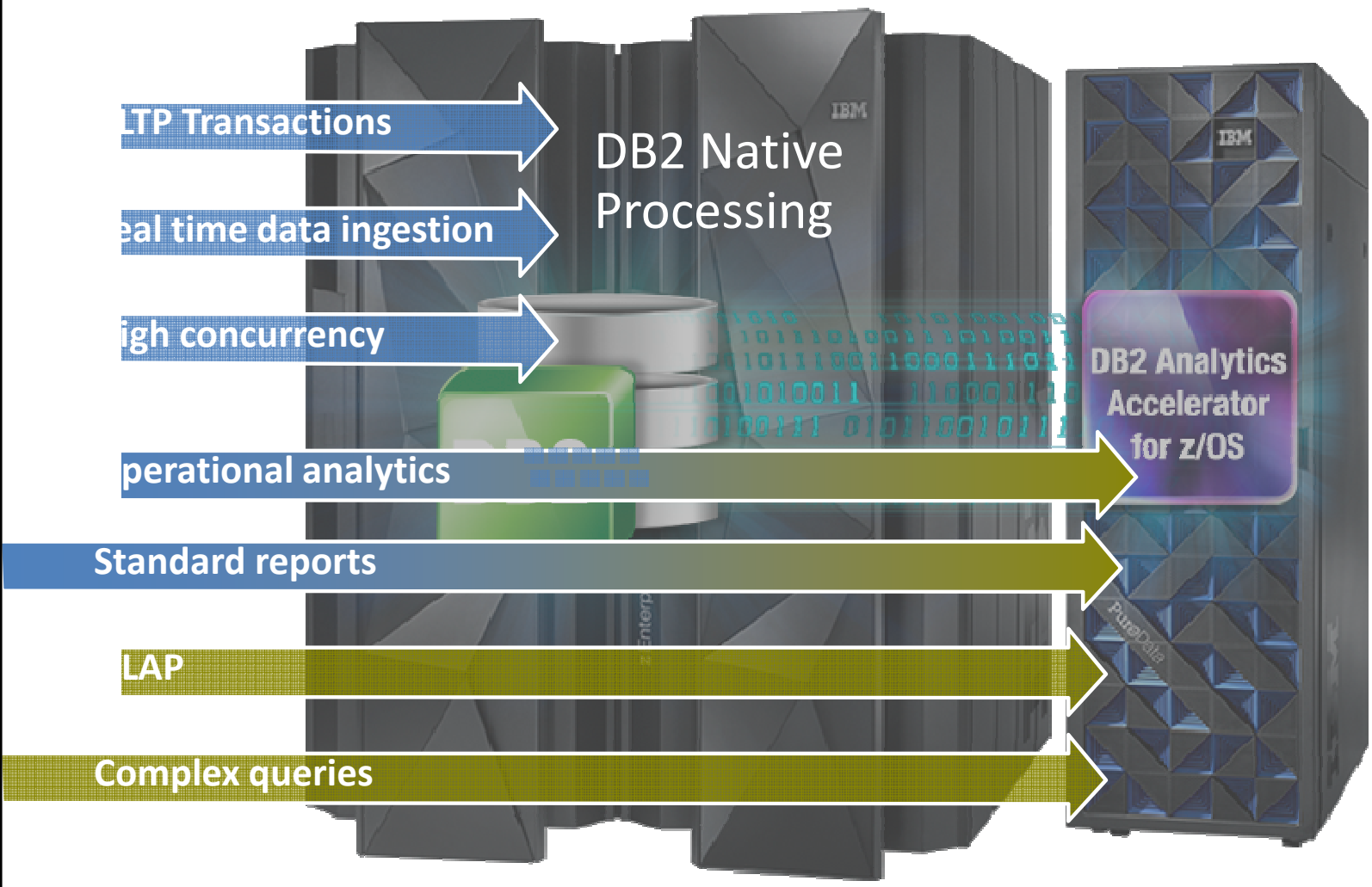
DB2 11 for z/OS and IBM DB2 Analytics Accelerator



- CPU savings benefit DB2 query workloads including short running operational analytics, and reporting
- DB2 Analytics Accelerator benefits data warehouse, OLAP, and complex query workloads

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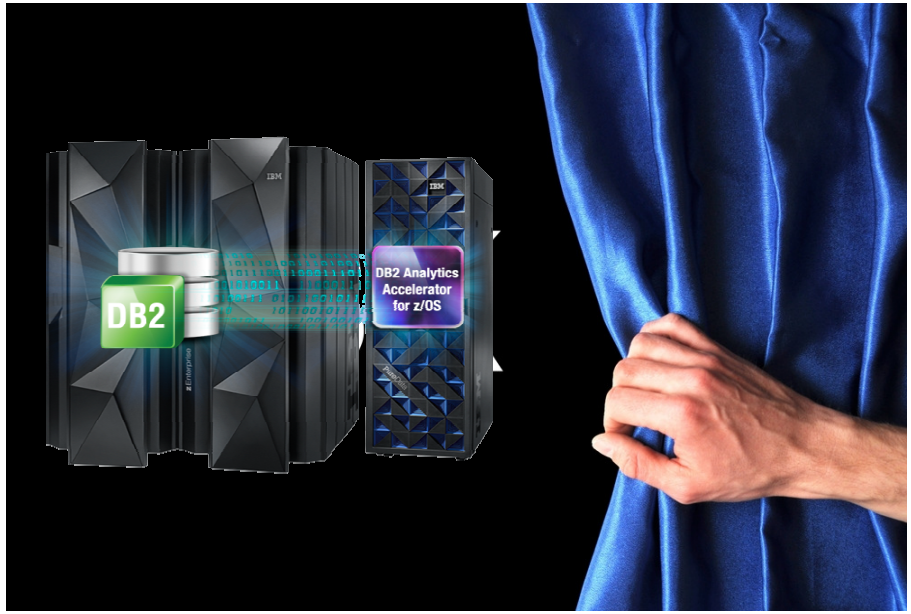
How IBM DB2 tools can maximize Accelerator value

- 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?



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IBM DB2 Tools: Maximizing your Analytics Accelerator Investment

Manage and Administer

DB2 Admin/OC

Performance Load with options

DB2 Analytics Accelerator Loader

Monitor and Identify

Query Monitor for DB2

Analyze and Report

OMEGAMON XE for DB2 PE

Compare and Tune

Query Workload Tuner for z/OS

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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?

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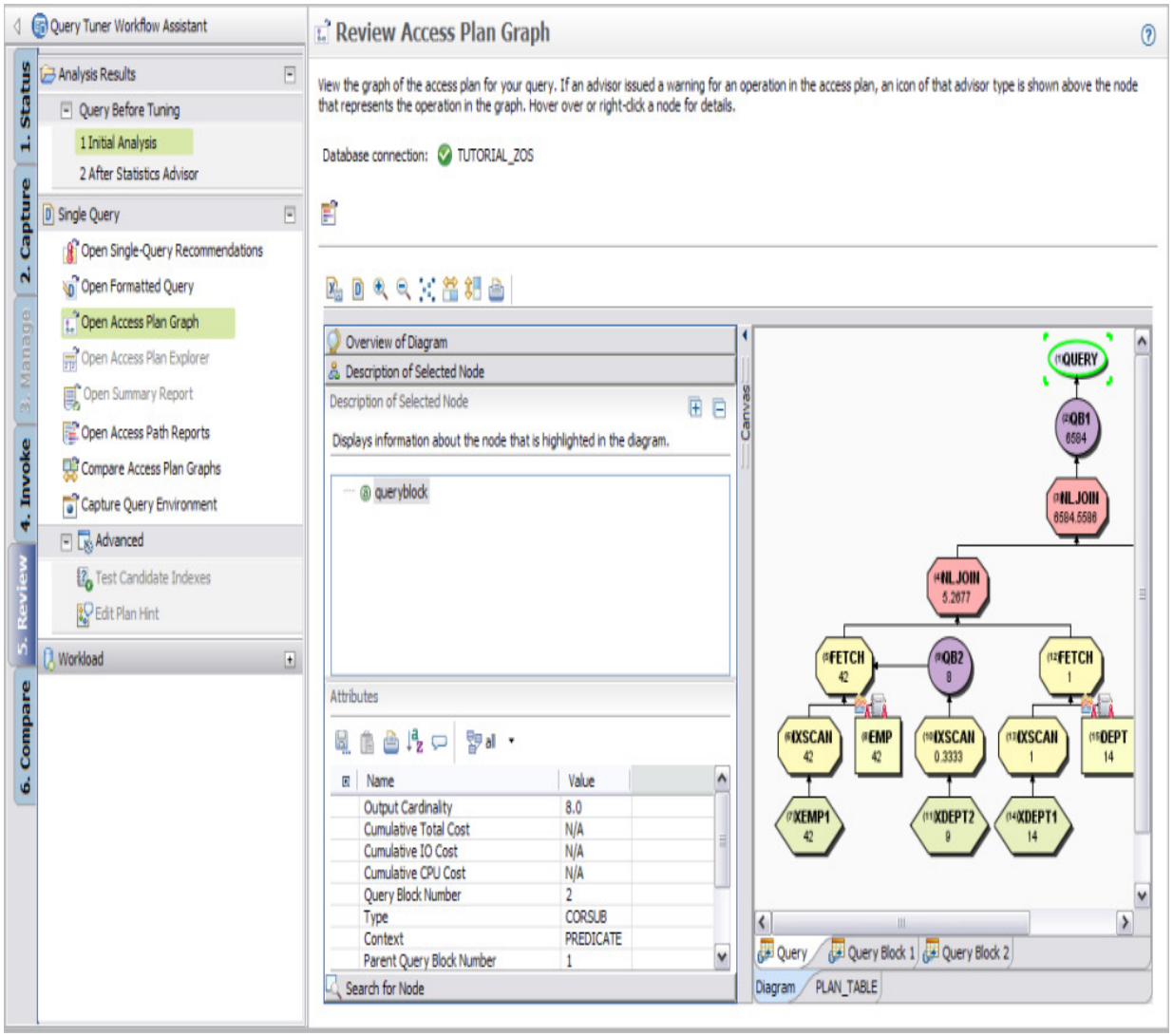
Expert-Enabled Query Tuning Out of the Box

- **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
  - new **Improve accelerated queries**



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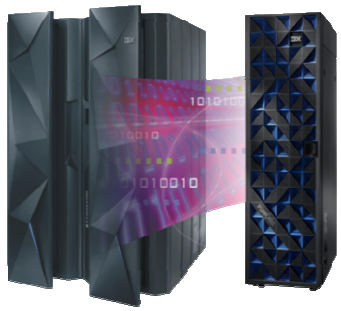
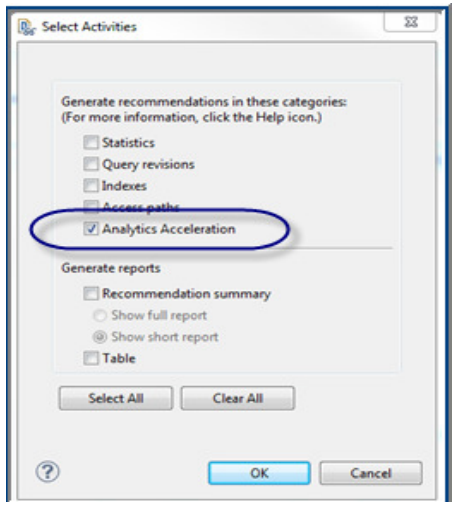
Optimizing the Selection, Tuning and Access Plan Analysis of Accelerated Workloads



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

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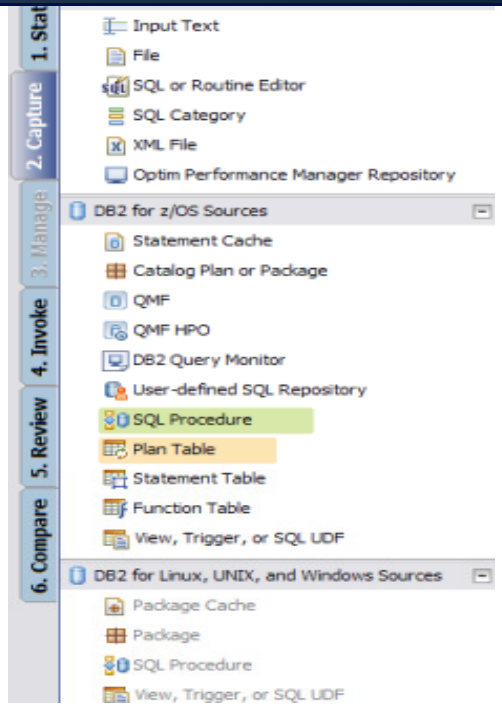
Streamlined Performance Analysis

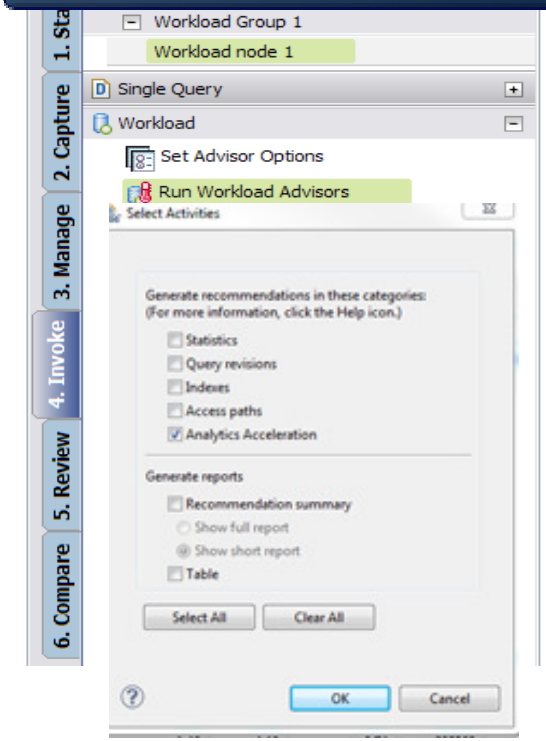
1

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

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Gather Queries and Workloads

DB2

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

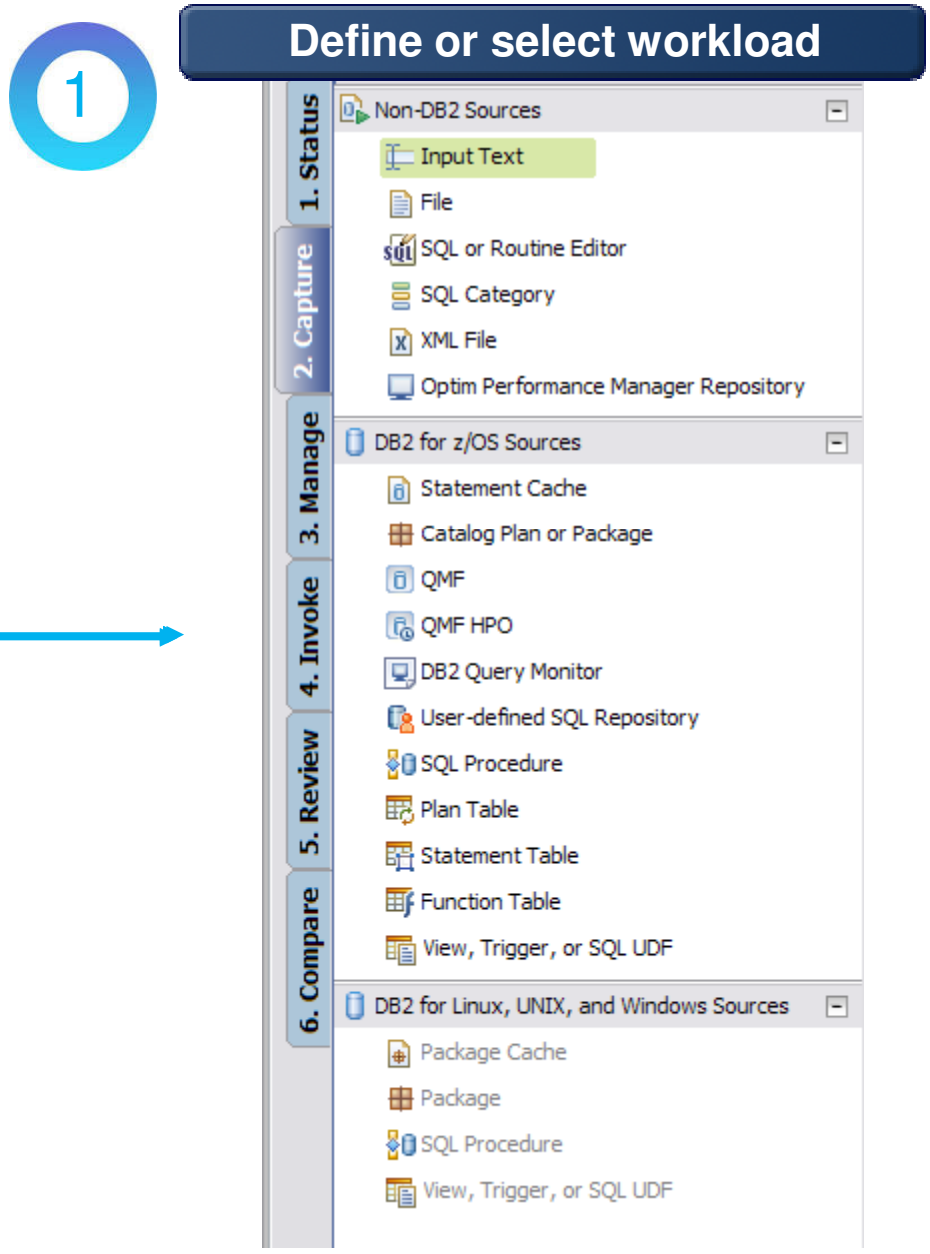
QMF and QMF HPO

DB2 Query Monitor

OMEGAMON XE for DB2

File, text, or exported workload

User defined SQL Repository



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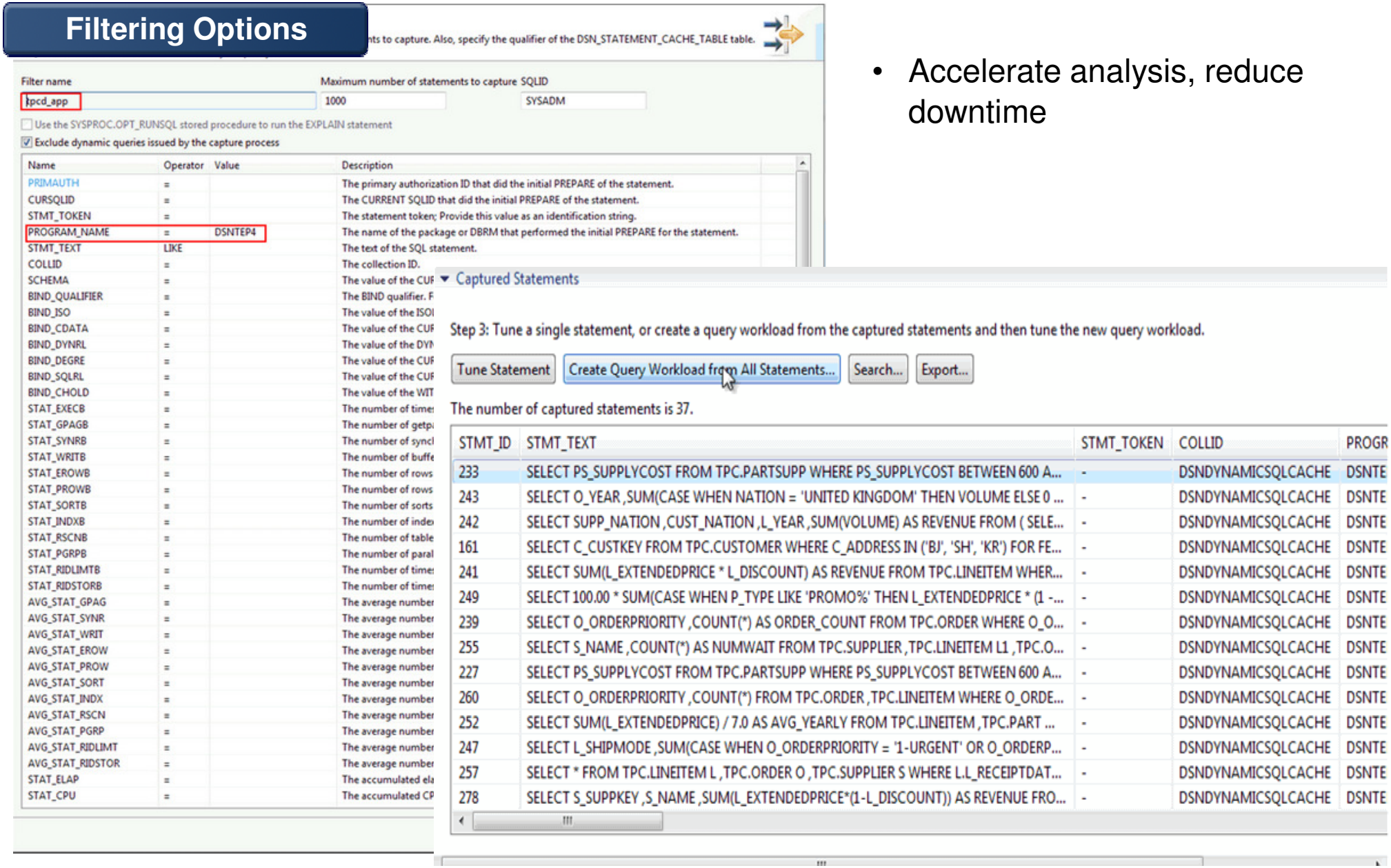
Customize Query Workloads

Filtering Options



- Accelerate analysis, reduce downtime

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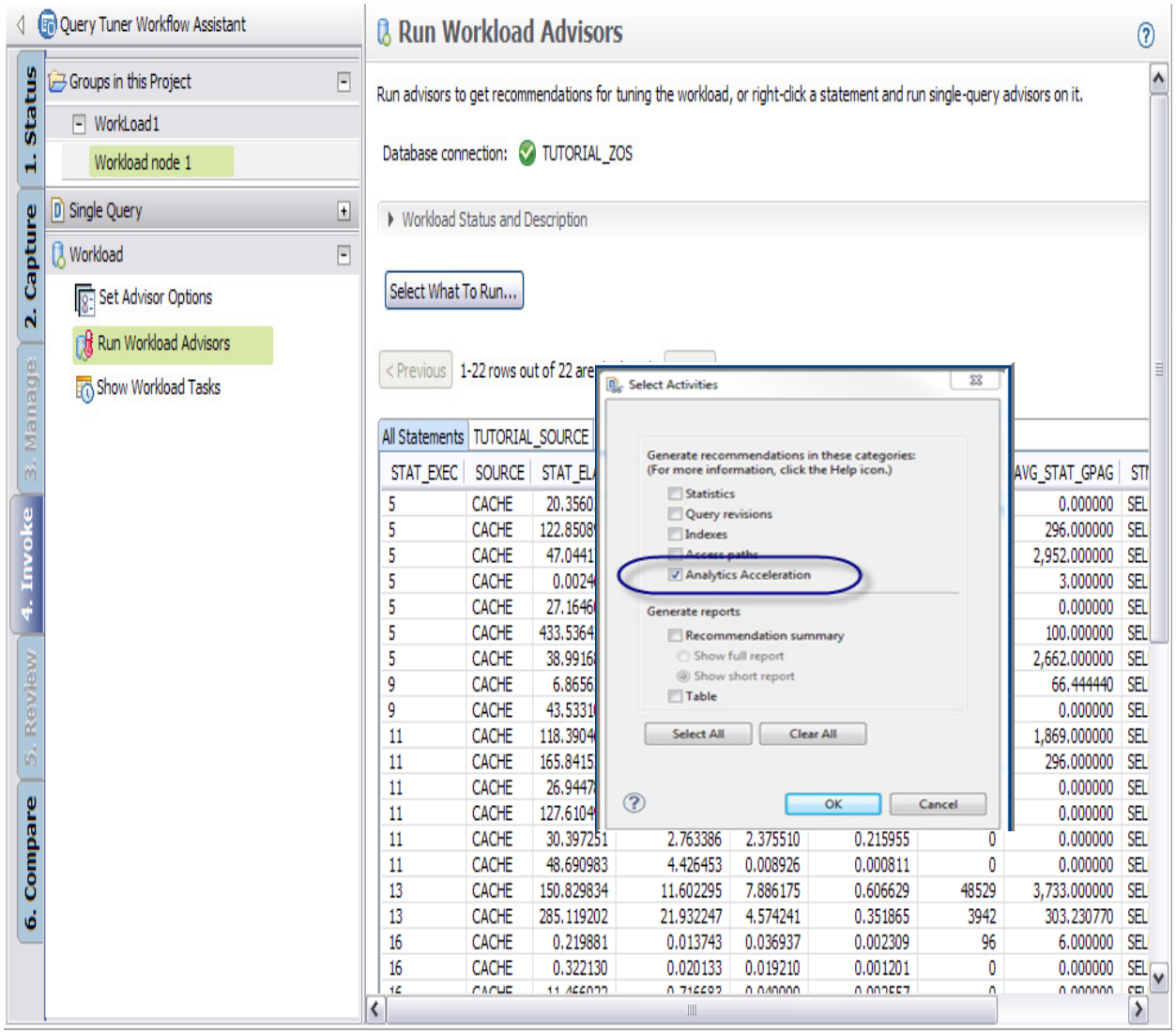
2 Execute Advisors



- **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

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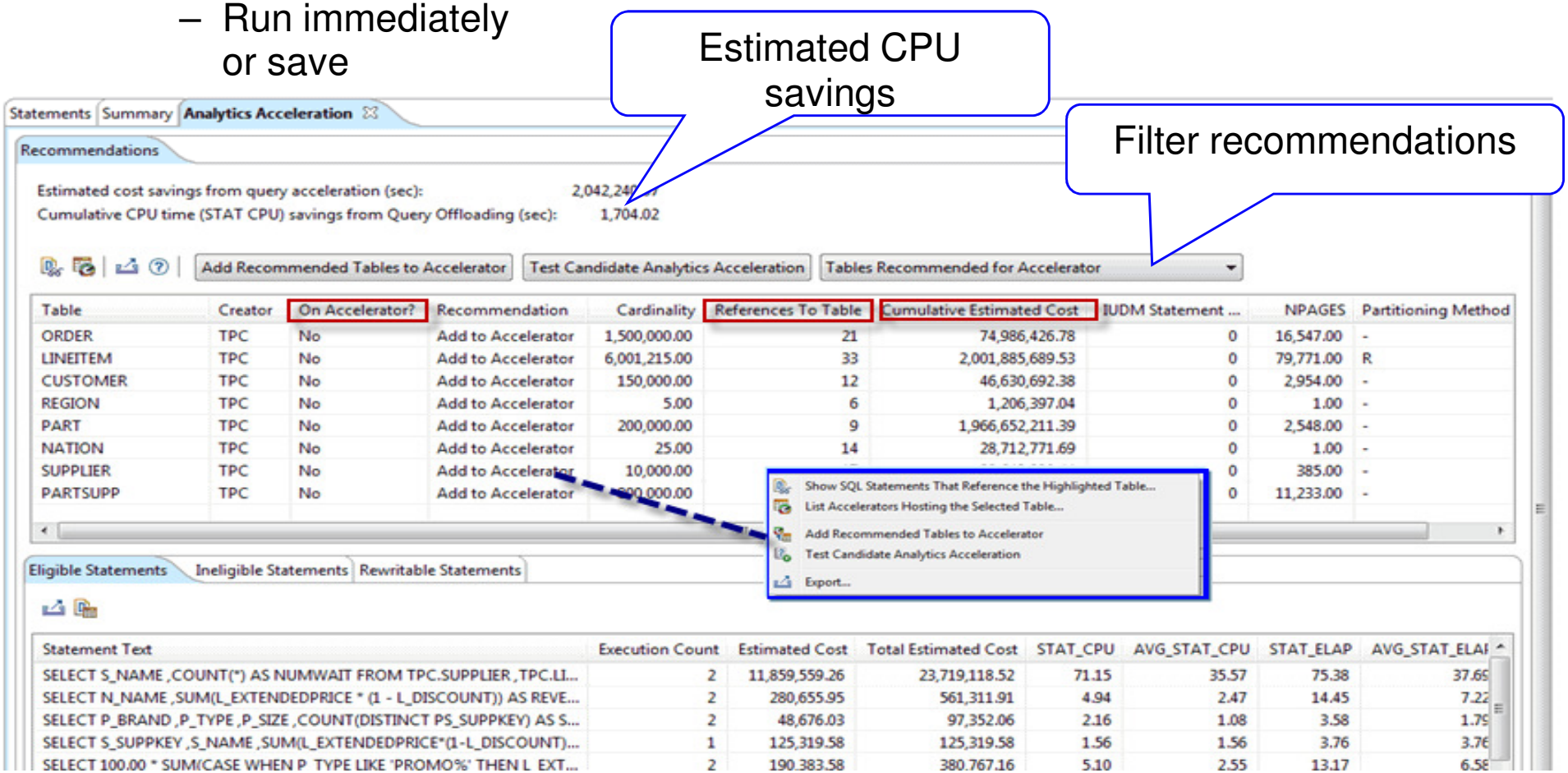
3 Drill down to advice for accelerated workload

- 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



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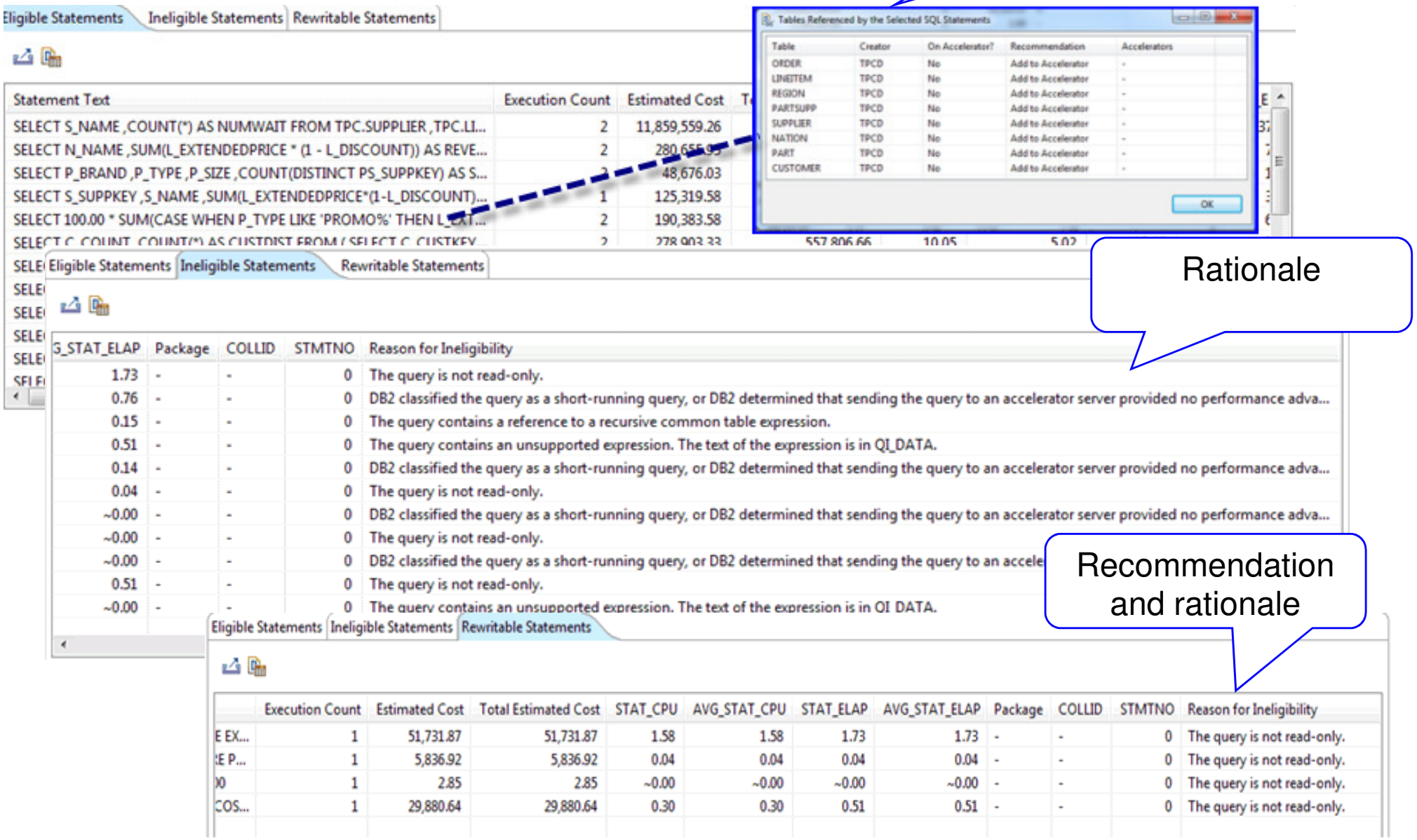
3 Drill down to advice for accelerated workload



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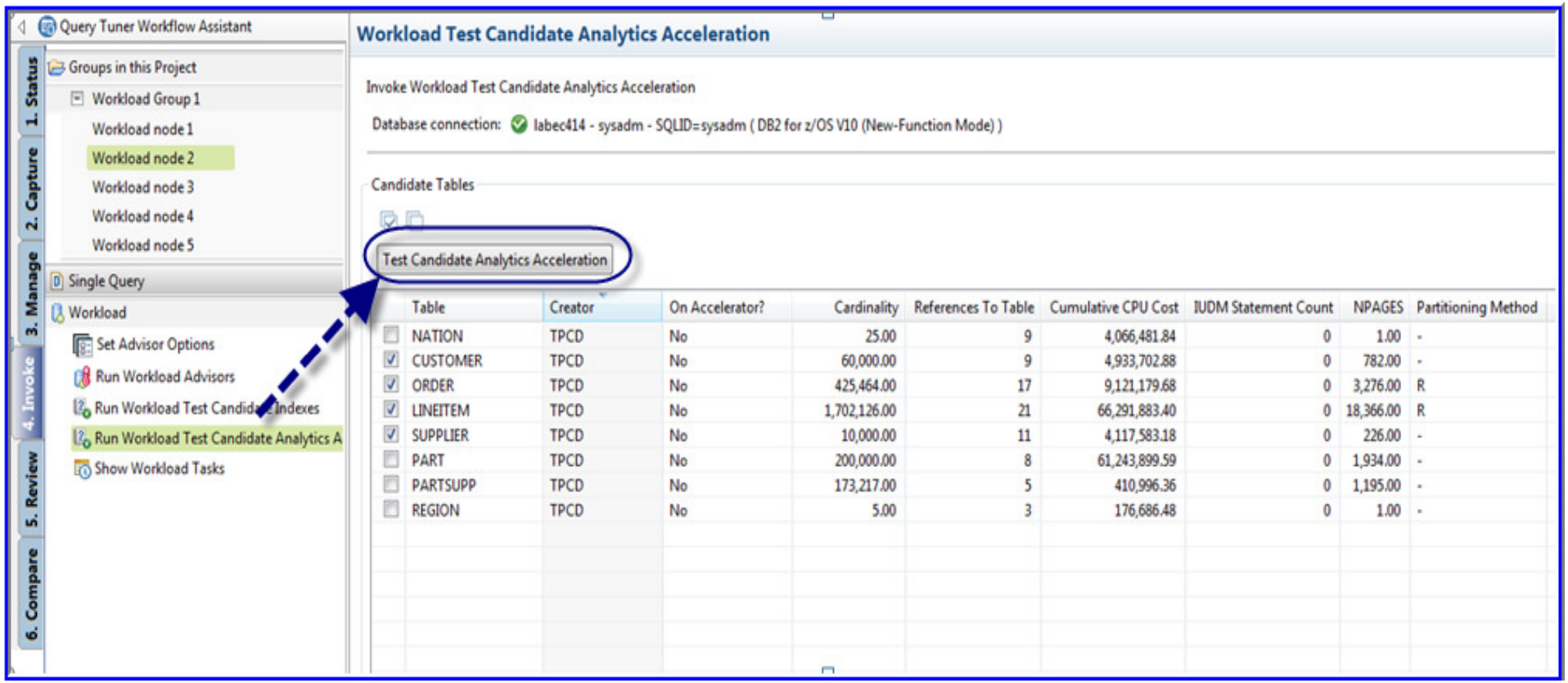
4 Test Candidate Analytics Acceleration



Test before deployment

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

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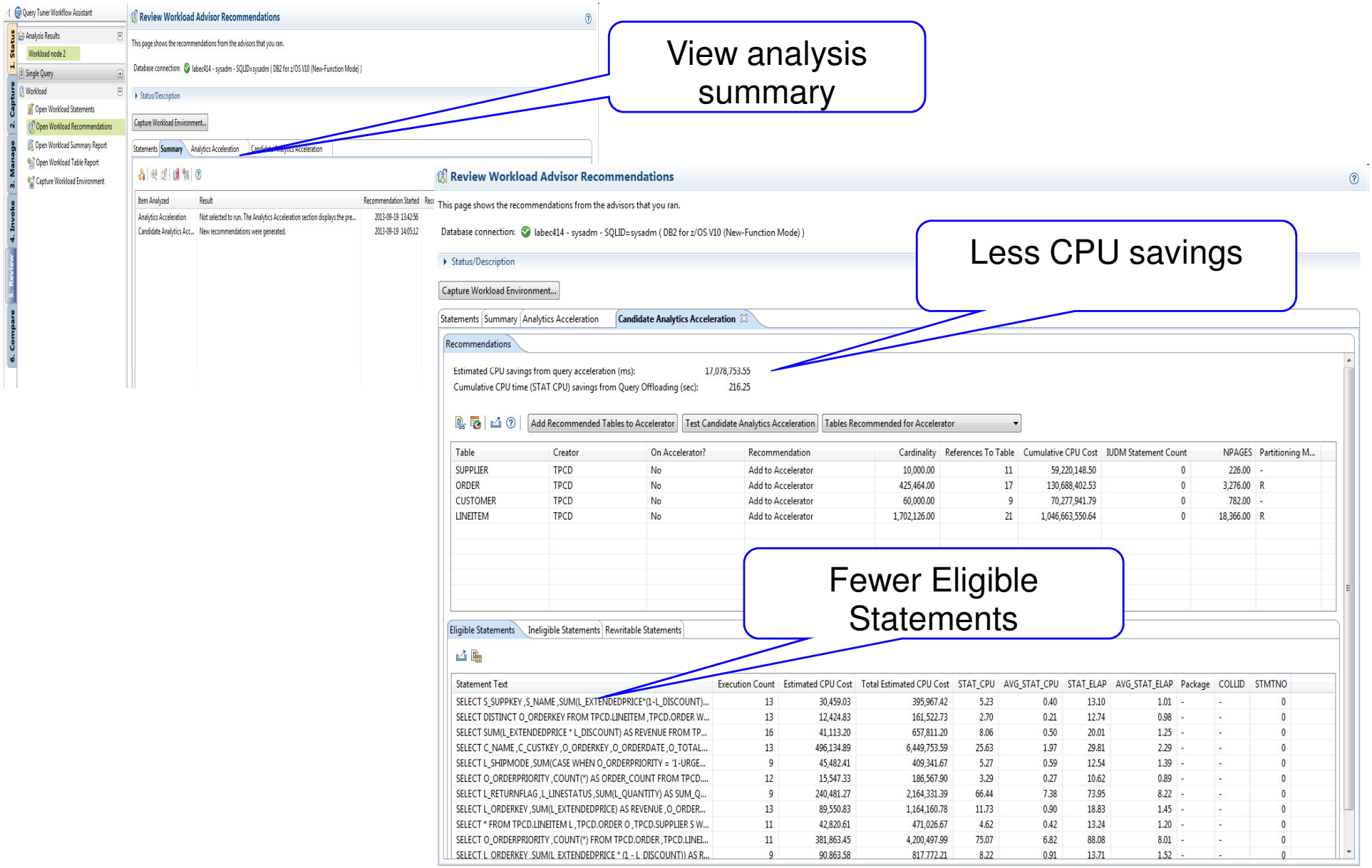
4 Validate Analytics Acceleration Result



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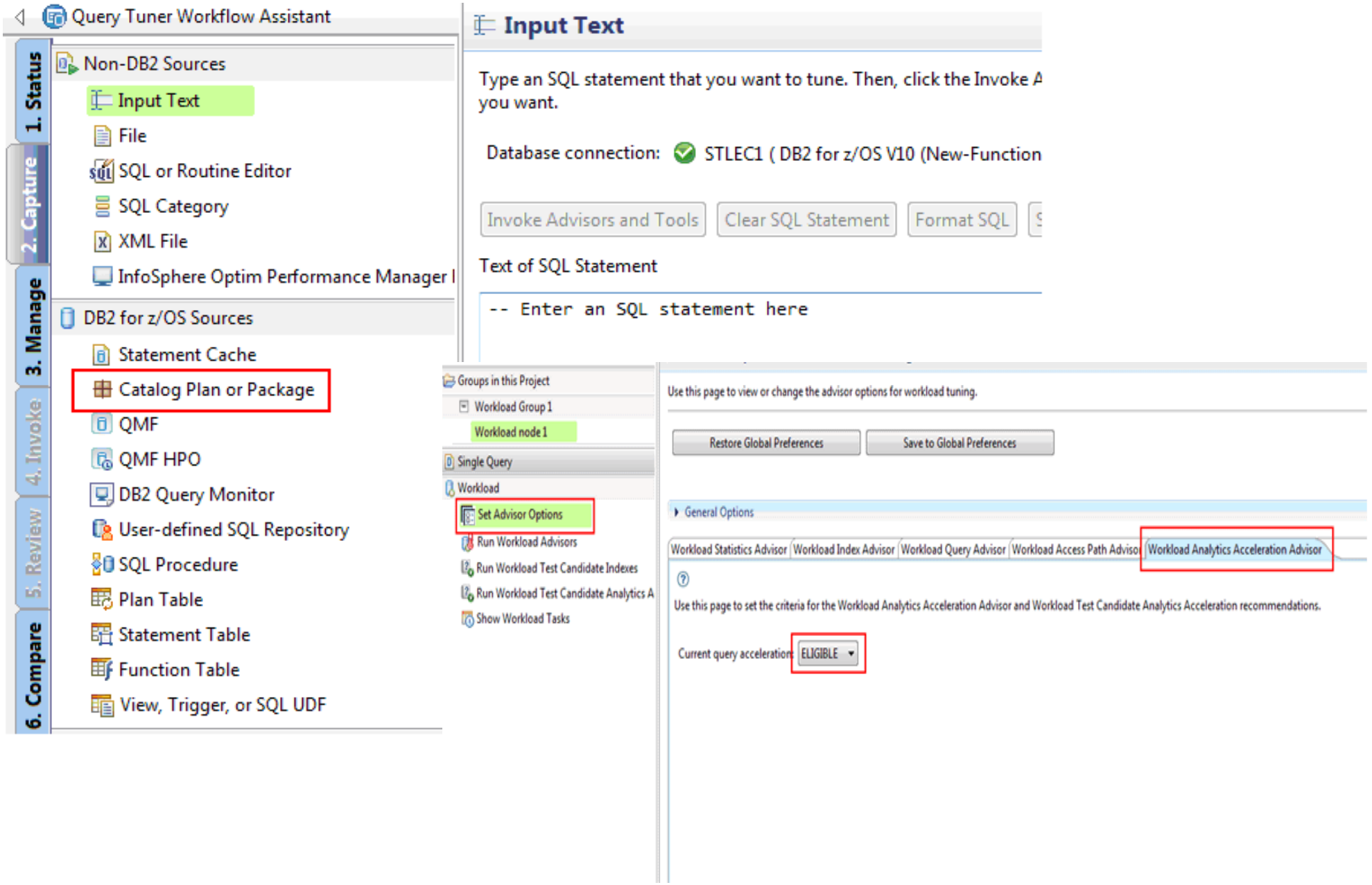
Hybrid Workloads



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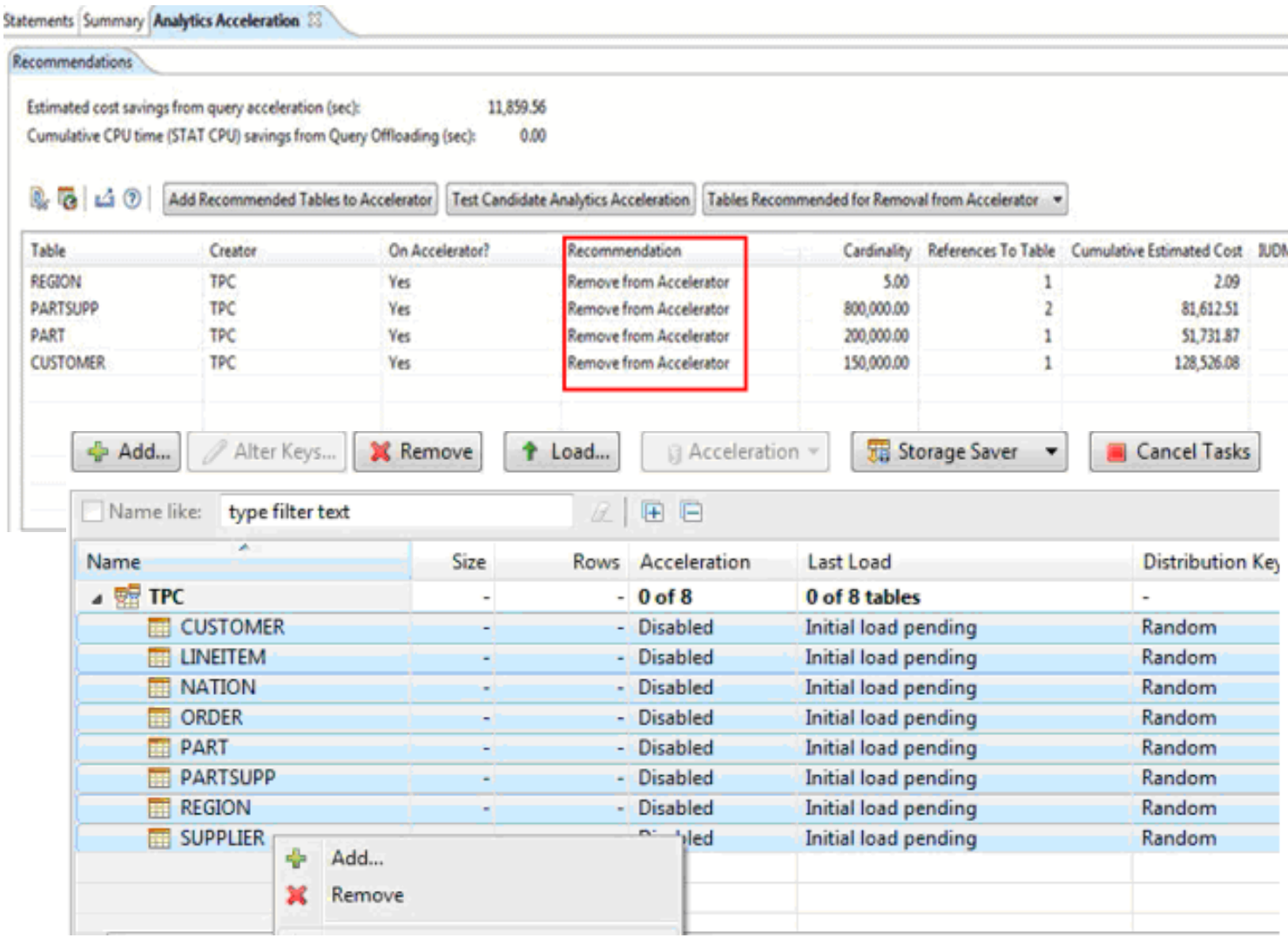
Removing Tables from the Analytics Accelerator



- Analyze tables with existing accelerator as consideration
- Recommendation table to remove from Accelerator

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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 recommendation
  - 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

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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=1aYsZUWsylg

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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

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