Testing changes in enterprise database environments is a difficult and costly task for IT organizations. In this video, we will see how an IT team at a fictional outdoor equipment retailer, the Sample Outdoor Company, overcomes this challenge with IBM InfoSphere Optim Workload Replay.

When organizations introduce changes to their enterprise database systems it is hard to know how these changes will affect business applications. These changes need to be tested carefully before they are introduced in production, to ensure that no service disruption or performance degradation is introduced, as this might lead to costly rollbacks to restore service. Even worse, customer Service Level Agreements might be missed, lowering customer satisfaction and leading to loss of business opportunities or revenue.

IT teams need to create and run reliable, efficient, and comprehensive tests with workloads that simulate production. This can be a time consuming, labor intense, and costly process. In addition, automated regression tests often cover only a small fraction of the production workload, and sometimes do not include the right mix of application stacks or number of users that is normally seen in production.

To help IT organizations meet these challenges, IBM has developed InfoSphere Optim Workload Replay, or Workload Replay for short. This web based tool lets them capture production workloads, replay them in a test environment, and analyze the potential impact of changes to their enterprise database environments.

Let’s see how the IT team at the Sample Outdoor Company uses Workload Replay to efficiently validate planned changes to their database production environment.

(Scenario)

In this scenario, Shelly, a DBA with the company, wants to adopt BLU Acceleration to improve her DB2 for Linux, UNIX, and Windows database performance. Before she makes any changes to the production environment, she wants to use Workload Replay in a test environment to verify that the required upgrade from DB2 version 9.7 to version 10.5 and the additional conversion to BLU Acceleration will improve performance, and not introduce any problems.

This verification process has two stages:

In the first stage, Shelly creates a baseline workload to validate that her test environment behaves like the production environment.

She completes the following four tasks:

First, she captures a representative production workload for the analytic applications that run on DB2 version 9.7.
Second, she transforms the raw captured workload to a replayable format and prepares the test environment by cloning the production database to a test database with DB2 version 10.5.

Third, she replays the captured workload in the test environment.

Last, after the workload replay completes, she creates a report to compare and analyze the accuracy of the replayed workload.

In the second stage, Shelly implements DB2 with BLU Acceleration for the workload, and validates that the baseline workload runs successfully with improved performance.

She completes the following tasks:

First, she exports the workload from Workload Replay, and uses Query Workload Tuner to identify and convert some tables from row-based to column-based format for BLU Acceleration.

Second, she replays the baseline workload in the accelerated test environment.

Finally, she creates a report to verify that BLU Acceleration has the desired positive impact on the performance of the SQL statements.

Let’s see how Shelly can easily use Workload Replay to complete this scenario.

(Stage 1 – Capture)

First, Shelly logs on to the Workload Replay web console, opens the Capture and Replay tab, and gets to the folder that she previously created for this project. She wants to schedule a production workload capture:

She clicks Capture and enters a descriptive workload name.

She selects the production database from her list of database connections.

She schedules the start time, and duration of 60 minutes.

She adds a descriptive note to help her identify the workload later.

Finally, before she can add the scheduled workload capture she must enter user credentials to validate that she is authorized to capture workloads in the selected production database.

This workload capture is now scheduled.
Later, Shelly checks back to see that the workload has been captured. She has the option to review the captured workload before replaying it to ensure that the workload has been correctly captured.

The Capture Report includes summarized information about unique SQL statements and transactions, as well as basic execution metrics.

(Prepare)

Next, Shelly prepares the test database for replaying the workload.

In general, the test database needs to mimic the state and content of the production database before the production workload was captured. This can, for example, be done by restoring a backup image.

Next, Shelly transforms the captured workload to a replay-ready workload:

She selects the database connection for the desired test database.

She enters and validates the database user credentials that will be used to run all captured SQL statements on the test database.

She proceeds, and provides the required user credentials to confirm that she’s authorized to transform the workload.

After the workload transform is done, Shelly has the option to create a Transform Report to preview the prepared SQL workload that will be executed during the replay.

The transform report includes three tabs. The Details tab displays information about the report generation. The two other tabs display information that is similar to what was displayed in the Capture Report. The main difference is that this report displays the workload’s SQL statements with the optional schema mapping information in place.

(Replay)

Now, Shelly can replay the workload on the test database.

She verifies that the correct test database is selected.

She then replays the workload.

While the workload is replaying, inbound database traffic is automatically captured as a new replayed workload for comparison.
(Compare and Analyze)

After the workload has replayed, Shelly moves on to the Compare and Analyze task to validate that the replayed workload is a valid baseline.

She chooses the default option to compare the selected replayed workload with the original captured workload, and then starts the report generation.

The comparison report is used to determine the accuracy of the replayed workload, and to identify performance differences.

The Replay Results tab is a high level summary. From here Shelly can drill down into more granular information if needed. In this example, the results show that 1139 SQL statements were successfully executed and that they all matched perfectly, giving 100 percent accuracy. The report consolidates all the matching SQL statements to a list of 22 unique SQL statements.

No unmatched statements are listed. Unmatched statements might result from different return codes or number of rows returned and updated during the SQL execution.

There are no new SQL statements. No other applications that could cause new SQL statements were running while the workload was replayed.

The information shown at the bottom of the table is broken down by transactions. All transactions replayed successfully, and there are no new transactions.

Shelly clicks the link to drill down to view the aggregated information for each unique SQL statement. The report consolidates the SQL statements by grouping the matching SQL and replacing literal values with parameter markers.

Next, she wants to make sure that no performance anomalies occurred.

In the Response Time tab, she notices that there is a bit of improvement in the response time. This is expected as the workload replayed on DB2 version 10.5. The Number of executions chart shows that the captured and replayed workloads match, as does the Number of rows returned chart.

(Stage 2 - Prepare)

With this report showing the accuracy of the replayed workload, Shelly confirms that she has a good baseline for the test environment and moves on to stage two – where she will assess how BLU Acceleration affects the database performance.

She exports the replayed workload to an XML file that she will use with Query Workload Tuner to identify and convert good candidate tables from row-based to column-based format for BLU Acceleration.
For the scope of this demo, we will not show that part. You can refer to the resources section for more information on this BLU Acceleration process.

(Replay after BLU acceleration)

Now, Shelly replays the workload again on the now BLU Accelerated test database.

(Compare after BLU acceleration)

Next, Shelly creates a report to analyze how BLU acceleration affected the workload execution.

This time she compares the baseline workload execution characteristics and the BLU accelerated workload execution.

In the report, the Replay Results tab shows all statements were successfully executed with 100 percent accuracy. The Response Time tab shows the cumulative response time has improved 89 percent, with the same number of SQL executions and number of rows over time. The replay elapse time is faster than the baseline elapse time.

The improved SQL statements tab, sorted by total response time change, shows the SQL statements that benefited the most from BLU Acceleration.

Shelly drills down further on the first entry to see the aggregated SQL statements and their execution details, including the top improved response time, and comparison for each statement in the two replays.

Based on the metrics on the Response Time tab and further analysis of the report, Shelly confirms that performance has improved significantly as a result of the BLU Acceleration. She plans to implement these changes in the production environment with great confidence!

Shelly is happy that she can easily and quickly validate the impact of the BLU Acceleration on the actual production workload.

(Summary)

In this video we have seen how Shelly and her IT department can use IBM InfoSphere Optim Workload Replay to save time and resources when validating the impact of planned changes to her enterprise database environment.
Workload Replay lets organizations fully assess and rigorously test the outcome of enterprise life cycle changes before deploying the changes to production. Changes such as hardware or software upgrades, new applications, performance tuning, migration, consolidation, and retirement can be tested in a consistent and cost efficient process.

Workload replays can be tailored to meet a variety of test objectives such as performance stress test, capacity planning, and growth.

With Workload Replay, organization can reduce the costs and the risks of life cycle changes, avoid potential service disruption and expensive rollbacks, and meet SLAs for availability and reliability with minimal performance overhead, with support across heterogeneous enterprises that include all major database servers.

To improve performance in large DB2 environments, Workload Replay version 2.1.0.1 supports server load sharing where multiple Workload Replay auxiliary servers are controlled by one main server and share the SQL capture and replay work.

For scalability, Workload Replay version 2.1.0.1 supports server load sharing with multiple Workload Replay auxiliary servers.

For more information about InfoSphere Optim Workload Replay and the related InfoSphere Optim offerings, visit us on the web at the links shown here.