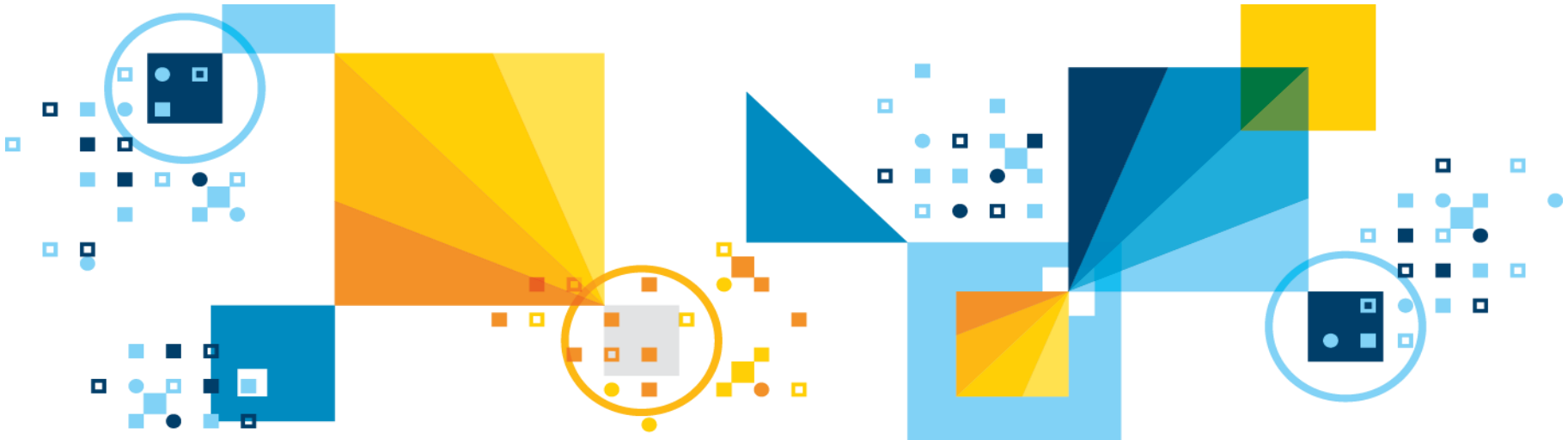IBM

IBM Data Studio

Module ID | 10102

Length | 1 hour + 1 hour Hands on Lab

For questions about this presentation contact askdata@ca.ibm.com

Disclaimer

Module Information

- You should have completed or acquired the necessary knowledge for the following modules in order to complete this module:
    - DB2 Fundamentals

- After completing this module, you should be able to:
    – Describe the major functions of Data Studio
    – Able to perform:
        • Establish a database connection
        • Browse database objects
        • Leverage task assistants to carry out administrative tasks
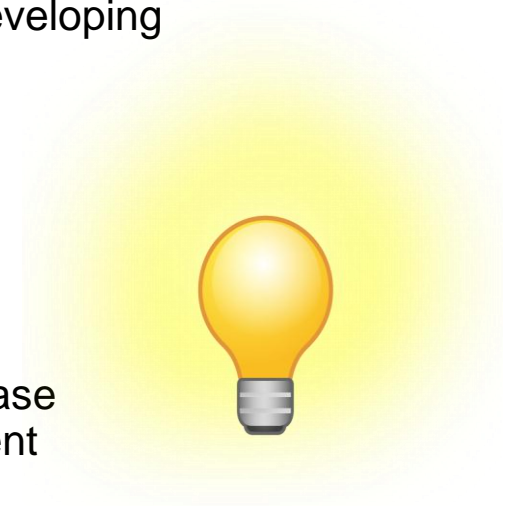   • Analyze data access plans using Visual Explain

Module Content

- **IBM Data Studio**
  - Past and Future
  - Installation
  - UI layout and basic navigation
  - Administration using Data Studio
    - System administrative tasks
    - Database objects management
    - Query development
    - Query tuning
    - DB2 10 features support

- **Monitor using Data Studio Web Console**

- **Optim Query Workload Tuner**

- **IBM DB2 Advanced Recovery Feature**

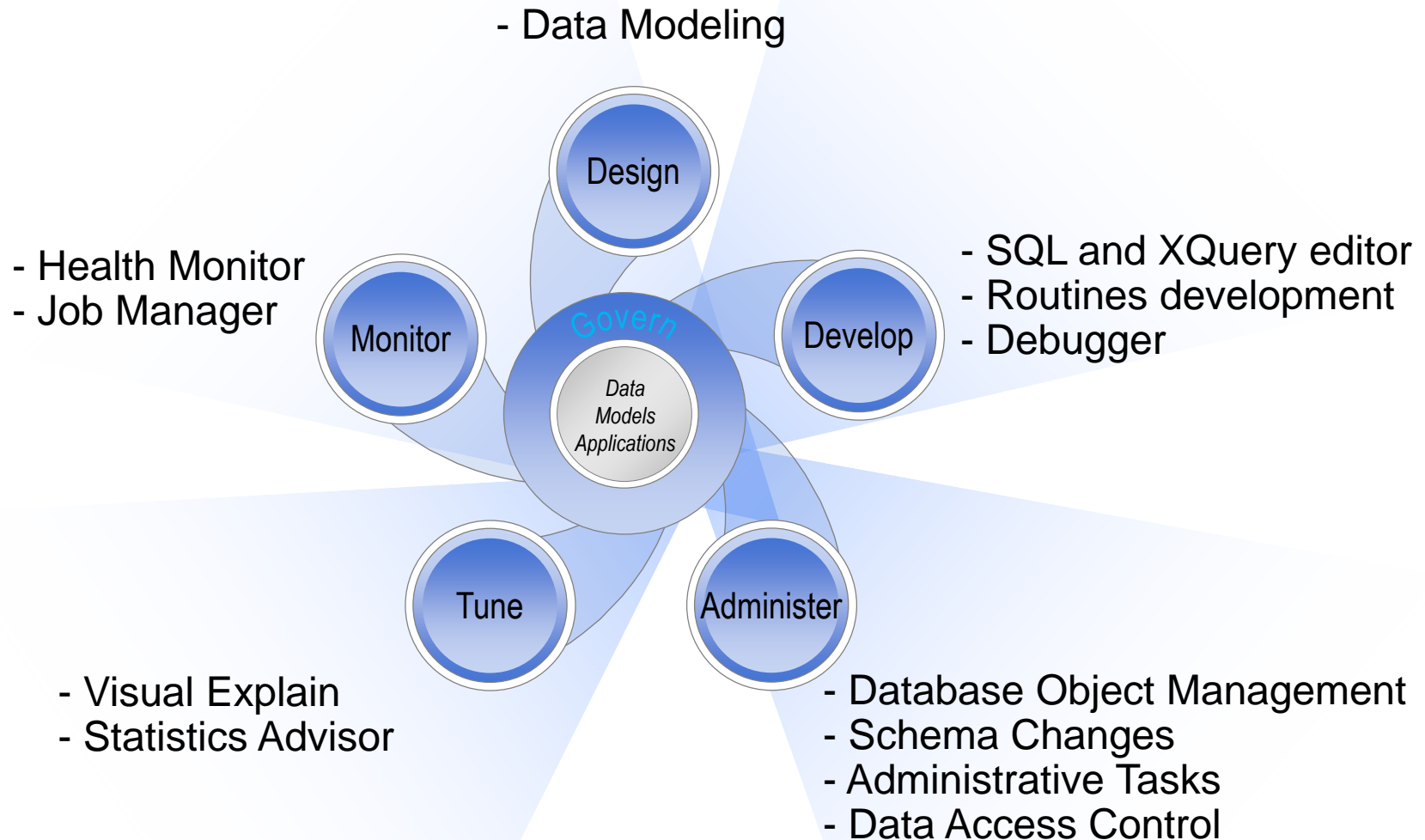- **Infosphere Optim Query Capture Replay**

What is IBM Data Studio?

- **Comprehensive data management tool**
  - An integrated environment for managing databases and developing database applications

- **Replaces Control Center in DB2 10**

- **Built on the popular Eclipse framework**

- **Support for Red Hat Linux, SUSE Linux, Windows**

- **2 packaging options:**
  - **Full client**: integrated development environment for database administration and routine and Java application development
  - **Administration client**: smaller foot-print, non-Java routine development

- **Optional extra component**
  - **Data Studio Web console**: health and availability monitoring

- **FREE to download!**

Data Lifecycle Management

- Data Modeling

Design

- Health Monitor
- Job Manager

Monitor

Govern

Data
Models
Applications

Develop

- SQL and XQuery editor
- Routines development
- Debugger

Tune

Administer

- Visual Explain
- Statistics Advisor

- Database Object Management
- Schema Changes
- Administrative Tasks
- Data Access Control

Past and Future

IBM Data Studio 2.2

Optim Development
Studio 2.2

Optim Database
Administrator 2.2

Oct/2011

IBM Data Studio 3.1.1
- Merges the functionality of all three tools into a single product
- Supports DB2 10 specific features
  - RCAC, Multi-temp, Adaptive Compression and more!
- Supports set of discontinued functions from Control Center

2014

NEW

IBM Data Studio 4.1.1
- Tooling support for
  - BLU Acceleration
  - HADR Multiple Standbys
  - DB2 for pureScale
  - and more!

7

Installation

- **Install Data Studio full client or administration client:**
  - Installation Manager wizard
  - Silent install using a response file
  - Migrating or upgrading existing installation is not supported in version 3.1
  - Saved workspace information is unaffected in the installation process

- **Install Data Studio web console:**
  - Can be installed running the installation wizard, installing in console mode, or installing silently
  - Upgrading from earlier versions is supported
    - database connections, alert settings, and user authentication settings stored locally or in the repository database are retained during upgrade

Basic Navigation

Web browser-like navigation bar

Object List
• Listing objects
• Editing scripts
• Running tasks

Administration Explorer
• Connect to databases
• Browse database objects
    • Organized in folders by their type

Object Properties / Results view

Creating a Database Connection

- The Administration Explorer contains a list of saved database connections

- If DB2 aliases have been configured, database connections are automatically created
  - This behavior can be changed in the Preferences menu

- To manually create a database connection, use the New Connection wizard

Not connected to database

Connected to database

Support multiple database server targets

Fill out database name, host, port and login credentials

Basic Navigation

- **Right-click on an object for a context-based menu, which lists all supported tasks for that object.**
  - More complex task (e.g.: setting up HADR) are carried out by **Task Assistants**

Context menu for **Databases**

Context menu for **Tables**
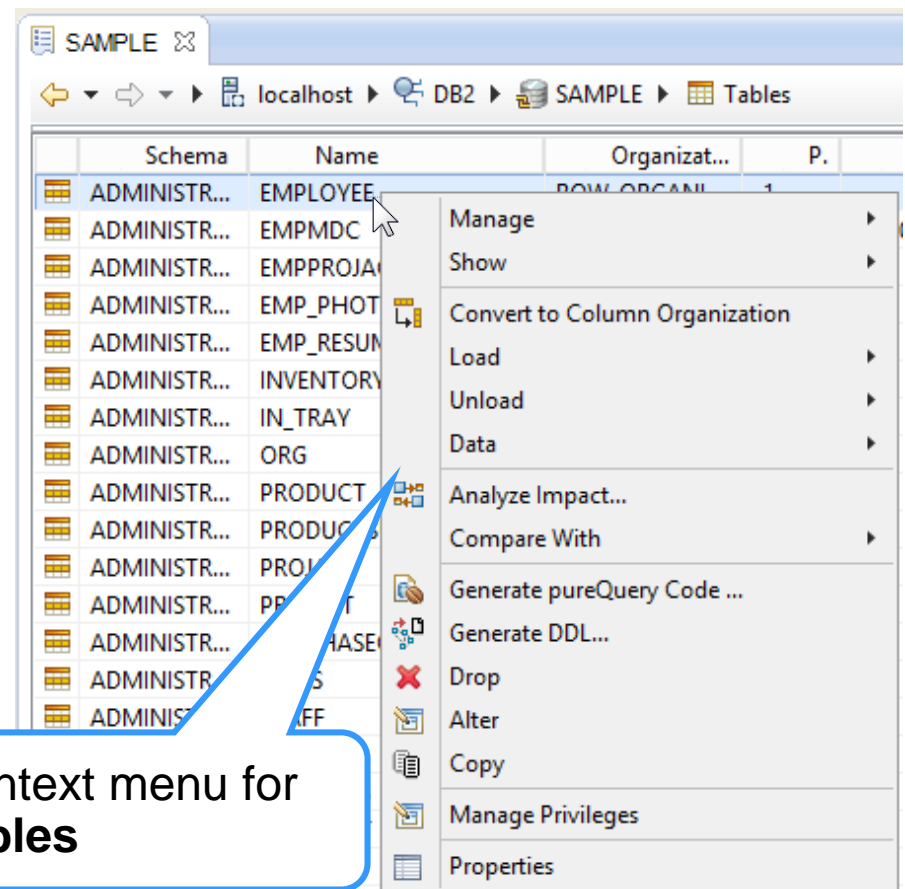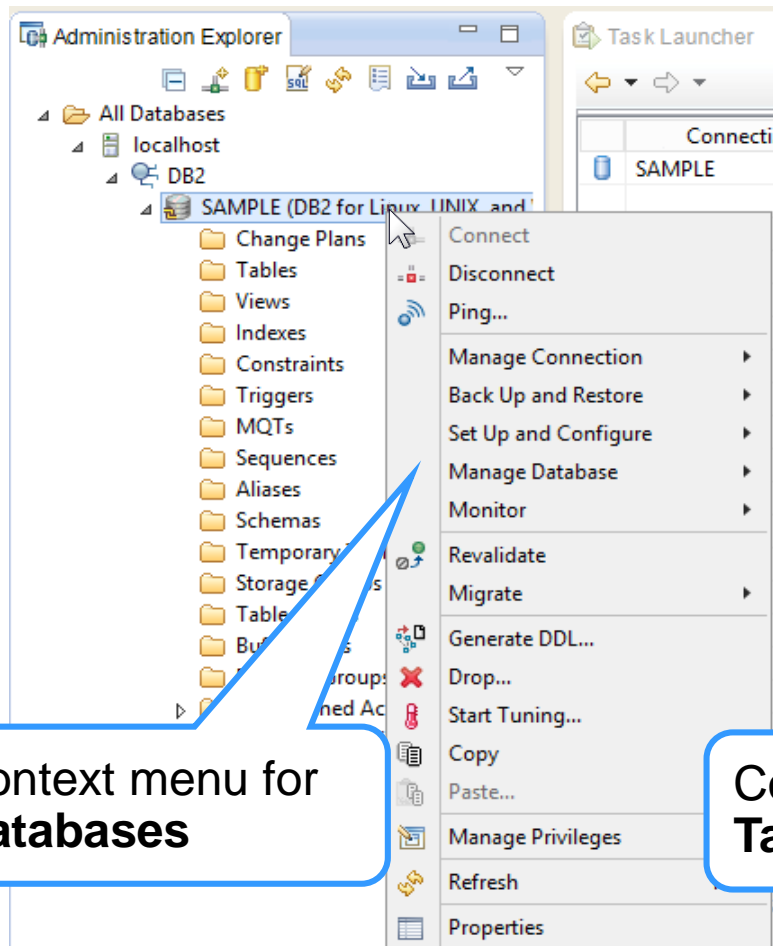
Administrative Tasks – Task Assistants Overview

- **Data Studio's Task Assistants are dialogs that help you create and run database administration commands, similar to Control Center's Wizards**
  - E.g. database backup task assistant

Back up SAMPLE

Back up a database or table space.
Learn about backing up a database. View the command reference.

▶ **Connection : localhost - DB2 - SAMPLE**

Settings
Specify any additional settings to use. Click Run when you are ___

Preview Command   ● Run

Backup Information
Backup Type
Backup Image
Backup Options
Backup Performance

Confirm the details of your database

Verify that the database listed below is the database that you want to backup. The type of logging for your database affects the backup options that are available. If you use circular logging, you can perform only an offline backup of the entire database. You can modify the type of logging for the database by configuring the parameters for the database.

Database details
Database: DB2-SAMPLE
Database state: AVAILABLE

Last backup time: No information is available.
Automatic database backup: DISABLED

Logging type: Cl
Online backup a

▶ Command
▶ Messages

Callouts:
1. Configure the task step by step, following the instructions on the screen

2. Review the commands that will be executed

3. Press RUN button to execute the task

4. Check the execution results
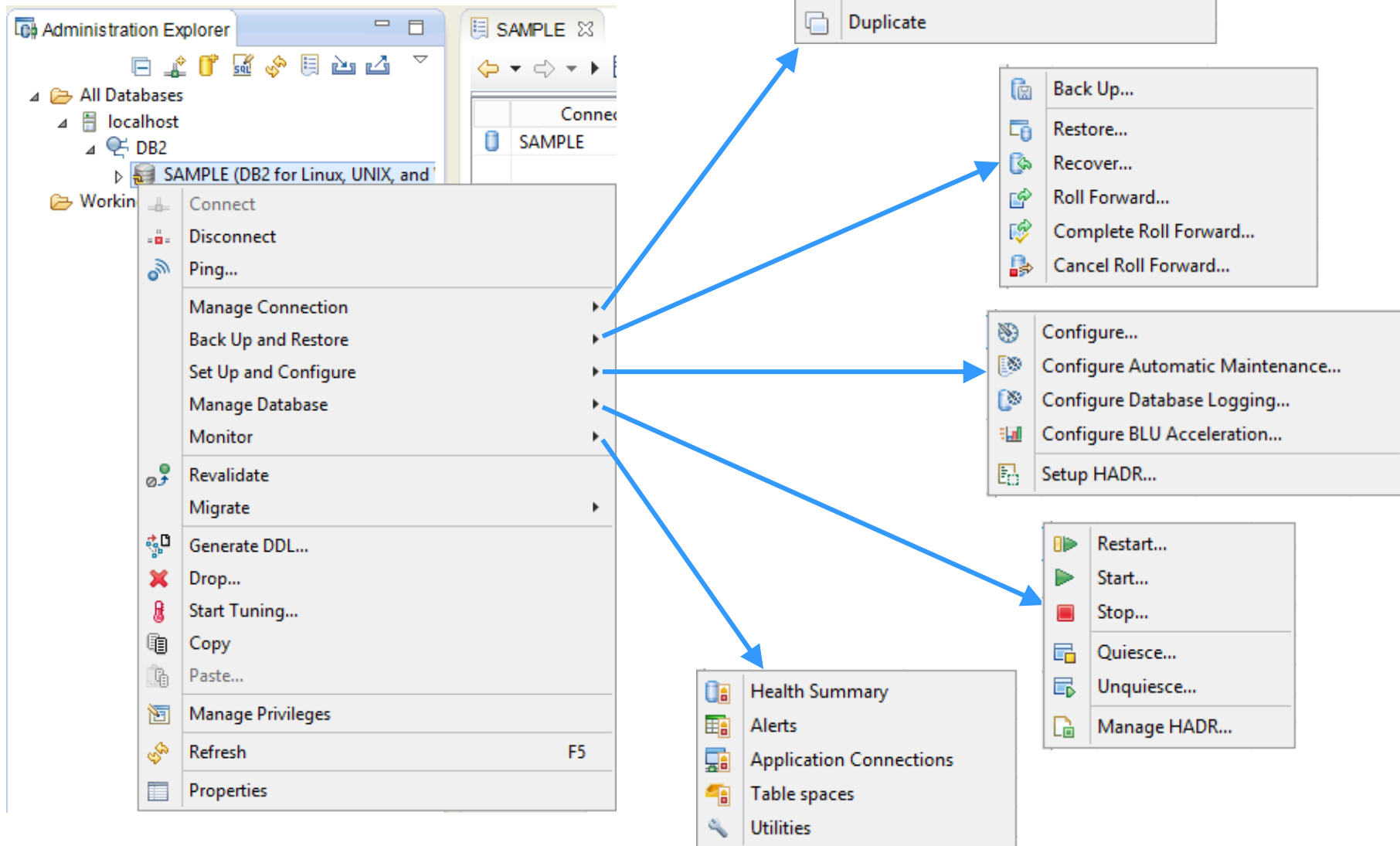
Administrative Tasks – Instances

- **Managing Instances**
  - Create new database
  - Start / Stop
  - Quiesce / Unquiesce
  - Configure (DBM config. params)
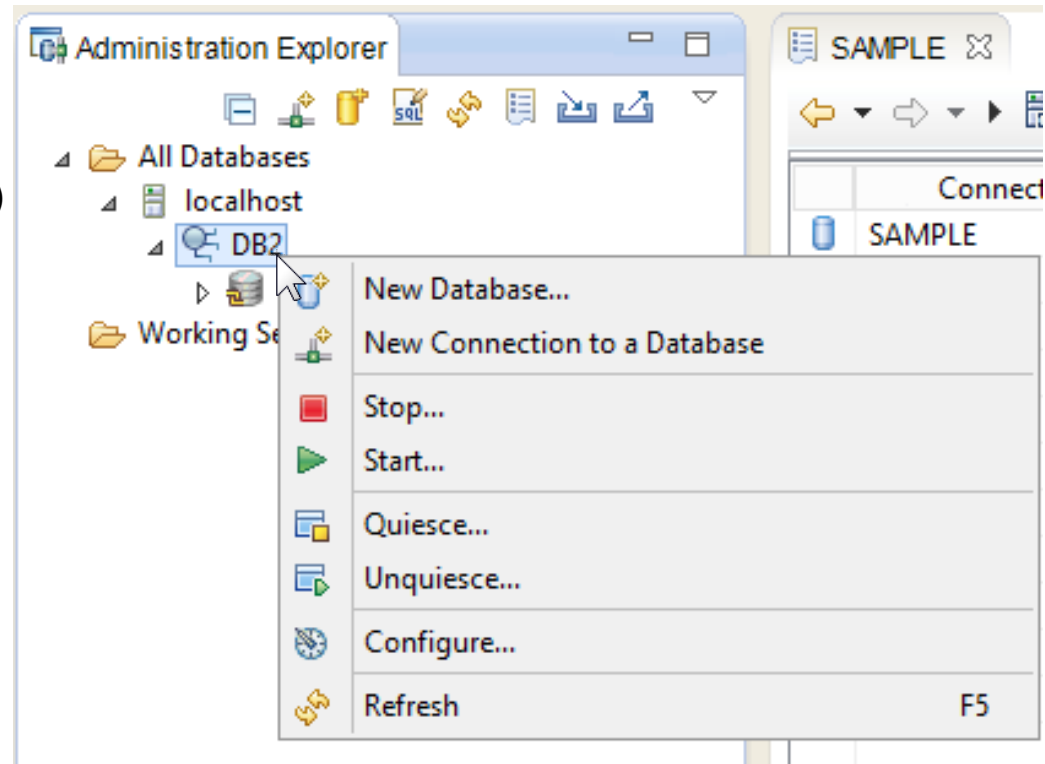
Administrative Tasks – Databases

▪ **Managing Databases**

Database Object Management :: Browsing

- **Click on a type of objects in Administration Explorer to list the objects in Object List on the right side.**
  - Object List contains several features to facilitate navigation such as: in-place searching, sorting, etc.

Multi-purpose navigation bar

Object List

Database Object Management :: Working with Database Objects

- **Context menu displays different options based on the object type. Some of these options are common to all objects.**

- **Most database objects support the following actions:**
  - Create New, Drop, Alter
  - Copy and Paste
  - Generate DDL
  - Analyze Impact (similar to CC's "Show Related" function)
  - Manage Privileges

Indexes
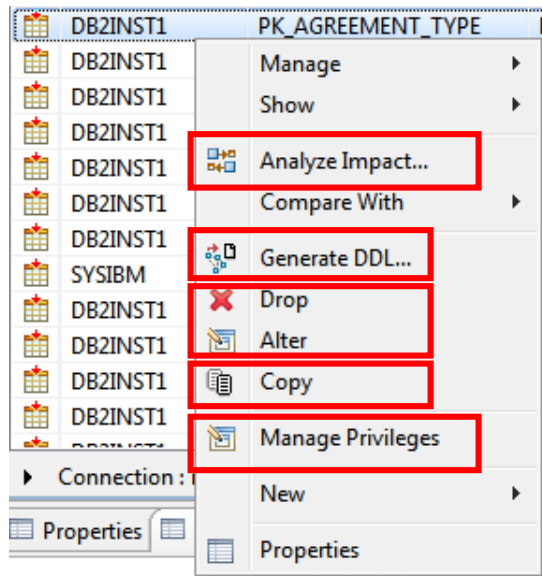
Comparing to *Control Center*

© 2015 IBM Corporation
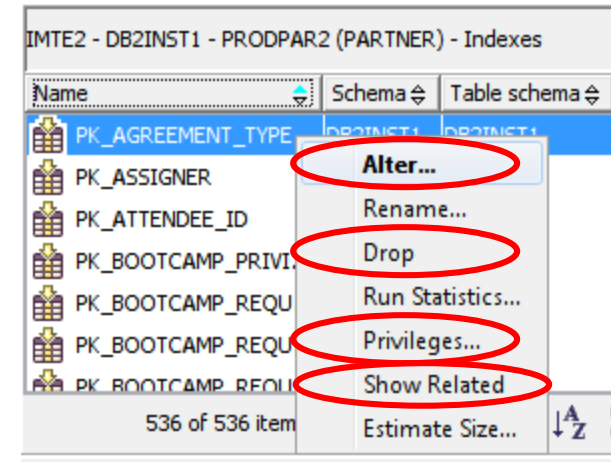
Database Object Management

- **Copying database objects**
  - Can copy between homogeneous (e.g. **DB2** ⇔ **DB2**) or heterogeneous databases (e.g. **DB2** ⇔ **Oracle**)
  - Support for tables, indexes, views, triggers, user-defined-types, etc
  - Simple **Copy and Paste** mechanism.
    - Task assistant helps to fine tune the task
  - Generated DDL for running on the target database can be modified before executing
  - Not intended for copying large data sets, but for testing and development purpose.

- **Visualize relationships between data objects using Overview Diagrams**
  - Support IE (information engineering) or UML diagrams for data modeling
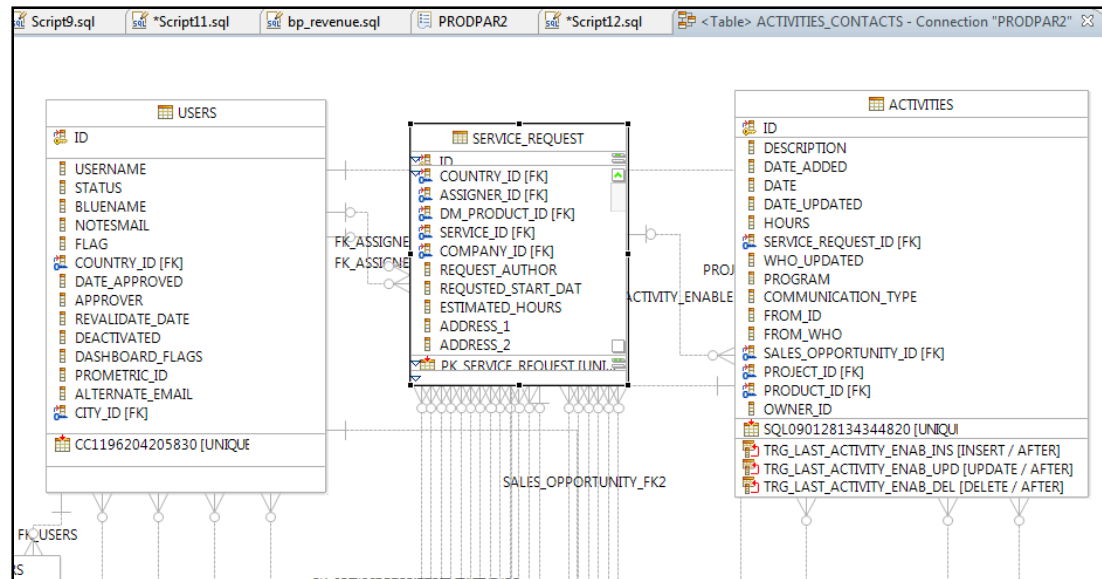
Working with SQL Statements
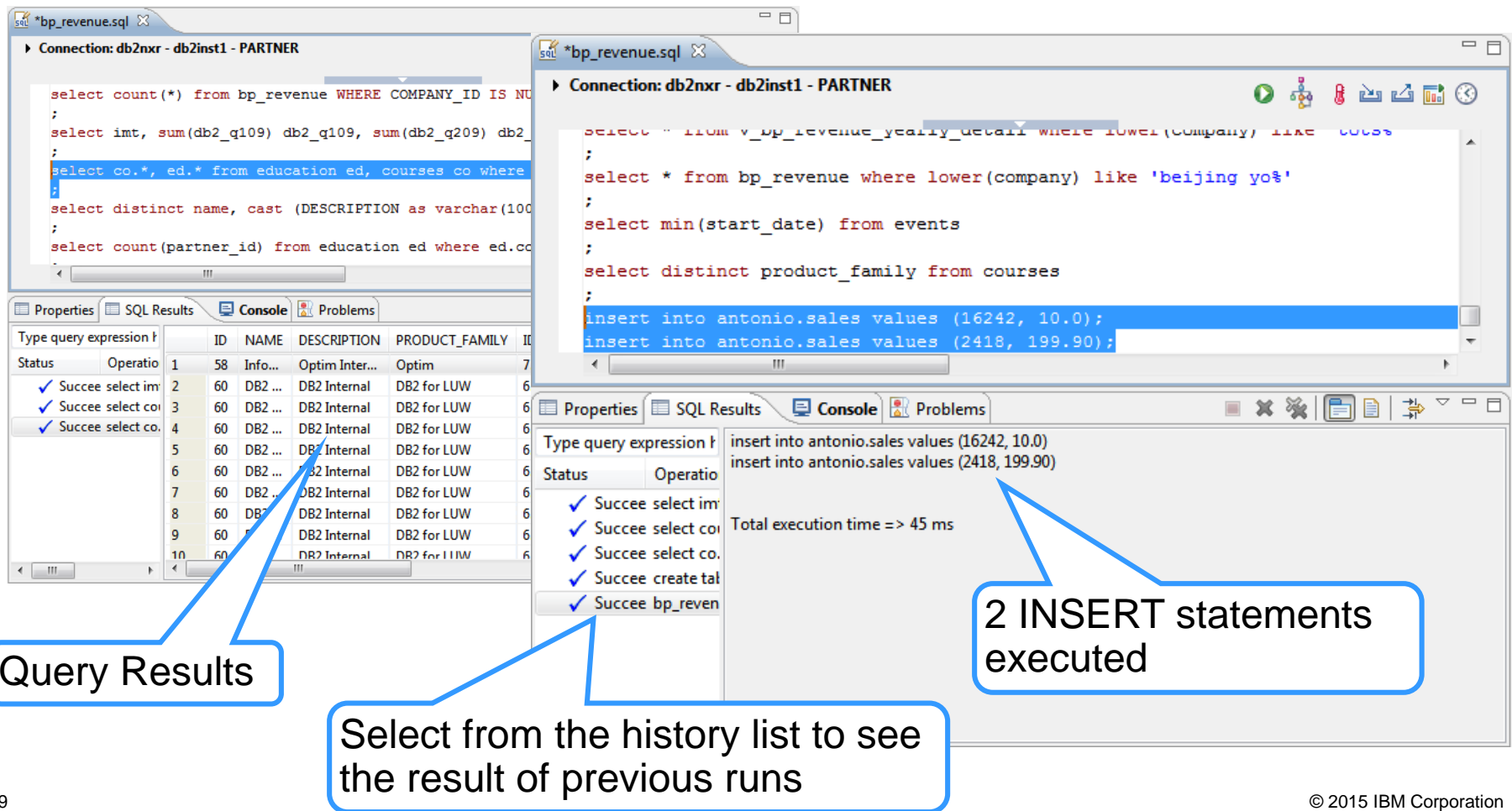
▪ **SQL Scripts Editor**
  – Launch with **New SQL Script**
  – **Integrated toolbar** for easy access to common tasks
  – Options to specify database connection, run method, validate syntax against a particular database, etc.
  – Advanced editor capabilities: Syntax highlighting and validations, Format SQL, Toggle comments, Content tip, Content Assist, Compare/Replace with local history, etc.

Syntax highlighting editor

Content-assist with ctrl + space

Integrated toolbar
• Run SQL
• Visual Explain
• Tuning
• Import
• Export
• Perf. Metrics
• Job Manager

Options

© 2015 IBM Corporation
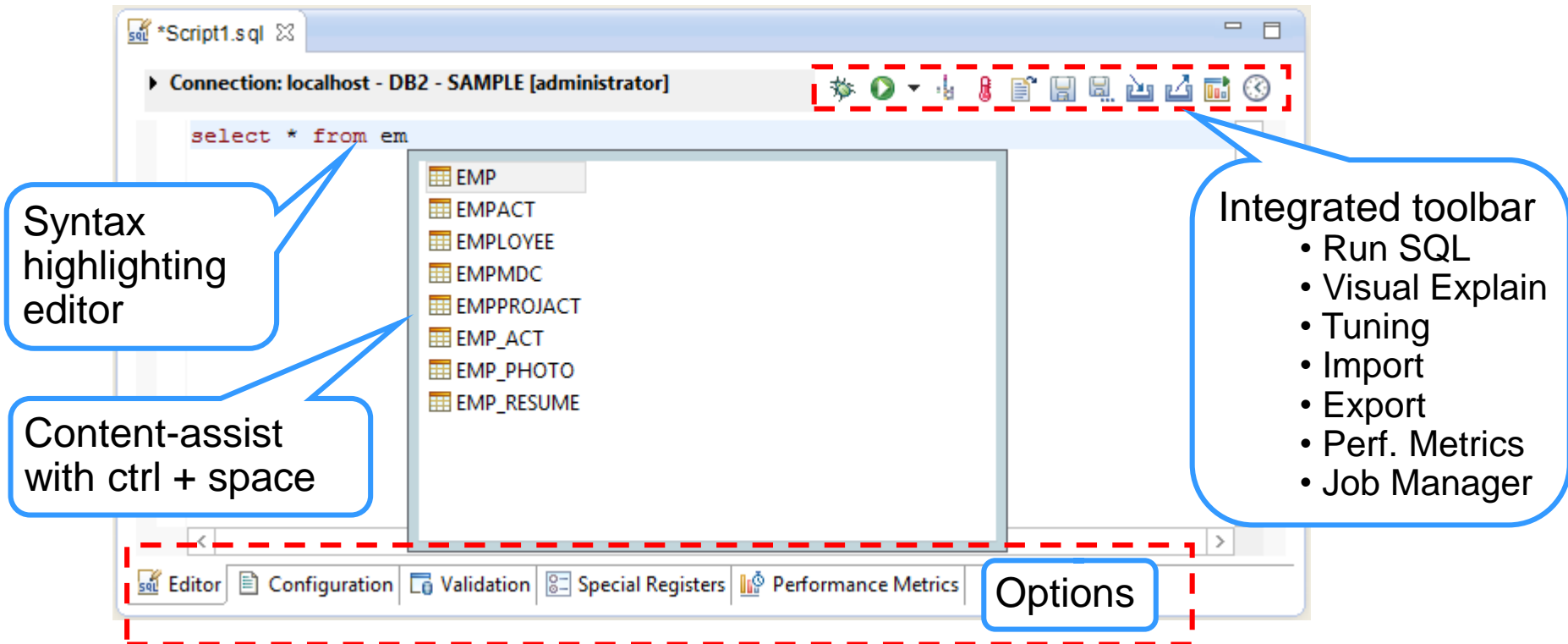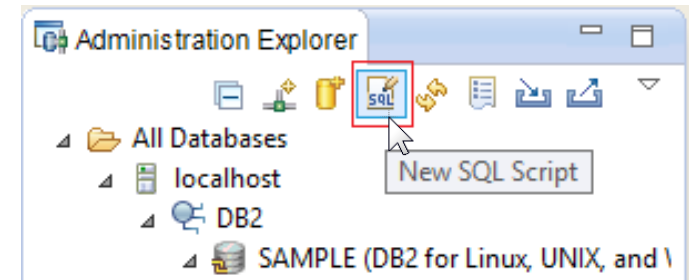
Working with SQL Statements :: Executing SQL scripts

- **Executing SQL Scripts**
  - Press **F5** to execute highlighted or all statements. Or click the ▶ button
  - Results are displayed at the **SQL Results** tab
  - You can browse previous results by selecting a previous run

Query Results

Select from the history list to see the result of previous runs

2 INSERT statements executed

Working with SQL Statements :: Visual Explain

- **Explains SQL statements as a graph, which can be used to tune SQL queries for better performance**

- **How to open Visual Explain**
  - Highlight a query in SQL Editor
  - Click the Visual Explain button
  - Access plan can be seen in the **Access Plan Diagram** tab
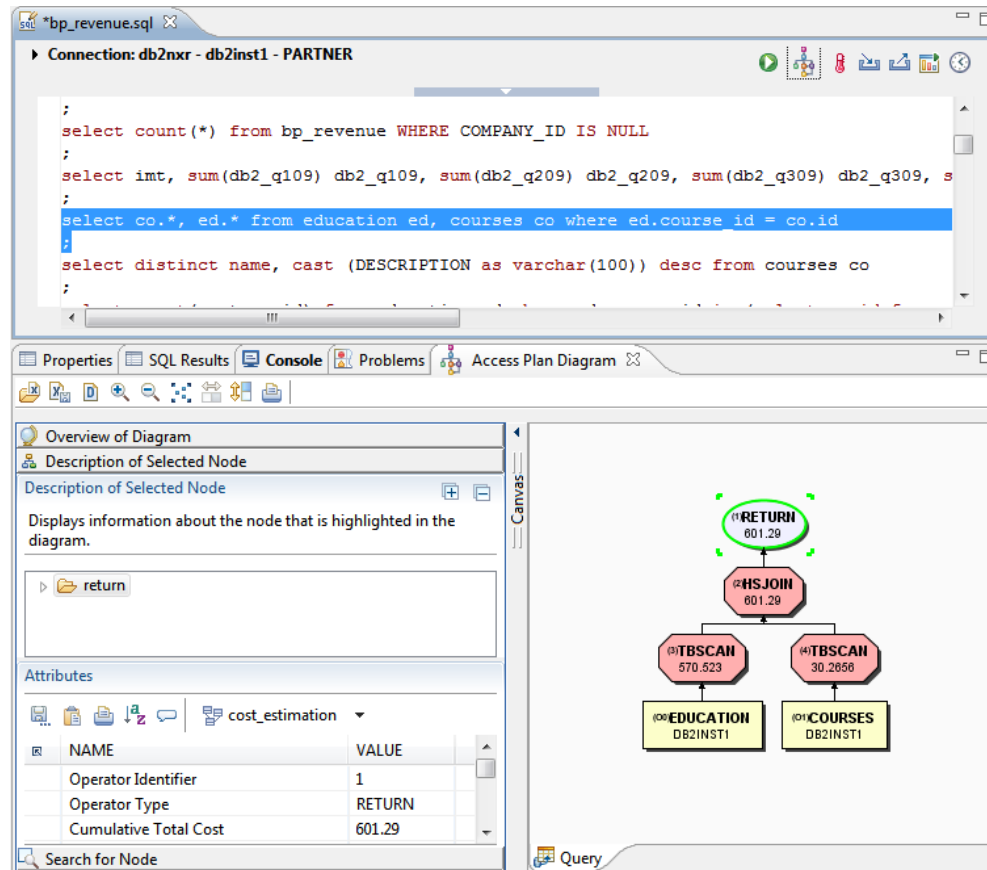
Support for DB2 10.5 with BLU Acceleration

- **BLU Acceleration supported statements and related user interfaces**
  - **Configure BLU Acceleration menu**
  - **New option added on LOAD for column-organized tables**
  - **Convert to Column Organization –single/multi-selection at table level**
  - **CREATE**
    - ORGANIZE BY ROW/COLUMN

Support for HADR Multiple Standby

- **HADR Multiple Standby - Prerequisite**
  - DB2 for LUW 10.1 (or later)
  - Primary database – only applicable to archive logging
  - Standby machine – require similar hardware and software configuration
 - Limitation: HADR is not supported for DPF
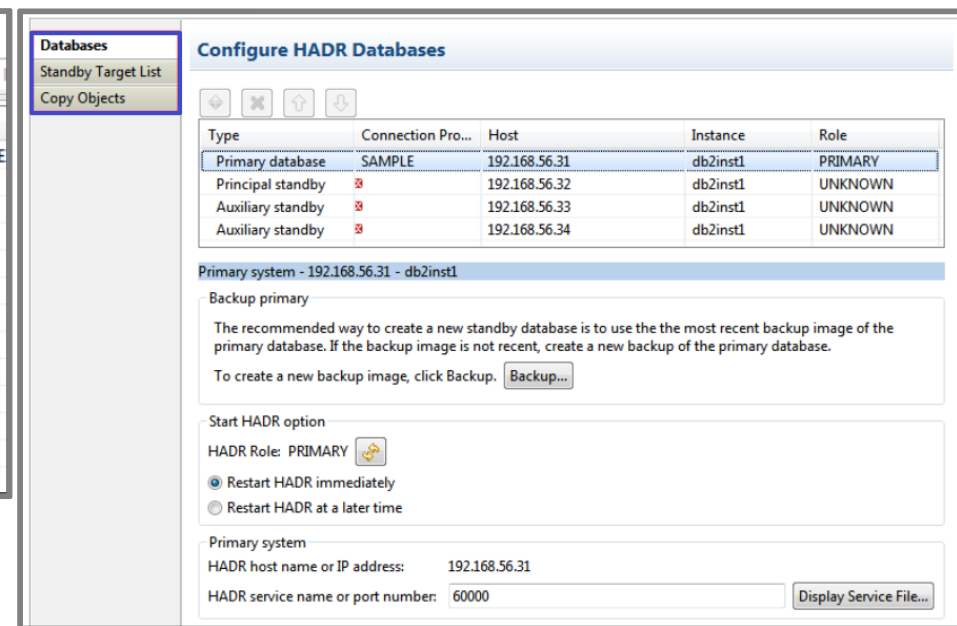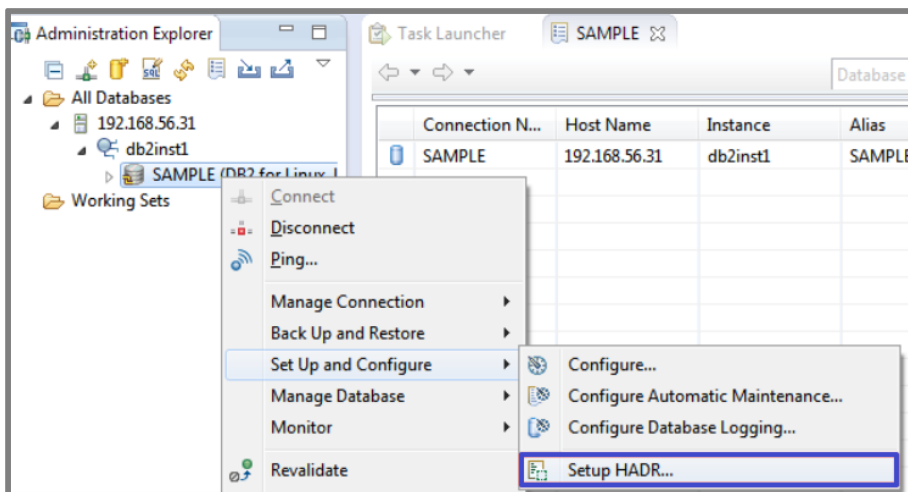
PureScale support - Overview

- Start/Stop pureScale instance

- Start/Stop instance on selected Hosts

- Start/Stop members or CFs

- List pureScale hosts

- Manage DB2 pureScale host maintenance mode

- Manage DB2 cluster service configuration

- Verify DB2 cluster service status
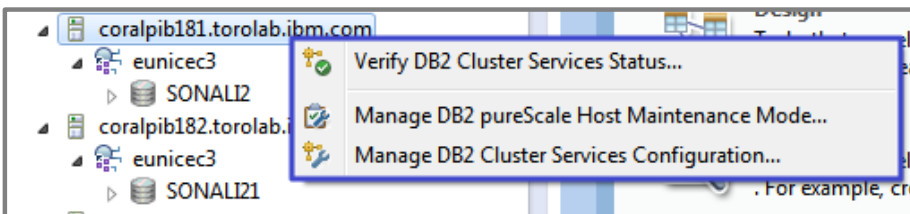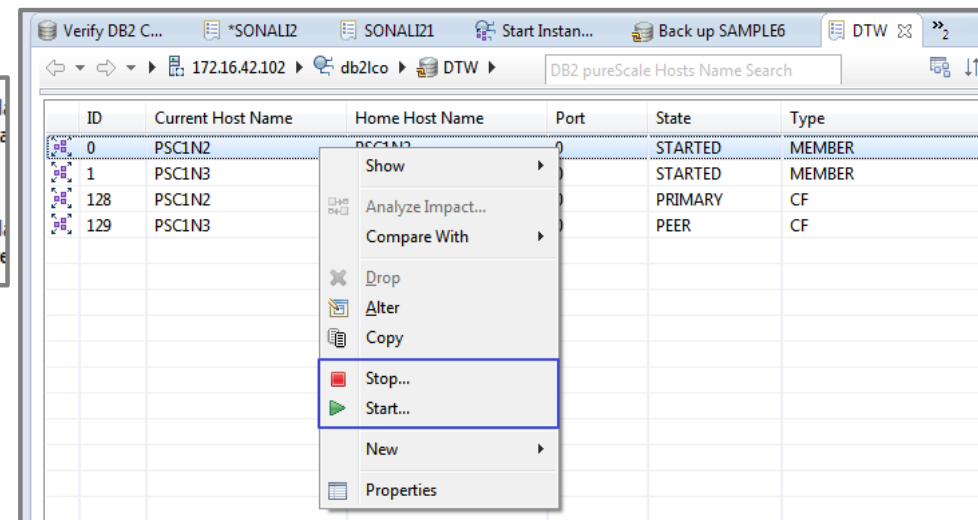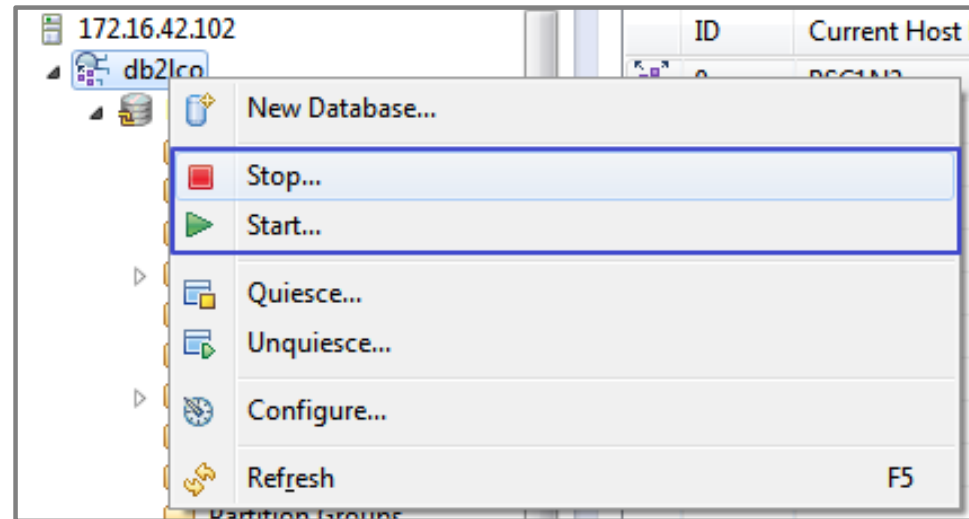
Data Studio Web Console

- **To monitor health and availability and to create and manage jobs on your DB2 for Linux, UNIX, and Windows and DB2 for z/OS® databases.**

- **How to launch Web Console?**
  - Schedule tasks from Query Editor
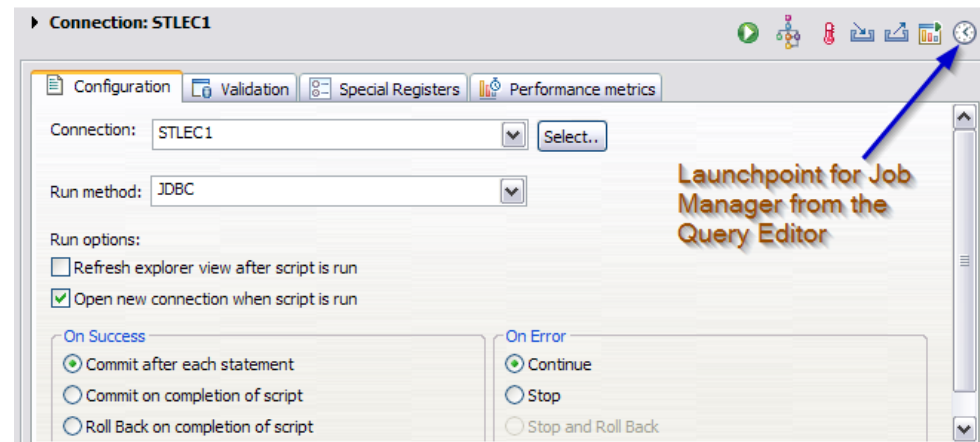
  - Monitor task assistant in
    - Administration Explorer
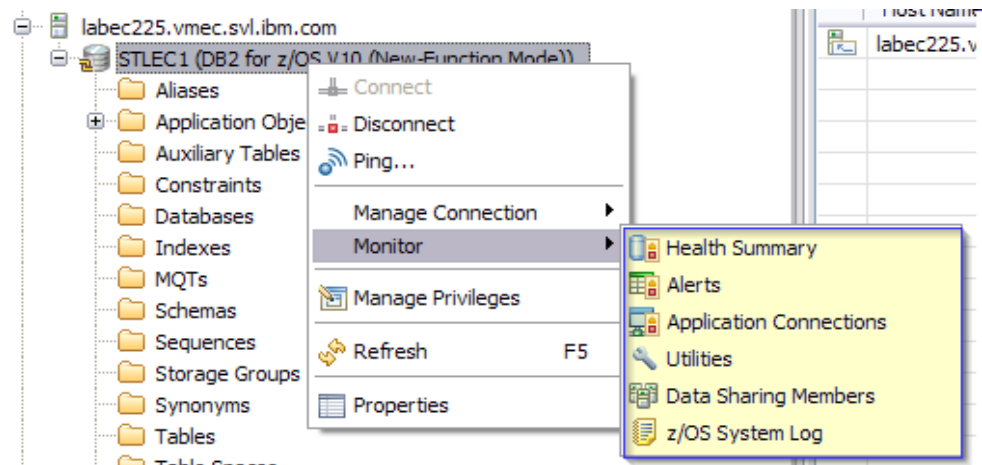
Data Studio Web Console

- **Job Manager**
  - View schedules
  - Add schedules
  - Edit a schedule
  - Delete a schedule

Data Studio Web Console

- **Monitor**
  - Health summary
  - Alert list
  - Current application connections
  - Data Sharing Members
  - Current utilities
  - System log
  - Current Table spaces

pureScale monitoring

Application connections Dashboard

Optim Query Workload Tuner- Overview

- Identify query candidates
  - DB2 catalog
  - Statement cache
  - Data Studio hot spots
  - Query or performance monitors
  - Editors, …

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

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

- Validate results
  - Compare iterations

Diagnose using Query Tuner

Examine access path information

Examine table statistics and additional information

Easily see tables, sections, join predicates, etc.

Improve Query Design

| Statements | Recommendation Summary | **Workload Query Advisor** ⌗ | Workload Index Advisor | Workload Query Advisor |

The following is a summary of the queries analyzed in the workload. Use this criteria to filte

Statements Sorted by	Number
Statements Analyzed Successfully	22
Statements with Warnings	4
Number of High Severity Warnings	0
Number of Medium Severity Warnings	0
Number of Low Severity Warnings	7
Statements with High Severity Warnings	0
Statements with Medium Severity Warnings	0
Statements with Low Severity Warnings	4

View analysis summary

Filter recommendations by severity

Guard against errors and oversights:
Further constrain query, increase index utilization, and reduce data reads

▼ SQL Text

```
SELECT A.EMPNO
    , A.FIRSTNME
    , A.LASTNAME
    , A.JOB
    , A.SALARY
    , A.BONUS
    , A.COMM
    , B.LOCATION
    , C.PROJNAME
FROM DSN8910.DEPT AS B
    , DSN8910.EMP AS A
    , DSN8910.EPROJ AS C
WHERE ( A.EMPNO IN ( SELECT DSN8910.DEPT.MGRNO
            FROM DSN8910.DEPT
```

Highlights relevant components of the query

Query Advisor checks for
- Missing join predicate for referential constraint
- Predicates that can be rewritten as indexable
- Stage 2 predicates that can be rewritten as stage 1 predicates

Recommendation and rationale

▽ **Selected Recommendation:**

▼ **Recommendation Details**

Provide a join predicate based on the referential constraint between tables DSN8910.EMP and DSN8910.DEPT.

There is a referential constraint between these two tables, but there is no join predicate that uses the foreign keys and their corresponding primary keys. Consider adding join predicates between columns EMPNO in table DSN8910.EMP and columns MGRNO in table DSN8910.DEPT to avoid fetching redundant data in the result set.

▼ **Explanation**

If a referential constraint is defined between two tables, the queries that join the two tables generally have corresponding join predicates that map to the referential constraint.

Contents of Eclipse-based Query Tuning offerings

	Data Studio	Optim Query Workload Tuner for LUW
Queries from all sources	✔	✔
Reports	✔	✔
Query Formatter	✔	✔
Access Plan Graph	✔	✔
Query Statistics Advisor	✔	✔
Query Annotation		✔
Visual Plan Hint		✔
Query Index Advisor		✔
Test Candidate Indexes		✔
Query Advisor		✔
Access Path Explorer		✔
Access Path Advisor		✔
Workload Statistics Advisor		✔
Workload Index Advisor		✔
Statistical View Advisor		✔
MQT, MDC, Partitioning Advisor (3.1.1)		✔

IBM DB2 Advanced Recovery Feature
New – Buy all 3 products in one bundle

DB2 Merge Backup

- *Improve speed of your backup & recovery processes*
  - *Minimize application impact*

DB2 Recovery Expert

- *Recover faster with greater granularity while protecting your critical business data*
  - *Eliminate data errors before they compound into costly business mistakes*
- *Track and report data changes in response to auditing requests*

Optim High Performance Unload

- *Extract large amounts of data quickly and with minimal impact on system productivity*
- *Perform full data and system migrations from one DB2 instance to another*

Backup

Unload

Recover

All products support DB2 10.5 for LUW

What's New - DB2 Advanced Recovery Feature 10.5

- **DB2 Recovery Expert**
  - Support for pureScale
  - Remote log analysis
    - No impact on production
  - Support for Adaptive Compression/ Multi-Temp Storage
  - Non-root install
  - Quiet Time Reporting

- **DB2 Merge Backup**
  - Mix DB2 backup types
  - Unload backups to pipe

- **Optim High Performance Unload**
  - Optim Masking on Demand Integration
  - Easier Install and Configuration
  - Better Performance

Enterprise Changes Can Cause Production Problems

- Change in Hardware
  - Platform switch, for example move to Linux
  - O/S Upgrade

- Change in Database
  - Change in schema, index, table space, etc.
  - Change in configuration
  - Increased data volume
  - Database upgrade – new version or fixpack

- Change in Workload
  - Increase in transactions due to expanded application rollout

- Change in Application
  - New application deployment
  - Changes to existing applications

InfoSphere Optim Query Capture Replay

Capture production workloads and replay them in testing environments

Application

Source Database

🔴 **Record**

InfoSphere Optim Query Capture and Replay

Test Database

▶ **Play**

Now also available for DB2 for z/OS

Requirements

- Minimize unexpected production problems

- Shorten testing cycles

- Develop more realistic database testing scenarios

Benefits

- Identify database problems sooner with validation reports and performance tuning

- Use actual production workloads for testing rather than fabricated scenarios

- Extend quality testing efforts to include the data layer

Solution Overview

- Capture production workload with real load, timing & concurrency characteristics

- Prepare the workload replay

- Replay workload with full production characteristics

- Compare and analyze replay with original capture
  - Validate correct SQL execution behavior
  - Identify performance regressions and/or improvements
  - Establish baseline
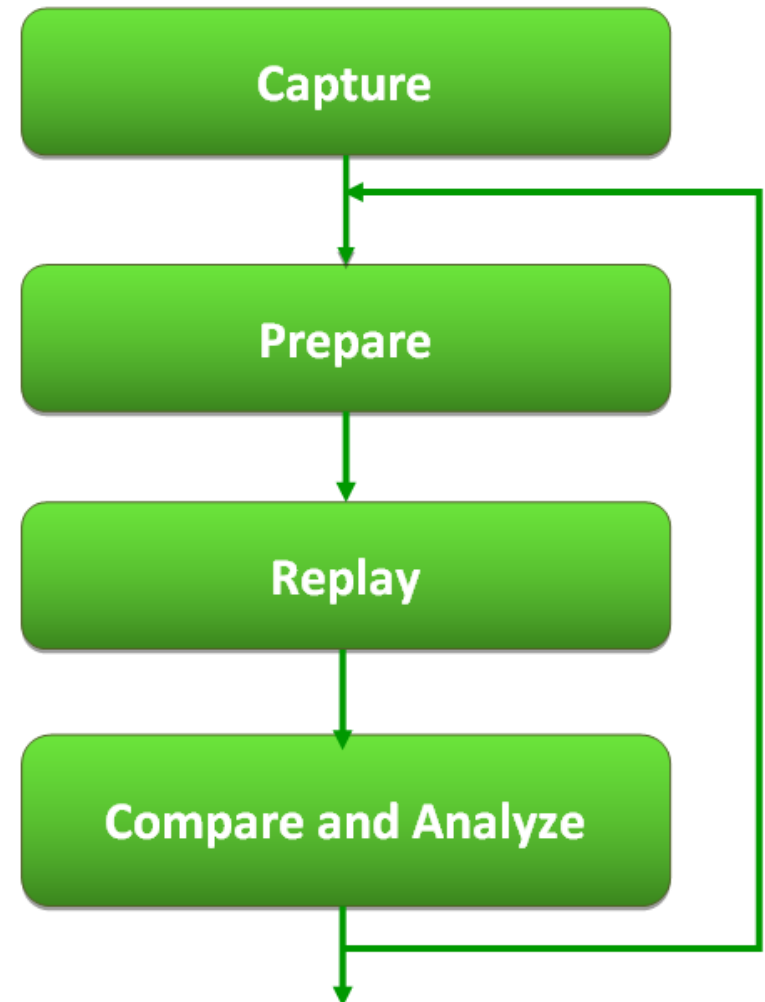
Summary

- **Data Studio replaces Control Center in DB2 10**
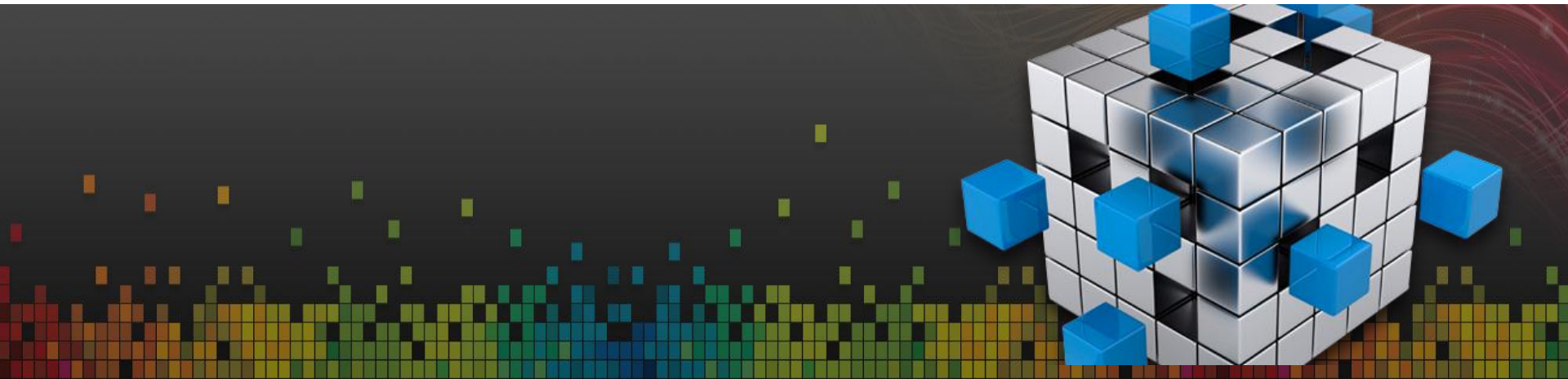
- **Offers more features in addition to the major functionality in Control Center**

- **Multi OS support**

- **Multi data server types support**

- **Free to download**

- **Start using today!**

The next steps…

The Next Steps…

- Complete the Hands on Lab for this module
  – Log onto SKI, go to "My Learning" page, and select the "In Progress" tab.
  – Find the module
  – Download the workbook and the virtual machine image
  – Follow the instructions in the workbook to complete the lab

- Complete the online quiz for this module
  – Log onto SKI, go to "My Learning" page, and select the "In Progress" tab.
  – Find the module and select the quiz

- Provide feedback on the module
  – Log onto SKI, go to "My Learning" page
  – Find the module and select the "Leave Feedback" button to leave your comments

Questions?
askdata@ca.ibm.com