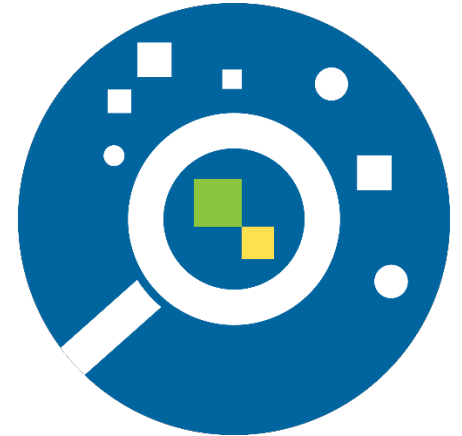


IBM Data Server Manager



Overview

Topic agenda

- Administration - Lab 01
- Configuration - Lab 02
- Monitoring - Lab 03
- Tuning - Lab 04

DB2 Business Value Offering

4 New Offerings – Announced on Jan 20, 2015

DB2 BLU Acceleration In-Memory

- Ability to scale from GBs to PBs of data
- 37x-70x performance gains for analytics and reporting
- 10x compression rates
- Load and Go simplicity; Application Transparent
- Real-time warehousing; columnar; in-memory
- HADR for High Availability and Disaster Recovery



Available for ESE and WSE

DB2 Business Application Continuity

- 24x7x365 Continuous Availability – No down time
- Protects from planned and unplanned outages
- Application transparent
- pureScale and HADR for Disaster Recovery



Available on ESE and WSE

DB2 Performance Management

- Capture and analyze real-time and historical data for capacity planning and growth
- Tune entire workloads to balance costs across query and insert actions
- Minimize events that impact user productivity and revenue
- Receive easy-to-understand, actionable recommendations for problem resolution



Available on ESE, WSE, and Express

DB2 Encryption

- Securely encrypt both databases and backup images
- Native to DB2 – runs anywhere DB2 runs – no restrictions!
- Transparent to applications and utilities
- Simple to deploy and manage



Available on ESE, WSE, and Express

Data Server Manager

Packaging options

- **Base Edition**

- Data Server Manager is included as part of DB2 advanced editions for existing and new customers

- **Enterprise Edition**

- Included in "DB2 Performance Management" of new Business Value Offering
- Purchase "DB2 Performance Management" pack to support DB2 Express, WSE and ESE editions



Data Server Manager

Options Availability for DB2 Packaging

Packaging	Data Server Manager
Express-C Edition	Base Features
Express Edition	Base Features or SPP
Workgroup Server Edition	Base Features or SPP
Advanced Workgroup Server Edition	Enterprise Features
Enterprise Server Edition	Base Features or SPP
Advanced Enterprise Server Edition	Enterprise Features
Developer Edition	Enterprise Features

SPP – Separately Purchasable "DB2 Performance Management" Pack

Data Server Manager

Availability Options for Customers

- **DB2 Advanced Workgroup or Enterprise Editions**
 - Data Server Manager is included as part of DB2 advanced editions for existing and new customers
- **Business Value Offering – Performance Management Offering**
 - Included in Business Value Offering
 - Purchase in support of non-advanced DB2 editions
- **License Exchange Offer from Existing Tools**
 - Move existing customers (OPM, OCM and OQWT) to DB2 Advanced Editions via trade-up part number or through Performance Management Offering (via license exchange)

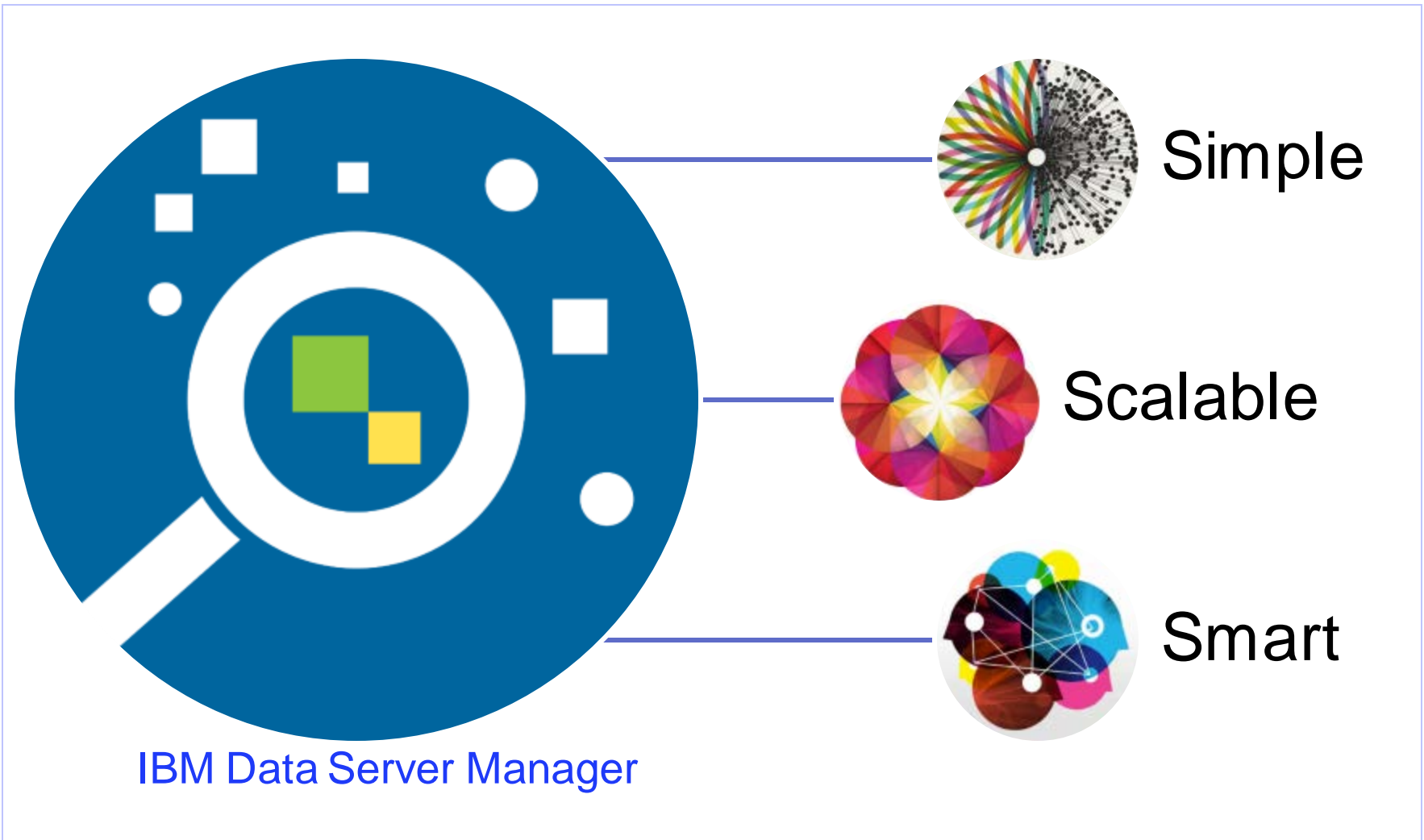
Performance Management Business Value Offering Include:

- ✓ Data Server Manager
- ✓ Optim Performance manager Extended Edition
- ✓ Optim Query Workload Tuner
- ✓ DB2 Workload Manager

Data Server Manager Compatibility Matrix

Operating System	Database Versions	Prerequisites
AIX 6.1 TL 7	DB2 9.7 Fix Pack 6 or higher	JCC Driver 3.66 or higher
AIX 7.1 TL1	DB2 10.1 Fix Pack 3 or higher	Java SDK 7.1.2 or higher
RHEL 5, Update 9	DB2 10.5 All Fix Packs	Web Browser
RHEL 6		Chrome 40 or up
SuSe SLED 11		FireFox 35 or up
SuSe SLES 11 SP2		IE 9,10,11
SuSe 12		
Ubuntu 12.04 and 14.04		
Windows 7		
Windows 8		
Windows Server 2008 R2 and 2012		

Data Server Manager Value Offering



Data Server Manager

Simple, Scalable and Smart



Deliver a Simplified User Experience

- Single installer and integrated repository



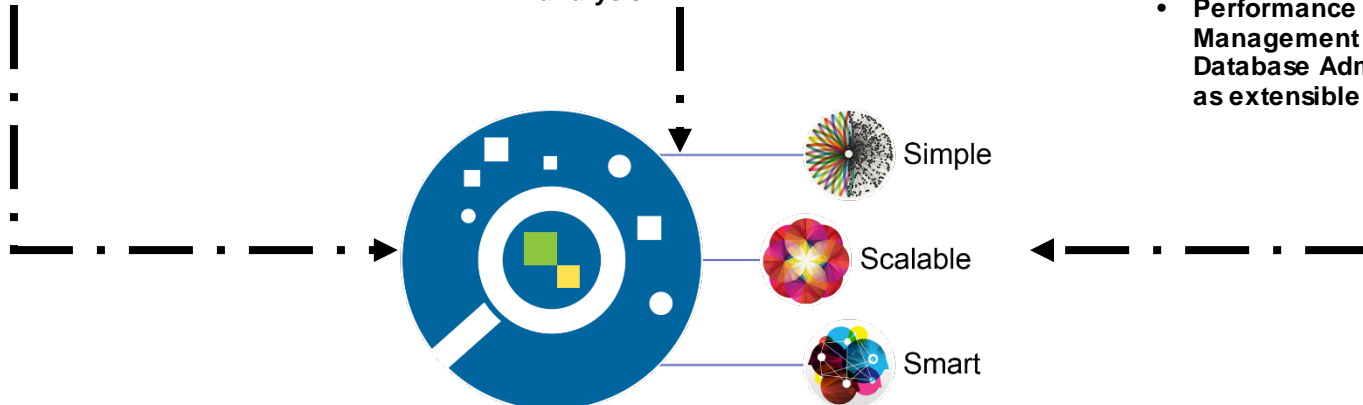
Common integrated web console

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



Deliver familiar capabilities from Optim Database Tools

- Performance Management and Database Administration as extensible services



Database Server Manager

Capabilities and New Features

Administration

- **Administration**

- The capabilities of the Data Studio and new features are rolled into the new Data Server Manager

Configuration

- **Configuration**

- The capabilities of the Optim Configuration Manager and new features are rolled into the new Data Server Manager

Monitoring

- **Monitoring**

- The capabilities of the Optim Performance Manager and new features are rolled into the new Data Server Manager

Tuning

- **Tuning**

- The capabilities of the Optim Query Workload Tuner and new features are rolled into the new Data Server Manager

All of the above is one tool!

Database Server Manager

Simplified Install

- **Base Edition**

- Download software
- Run setup command to install software as non-root to do the real-time basic monitoring

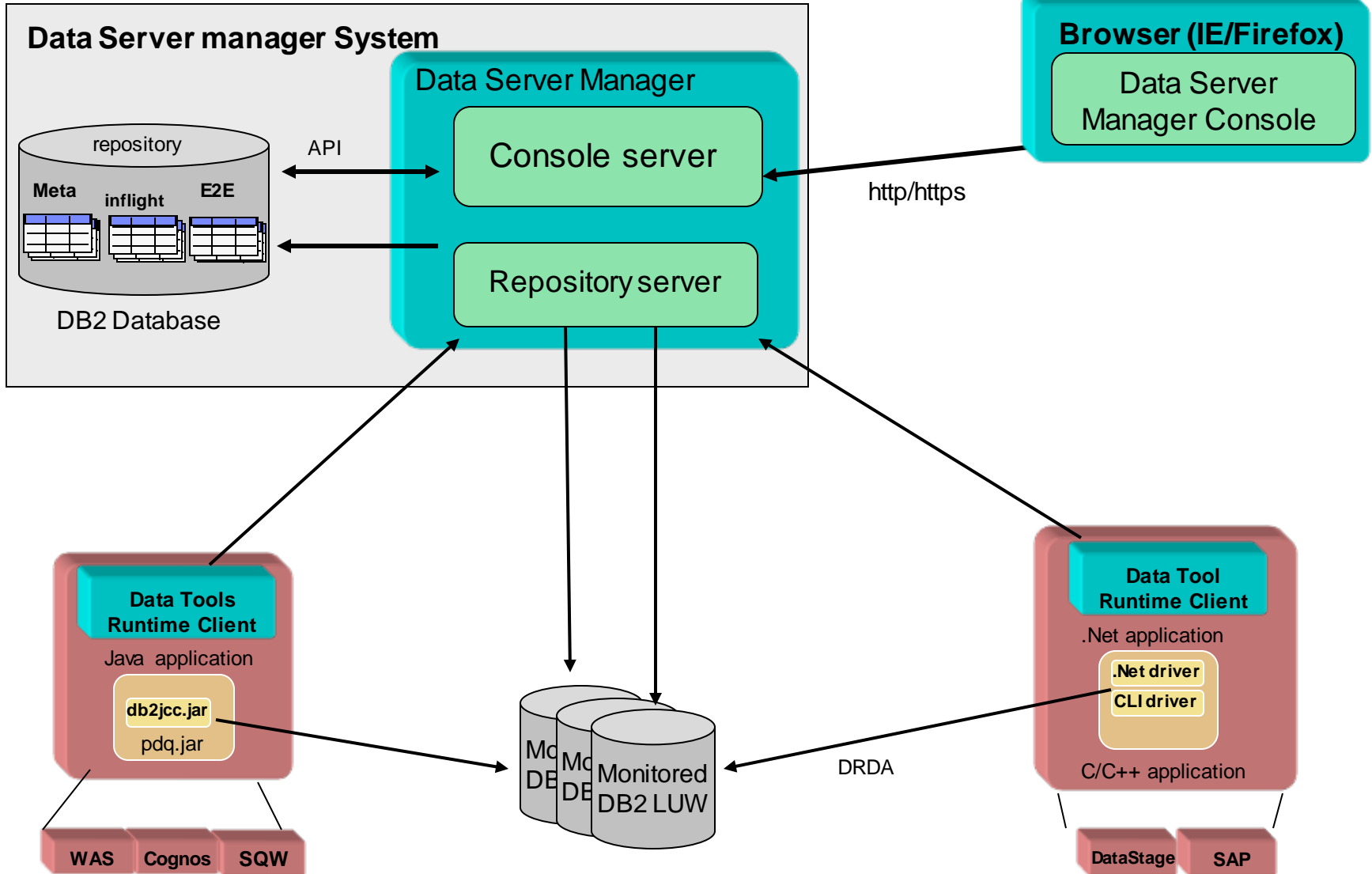
- **Enterprise Edition**

- Download software and license key in the directory
- Run setup command to install the software as non-root
- Setup repository database to store monitoring data before or after the install



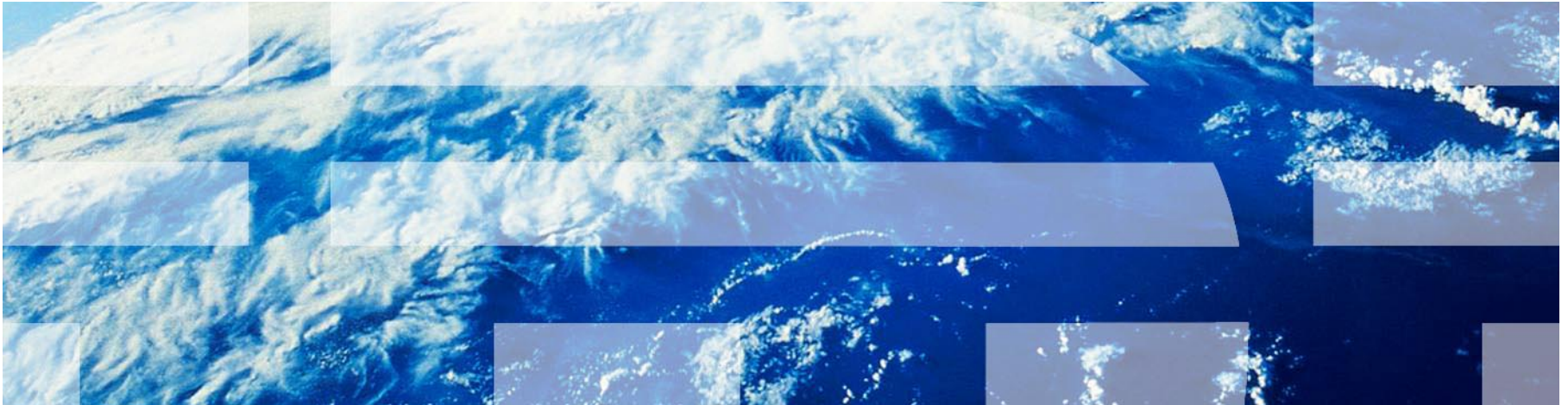
Data Server Manager

Architectural diagram (with Client Monitoring)



Administration

Lab 01 – Administration



Administration

Capability highlights: Scope

- **Administration**
 - Catalog Navigation
 - Object Management
 - Privilege Management
 - Maintenance Management
 - Availability Management
 - Change Management
- **Monitor**
 - Alerts
 - Dashboard
- **Schedule**
 - JDBC
 - CLP

Administration

Explore Database View

IBM Data Server Manager
Explore Databases ▼ Alerts ▼ Hello, admin Log Out

- 🏠 Home
- 📊 Monitor
- 🔧 Administer
- 📈 Optimize
- 🔑 Set Up
- ❓ Help

Explore Databases - Browse database objects and run commands. [Learn more](#)

* Host:Port Instance PSDB ▼ ↻ User:db2psc Add ▼

192.168.142.101 / db2psc / PSDB - V10.5.5

Open SQL editor
Open scheduled commands

- ▼ db2psc
 - ▼ PSDB
 - 📄 Tables
 - 📄 Views
 - 📄 Indexes
 - 📄 Constraints
 - 📄 Triggers
 - 📄 MQTs
 - 📄 Sequences
 - 📄 Aliases
 - 📄 Schemas
 - 📄 Storage Groups
 - 📄 Table Spaces
 - 📄 Buffer Pools
 - 📄 Database Partition Groups
 - ▼ Application Objects
 - 📄 Packages
 - 📄 Stored Procedures
 - 📄 User-Defined Types
 - 📄 User-Defined Functions
 - 📄 PL/SQL Packages
 - 📄 Privileges

Activate
Deactivate
Backup
Restore
Quiesce
Unquiesce
More Actions(4) ▼

PSDB

- Configuration parameters
- Track configuration changes
- 04/22/2015: No storage savings found
- Configure BLU Acceleration

- Recover
- Roll Forward
- Revalidate
- Configure Logging

Administration

Edit and Run SQL

☰
IBM Data Server Manager
SQL Editor
Alerts ▾ Hello, admin Log Out

- 🏠 Home
- 📊 Monitor
- 👤 Administer
- 📈 Optimize
- 🔧 Set Up
- ❓ Help

Run Validate

Syntax Validation: Not Validated

Syntax Assist
Explain
Tune
More Actions(3) ▾

Options

1

Database connection: Name ▾ ▾ ↻

* Statement terminator: ;

Default schema: Enter the current schem

Current path: Enter the current path

Run method: JDBC ▾

JDBC

CLP with SSH

Maximum row returned: ?

On success:

- Automatically commit each statement
- Commit after the last statement in the script
- Roll back on completion

On error:

- Continue with following statements
- Stop at current statement
- Stop and roll back all previous statements in the script

Administration

Generate SQL – Run db2look from Web Console

The screenshot displays the IBM Data Server Manager web console interface. At the top, the navigation bar includes 'IBM Data Server Manager', 'Explore Databases', 'Alerts', and a user greeting 'Hello, admin'. A left-hand sidebar contains navigation icons for Home, Monitor, Administer, Optimize, Set Up, and Help.

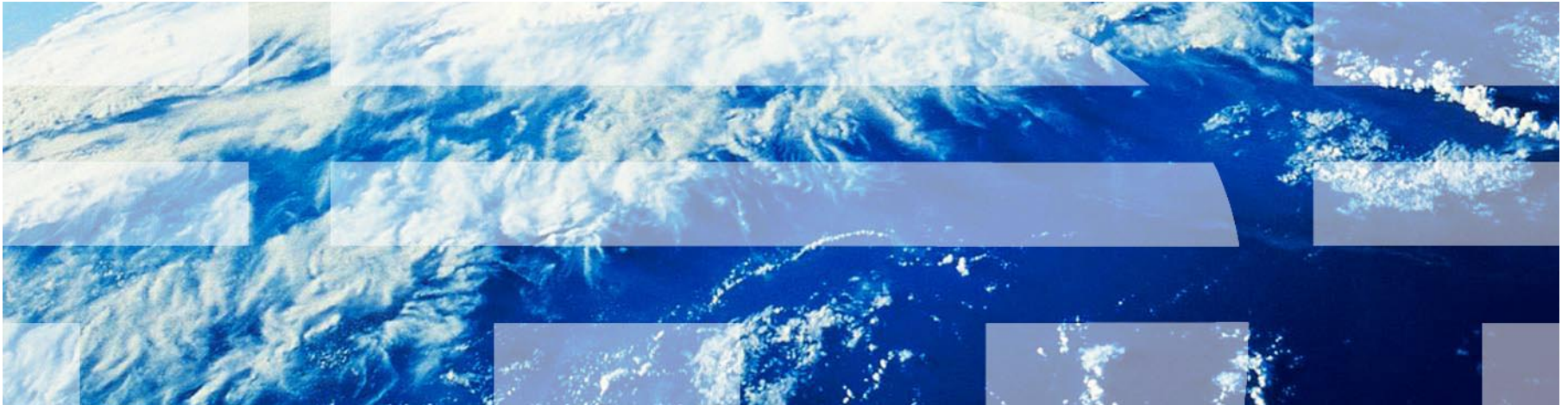
The main content area is titled 'Explore Databases' and shows a list of database instances. The selected instance is '192.168.142.101 / 50000 / db2psc - V10.5.5'. A status bar indicates 'db2psc is started and ready.' with a timestamp of 'Apr 22, 2015, 10:57:14 PM'.

The 'Database Explorer' pane on the left shows a tree view of the database structure, with 'Application Objects' expanded to show 'Packages'. The 'Generate DDL' tab is active, displaying a code editor with the following SQL output:

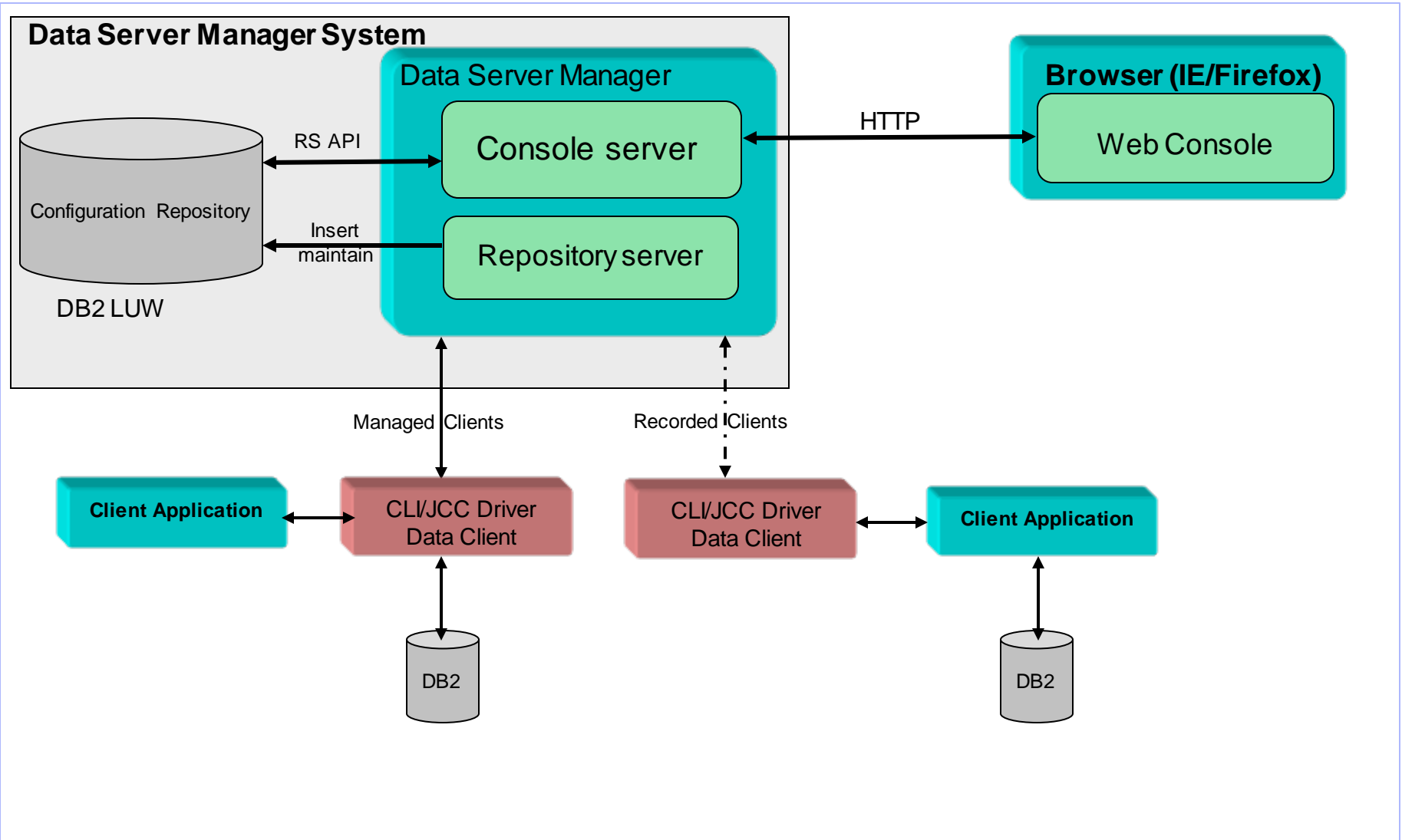
```

1  -- This CLP file was created using DB2LOOK Version "10.5"
2  -- Timestamp: Wed 22 Apr 2015 10:57:52 PM EDT
3  -- Database Name: PSDB
4  -- Database Manager Version: DB2/LINUX8664 Version 10.5.5
5  -- Database Codepage: 1208
6  -- Database Collating Sequence is: IDENTITY
7  -- Alternate collating sequence(alt_collate): null
8  -- varchar2 compatibility(varchar2_compat): OFF
9
10
11 CONNECT TO PSDB;
12
13 -----
14 -- DDL Statements for BUFFERPOOLS --
15 -----
16
17 DROP BUFFERPOOL "BP8K";
18
19 CREATE BUFFERPOOL "BP8K" SIZE AUTOMATIC PAGESIZE 8192;
20
21 --
  
```

Configuration



Data Server Manager Configuration - Architectural diagram



Configuration

Capability highlights: Scope

- **Get insights into IT deployments**
 - Explore information about all the entities in your enterprise that the Data Server Manager finds and is aware of.
- **Monitor client and server configuration changes**
 - View the modifications made to client and server configurations
 - See a history of the changes.
- **Control client applications from a central location**
 - Use the Rule Set Manager to act on managed clients
 - Define rules to isolate application transactions
 - ✓ Map workload management service classes
 - ✓ Redirect managed connections
 - ✓ Throttle managed connections
 - ✓ Tune workload balancing
- **Optimize storage utilizations**
 - Automatic movement of data between storage groups for table spaces
 - Show classic and adaptive compression savings
 - Show storage savings by reclaiming deleted pages
 - Show storage access patterns to highlight most used objects
- **Job Manager**
 - Create, manage jobs, schedule, chain and alerts notifications

Configuration

Managed Clients - Java

- **Managed Clients**

- Clients that connect to OCM through `httpControllerURL` (Push Model)

- **Java Clients**

- Through `pdq.properties` or through `-D` switches or driver properties
- Specify a unique UUID through `pdq.cmx.uuid` property
- Specify location of the OCM server through `pdq.cmx.http.controllerURL` property
- Specify `pdq.cmx.controllerAccessPolicy`
 - ✓ 1 – Allows application to start only if OCM is running or there is a cached profile on the client (This is default.)
 - ✓ 3 – Allows application to start (Ignore OCM)

```
DB2SERVER=192.168.142.101
OCMSERVER=http://192.168.142.101:54000
UUID=59ab22f3-b34f-4f0f-b641-9c3b315bc048
PORT=50000
PREFIX=$filename
TRACELEVEL="-Dpdq.traceLevel=ALL"
TRACEFILE="-Dpdq.traceFile=$LOGDIR/$PREFIX.pdqlog"

PDQ_HOME=/opt/ibm/OPM/pureQuery

PRINT=false
CLPATH=$HOME/sqlllib/java/db2jcc.jar:$HOME/sqlllib/java/db2jcc_license_cu.jar
CLPATH=$CLPATH:$HOME/pot_tools/02opm/opm30.jar
CLPATH=$CLPATH:$PDQ_HOME/pdq.jar
OCMFLAG1="-Dpdq.cmx.http.controllerURL=$OCMSERVER"
OCMFLAG2="-Dpdq.cmx.uuid=$UUID"
```

Configuration

Managed Clients - CLI

- **Managed Clients**

- Clients that connect to OCM through `httpControllerURL` (Push Model)

- **CLI Clients (ODBC, .NET, PHP, Perl, Ruby, etc.)**

- Through `db2dsdriver.cfg`

```
<configuration>
  <dsncollection>
    <dsn alias="sample" host="toolsserver" name="sample" port="50000"/>
  </dsncollection>
  <databases>
    <database host="toolsserver" name="sample" port="50000">
      <parameter name="CurrentSchema" value="dbapot"/>
      <parameter name="ClientApplicationName" value="db2cli"/>
      <parameter name="ClientWorkstationName" value="VMwarei SuSe Linux"/>
      <parameter name="ClientUserID" value="cliuser"/>
      <parameter name="IsolationLevel" value="ReadCommitted"/>
      <parameter name="KeepAliveTimeout" value="10"/>
      <parameter name="ProgramName" value="db2cli_64bit"/>
      <parameter name="QueryOptimizationLevel" value="1"/>
      <wlb>
        <parameter name="enableWLB" value="true"/>
        <parameter name="maxTransports" value="50"/>
      </wlb>
      <acr>
        <parameter name="enableACR" value="true"/>
      </acr>
      <specialregisters>
        <parameter name="CURRENT DEGREE" value="" ANY""/>
      </specialregisters>
    </database>
  </databases>
  <parameters>
    <parameter name="connectionSupervisorProperties" value="httpControllerURL=http://toolsserver:54000,cmxUUID=e485a065-01c0-469e-9b99-fe98225feb0"/>
    <parameter name="connectionSupervisorLibrary" value="/home/dbapot/DTRC/pureQuery/lib64/pqcmx"/>
  </parameters>
</configuration>
```



Configuration Compare Configurations

The screenshot shows the IBM Data Server Manager web interface. The browser address bar displays the URL: `192.168.142.101/console/ots/index.jsp#tasks=ocm.multiDBView.task.id%2Cocm.configCompare.task.id&`. The page title is "IBM Data Server Manager". The navigation menu on the left includes: Home, Monitor, Administer, Optimize, Set Up, and Help. The "Administer" menu is expanded, showing options: Explore Databases, SQL Editor, Jobs, Track Changes, Compare Configurations (highlighted), and Diagnostic Log. A tooltip for "Compare Configurations" says "Compare database configurations". The main content area shows a table with the following data:

Instance name	Managed connection nam	Host name:Port
db2psc	PSDB	dmsserver.ibm.local:50000

At the bottom of the interface, there are buttons for "Current selection:", "Set as Source", "Create Comparison Job...", and "Create Clone Job...".

Configuration Storage Savings

☰
IBM Data Server Manager
Jobs ▼
Alerts ▼
Hello, admin
Log Out

- 🏠 Home
- 📊 Monitor
- 🛠️ Administer
- 📈 Optimize
- 🔧 Set Up
- ❓ Help

Execution History

Job Definition

View the job status details for all jobs or select a job and open the log file to see more detailed information.

View log in browser
Run Job...
Job History Settings...
Cancel
🗑️
🔍
↻

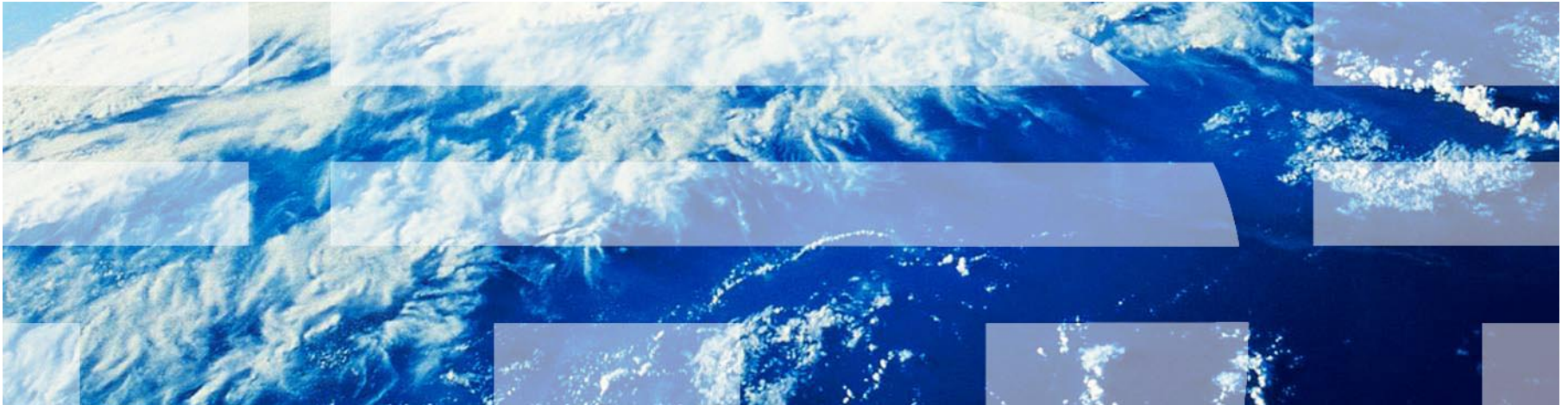
Job ID	Job Name	Start Time	End Time	Status	Database Name
1429757329960	Storage Saving	2015-04-22, 22:50:17	2015-04-22, 22:50:31	Succeeded with warnings	PSDB
1429757329960	Storage Saving	2015-04-22, 22:50:16	2015-04-22, 22:50:17	Succeeded	META_DB_CONNECTION_ID

Range: 1-2 Total: 2 Selected: 2
◀ 1 ▶
10 | 25 | 50 ⬆

Storage Savings Details

- **Reclaim Storage**
 - Show a list of tables and indexes with trapped storage
 - Candidates are ranked by space savings
 - Trapped storage results when
 - Rows are deleted
 - Rows are updated and their size changes
- **Find seldom Used Objects**
 - A list of objects that were seldom used
 - Candidates are ranked based upon last usage

Monitoring



Data Server Manager

Monitoring Features

- **Guided Approach to Solve Performance Problems**
 - Identify
 - Diagnose
 - Solve
 - Prevent
- **Monitor database and transaction performance**
 - Get notified of emergent issues using proactive alerts
 - Use overview dashboards and drill into problem area specific detailed dashboards to diagnose issues quickly
 - Identify potential data access bottlenecks for distributed applications
 - Access real-time, near real-time and historical performance metrics
 - Compare SQL performance over time
 - Create reports to share findings or use as input for trend analysis and capacity planning
 - Get alerts on Workload Management Policy deviations

Data Server Manager Monitoring Dashboards

- 24x7 monitoring
- Real-time monitoring
- Long-term data aggregation
- Web based dashboards based on KPIs
- KPIs for server and response time metrics
- Workload-specific templates
- Cross-database summary
- Alerting and notification via customized email, SMTP, SNMP, alert history, alert details
- Drill through to detailed data for alerted condition

Data Server Manager

Enterprise-wide monitoring of DB2 servers

The screenshot displays the IBM Data Server Manager interface. The main dashboard shows a grid of monitoring cards for various databases, including NEWTEST, DCBCONF8, REPOBETA, REPOB20, MICHELLE, REPOB10, and REPOB13. Each card displays CPU, I/O, and Memory usage with progress indicators and status icons. A callout box states: "Databases are automatically set up for monitoring".

An inset window provides a detailed view of the 'Database NEWTEST'. It features a 'Database Time Breakdown' pie chart and a 'Key Metrics' table. The pie chart shows the following breakdown:

Category	Percentage
SQL Execution Time	50.5%
IO Time	10.0%
Lock Wait Time	40.0%
Other Time	0.0%

The 'Key Metrics' table includes the following data:

Metric	Value
Total CPU	28.0%
Database CPU	21.4%
Avg Response Time	714.12 ms
Total Throughput	947.01 requests
Active Connections	1

Data Server Manager

Enterprise-wide monitoring of DB2 servers

The screenshot displays the IBM Data Server Manager interface for a database named 'PSDB'. The interface is divided into a left-hand navigation menu and a main content area. The navigation menu includes options for Home, Monitor, Administer, Optimize, Set Up, and Help. The main content area is currently showing the 'Applications' view, which displays 'Top Consumers' with a table of server resources and application handles. Below this, the 'Statements' view is shown, displaying 'In-Flight Statements' with a table of active queries and various management buttons like 'Visual Explain', 'Tune Query', and 'Show System Statements'.

IBM Data Server Manager Database: PSDB Alerts Hello, admin

Home Monitor Administer Optimize Set Up Help

Overview Statements Locking **Applications** Workload Memory I/O Storage Notifications

Top Consumers Connections Managed Clients Utilities

Top Consumers

View Details Force Application Cancel Activities

Server resource	Application handle	Rank #	Value of top UOW	Average, excluding top UOW	Application name	User ID	Workload name
...

Overview **Statements** Locking Applications Workload Memory I/O Storage Notifications

In-Flight Statements Executed Statements Stored Procedures

In-Flight Statements

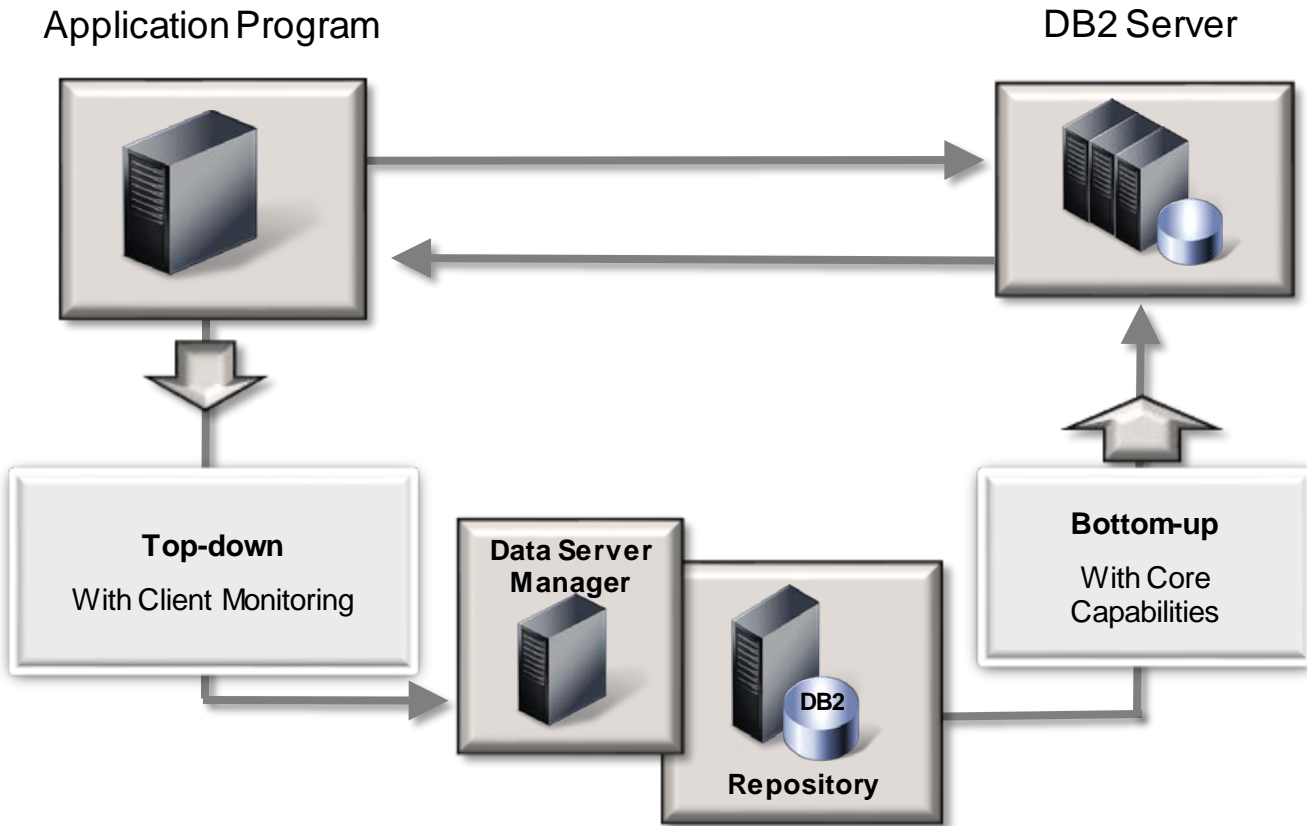
View Details Visual Explain Tune Query Force Application Cancel Activities Show System Statements

Data Server Manager

Database Monitoring

- Different monitoring categories
 - Overview
 - Locking
 - Memory
 - Top Consumers
 - Connections
 - Statements
 - Disk Space Consumption
- Ability to force connections and cancel statements (not the entire workload)
- Blackout periods
 - Disallow monitoring during maintenance periods
- Stored Procedure monitoring
- Get alerted on DB2 Workload Manager Thresholds
 - WLM is a feature of the DB2 server
 - Get alerted when WLM thresholds are breached
- Smart Alerts using a rolling baseline for comparison to show if current metrics are out of norm

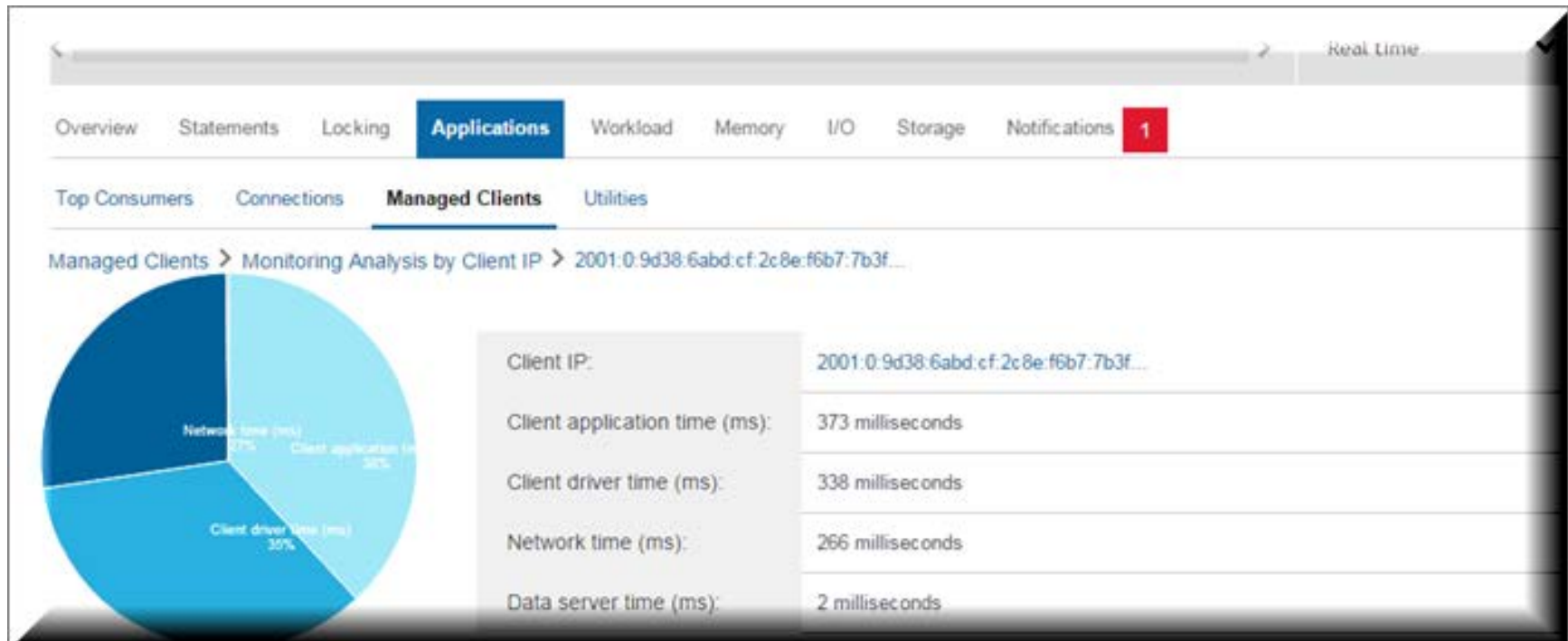
Data Server Manager Client Monitoring



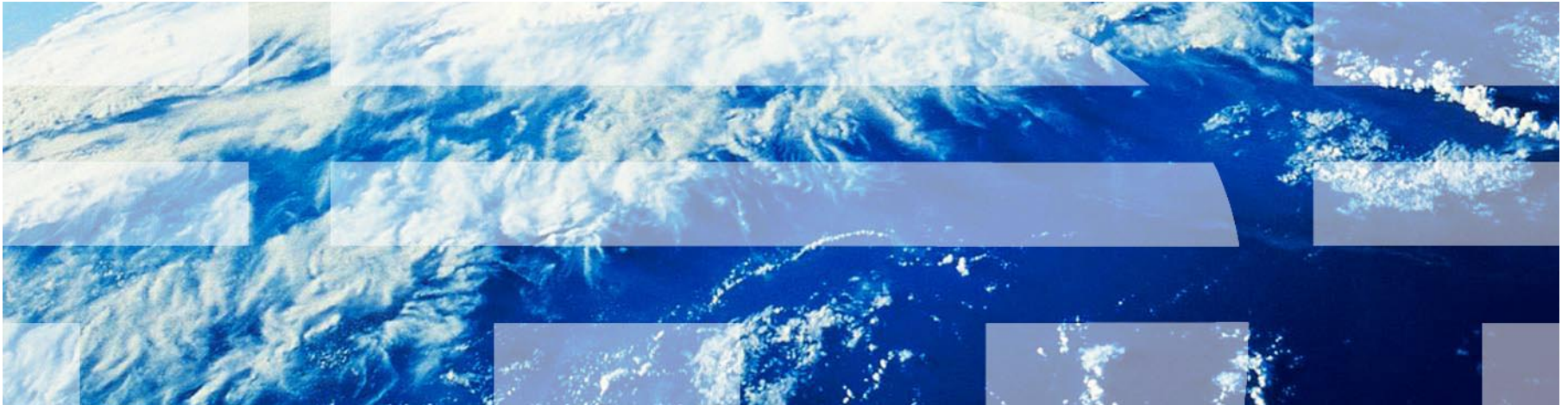
Data Server Manager

Client Monitoring – Top Down Performance Monitoring

- Monitor end-to-end transaction response with Client Monitoring (aka Extended Insight)
 - Identify the problem workload (Who)
 - Problem period (When)
 - Problem SQL (What)
 - Problem Layer (Why)



Tuning



Data Server Manager

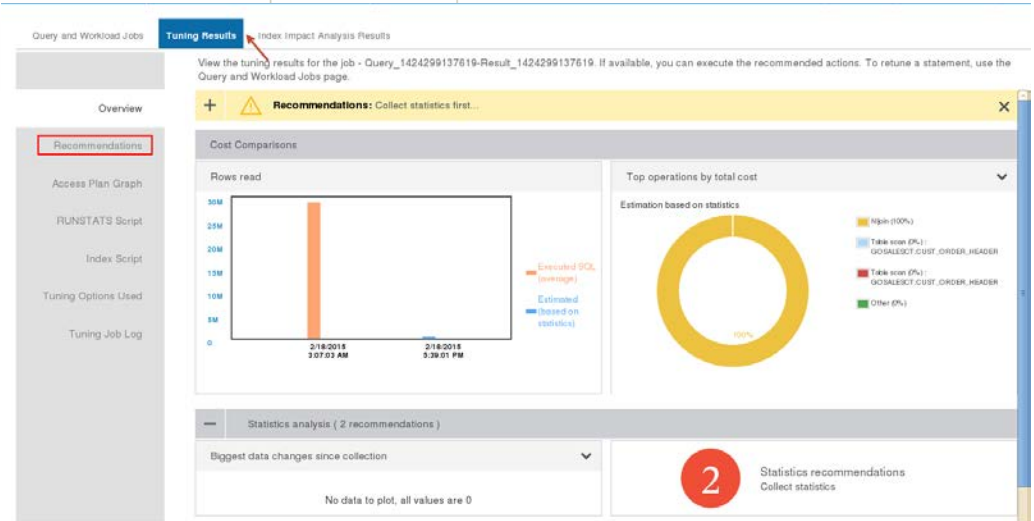
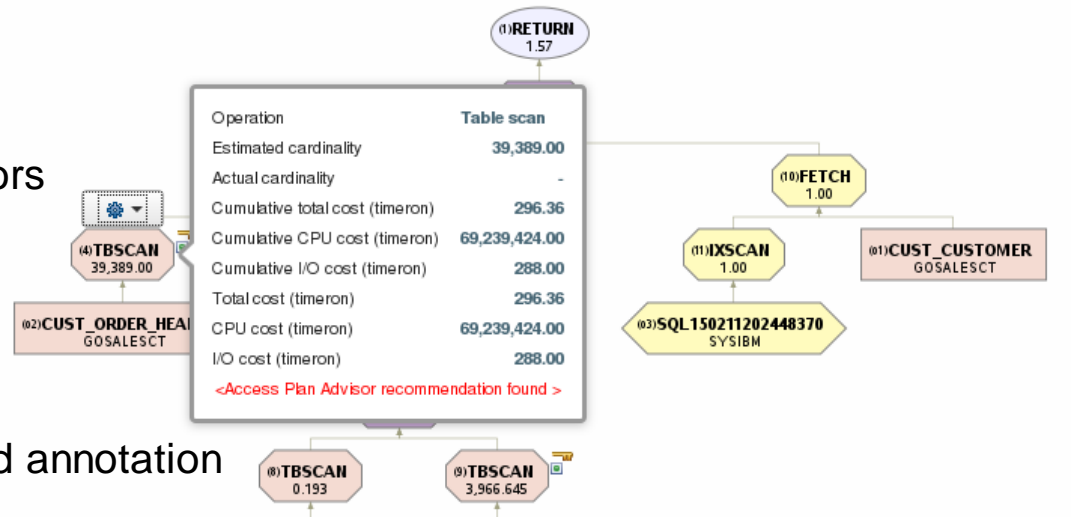
Query Tuning

- Tune individual SQL or entire workloads
 - Improve statistics quality
 - Improve database design
 - Improve query design
- Simplify tuning process for DBAs and developers
 - Capture SQL and workloads from a variety of sources (e.g. performance monitor, development environment, or directly from database)
 - Understand DB2's SQL processing through advanced access plan visualization (graph or grid based)
 - Use wizards to identify tuning opportunities and assess benefits and impact
 - Create detailed reports to document and share your findings

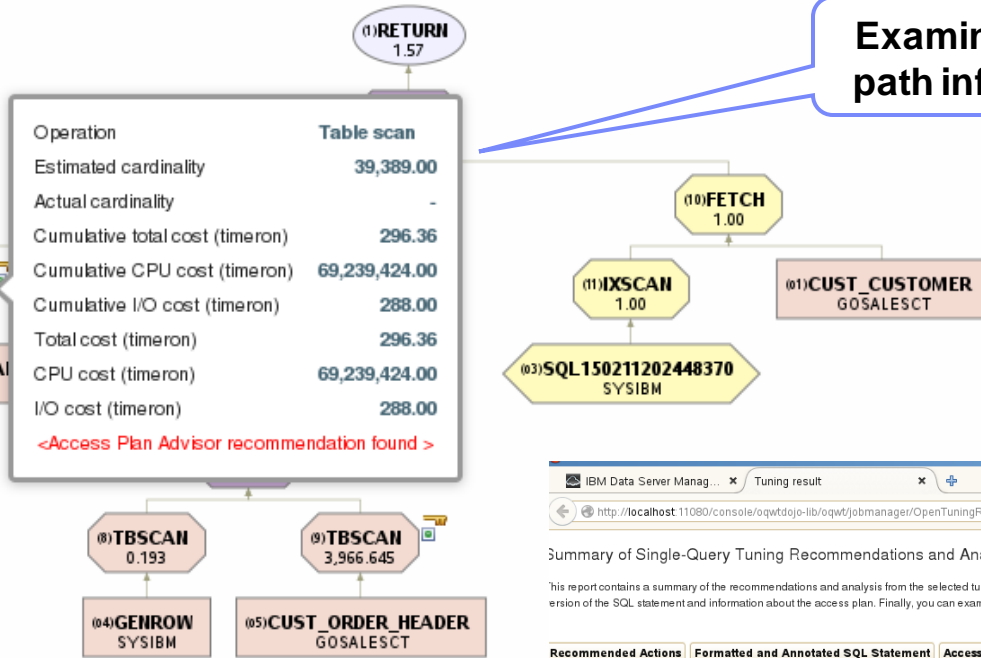
Data Server Manager

Query or Workload Tuning - Overview

- Identify query candidates
 - DB2 catalog
 - Statement cache
 - 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



Data Server Manager Diagnose using Query Tuner



Examine access path information

Examine table statistics and additional information

IBM Data Server Manager - Tuning result

http://localhost:11080/console/oaqwt0je-lib/oaqwt/jobmanager/OpenTuningResultsInSession.jsp?type=SQL_BASED

Summary of Single-Query Tuning Recommendations and Analysis

This report contains a summary of the recommendations and analysis from the selected tuning advisors and tools. Examine the recommendations and take appropriate actions to tune your query. You can view the original version of the SQL statement and information about the access plan. Finally, you can examine table, column, and index information from system catalog to do further analysis and tuning.

Recommended Actions | **Formatted and Annotated SQL Statement** | **Access Plan Summary** | **Table and Index Information**

Overview

Timestamp for the recommendations and analysis: 2015-02-19 00:49:32
Database server connection: jdbc:db2://localhost:50001/REGION2 (DB2 for Linux, Unix, and Windows V10.5 Fix Pack 5)
Estimated plan cost: 680,233,000 units
Critical recommendations: 0 regarding statistics, 0 regarding indexes, and 2 regarding the access path.
Recommended best practices: 1 regarding statistics, 1 regarding indexes, and 1 regarding access path.

Recommendation	Category	Importance	Description
4	Access path	CRITICAL	Avoid joining two tables without a join predicate in a nested loop join (Operator ID = 7). The optimizer chooses a join sequence that contains an inner table GOSALESCT.CUST_ORDER_HEADER without join predicates to any of the outer tables. When a large number of records are returned, DB2 might be using an inefficient access path. Consider providing an appropriate join predicate. Click here to see the access plan operator.
5	Access path	CRITICAL	Avoid table space scan on the inner table of a nested loop join (Operator ID = 7). The inner table GOSALESCT.CUST_ORDER_HEADER in a nested loop join is accessed by a table space scan (table scan). When a large number of records are returned after the outer table is accessed, DB2 might use an inefficient access path. Consider running the Statistics Advisor or run the Index Advisor to determine whether creating an index might improve the access path. Click here to see the access plan operator.
1	Statistics		Console statistics: Use RUNSTATS to reflect all the relevant statistics for this query. Important: If statistics are missing, recommendations regarding indexes and the access path will be based on default statistics. Click here to review the recommended RUNSTATS control statements.
2	Index		Index recommendation is found for the following table: GOSALESCT.CUST_ORDER_HEADER. The total estimated disk space required is 0.367 MB and the estimated performance improvement is 94%. This index recommendation will help improve query performance for general indexing. Click here to review the recommended CREATE INDEX DDL script.
3	Access path		Avoid table space scans (Operator ID = 4) on table GOSALESCT.CUST_ORDER_HEADER. The table is accessed by a table space scan. Consider running the Statistics Advisor, because the improving statistics might improve the access path. Also, consider running the Index Advisor to determine whether creating an index might improve the access path. Click here to see the access plan operator.

Data Server Manager

BLU / Shadow Tables Advisor

- Displays performance improvement
- Lists all tables in the workload and ones that should be converted
- Displays the current and recommended organization for each table as well as other properties including:
 - The number of references of the table in the workload
 - Findings of why a table was or was not recommended, and any warnings if a conversion is made
- Lists the statements in the workload affected by the table conversion

Grazie

ITALIAN

धन्यवाद

HINDI

Merci

FRENCH

ありがとうございました

JAPANESE

Obrigado

BRAZILIAN PORTUGUESE

多谢

SIMPLIFIED CHINESE

Thank You

多謝

TRADITIONAL CHINESE

Gracias

SPANISH

Спасибо

RUSSIAN

நன்றி

TAMIL

ขอบคุณ

THAI

Danke

GERMAN

شكراً

ARABIC

We appreciate your feedback.
Please fill out the survey in order to improve this event.

Presentation By:

Vikram S Khatri

IBM Senior Certified Consulting IT Specialist, IBM IT Certification Board
IBM Information Management DB2 10.1 pureScale Technical Mastery Test (v2)
IBM Certified Advanced Database Administrator – DB2 10.1 for Linux, Unix and Windows
IBM Certified Database Administrator for DB2 10.1 for Linux, UNIX and Windows
IBM Certified Solutions Developer DB2 9.7 SQL Procedures
IBM Certified Solutions Developer – DB2 9.5 SQL Procedure Developer
IBM Advanced Technical Expert for DB2 Clusters
Project Management Professional (PMP)
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