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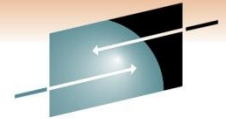
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An Introduction to IBM's pureQuery

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IBM

Session Code: Xxx
Thursday, March 3, 2011: 6:00 PM-7:00 PM
ACC, Room 211A





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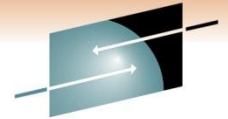
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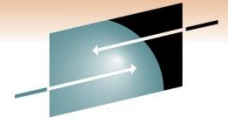


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Abstract

- There's a surge of interest from people who are becoming aware of the cost savings and management benefits of pureQuery. The client optimization capability of pureQuery enables DBAs to enable static execution for any existing Java™, .NET, or CLI application without changing any application code. This presentation will show you how to client optimize an existing application and provide hints and tips for managing the process and making it more efficient. DB2 for z/OS and DB2 for LUW environments are covered.

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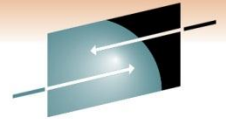


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Agenda

- Static SQL binding for Java, .NET, and CLI
- Correlate SQL to java source code
- SQL execution statistics
- SQL replacement and lockdown
- Literal consolidation and replacement
- Privacy visibility

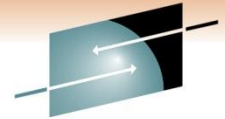
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pureQuery

- How Java, .NET and CLI applications can be managed like static SQL applications
 - What problems do these application platforms present to the DBA?
 - ORM frameworks obscure the SQL generated
 - Dynamic SQL
 - Capturing SQL for review/tune/revisement
 - Converting to static SQL and the benefits of doing so



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Frequently Cited Concerns



I have more and more Java workload coming into my data server driving up costs, but the budget is not keeping pace.

I don't even want to allow framework-generated SQL on my database. If I can't see it, I don't know how it will impact me.



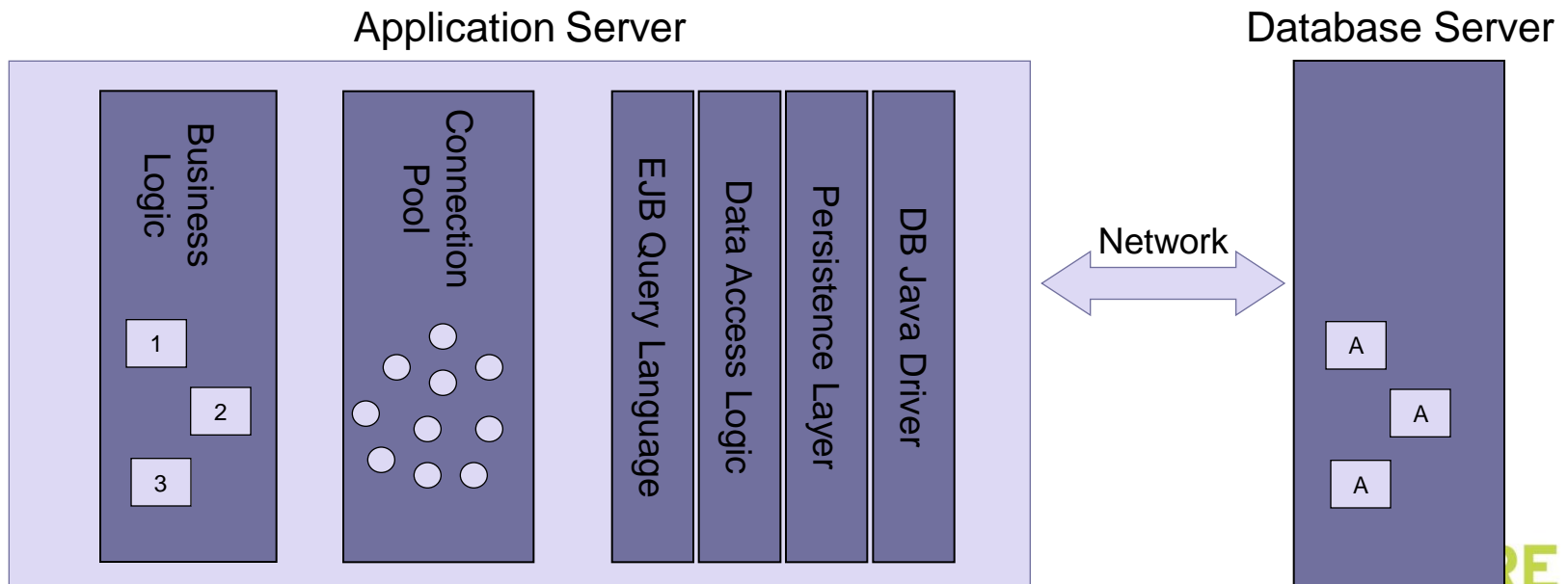
Java, .NET, and CLI performance problems are a real pain to resolve because I can't even tell what application issued the SQL.

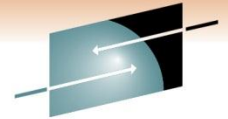


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Contemporary Application Stack Challenges

- Simplify development, but ...
 - Challenge problem resolution
 - Impact performance
 - Obscure impact analysis
 - Impede capacity planning





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Introducing pureQuery

A high-performance, data access platform to simplify developing, managing, securing, and optimizing data access for new and existing applications.



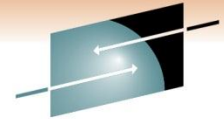
pureQuery Components:

- Optim Development Studio
 - Integrated development environment with Java and SQL support
 - Improve problem isolation and impact analysis
- Simple and intuitive API
 - Enables SQL access to databases or in-memory Java objects
 - Facilitates best practices
 - Enables heterogeneous batching
- Optim pureQuery Runtime
 - Flexible static SQL deployment for DB2



and





pureQuery Improves Performance, Security, and Manageability for DB2 & Oracle... *Without Changing Code*

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Three steps

1. Capture the SQL

- Use pureQuery API, generate from WebSphere JPA, or capture while executing
- Use with custom-developed, framework-based, or packaged applications
- **Translation of literals to host variables (new in 2.2)**

2. Bind SQL to DB2 (Client Optimization)

- Use tooling in Data Studio Developer, WAS console or command line

3. Choose execution mode

- Dynamic or static
- Choose at deployment time instead of development time

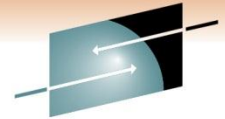
Static SQL value

- Make response time predictable
 - Lock in the SQL access path pre-execution
- Limit user access and reduce SQL injection
 - Grant execute privileges on the query packages rather than access privileges on the table
- Accelerate problem resolution
 - Trace SQL execution to a specific package and the originating source
- Improve impact analysis and capacity planning
 - Visualize application SQL and correlation metadata
- Increase system capacity
 - Drive down DB cycles

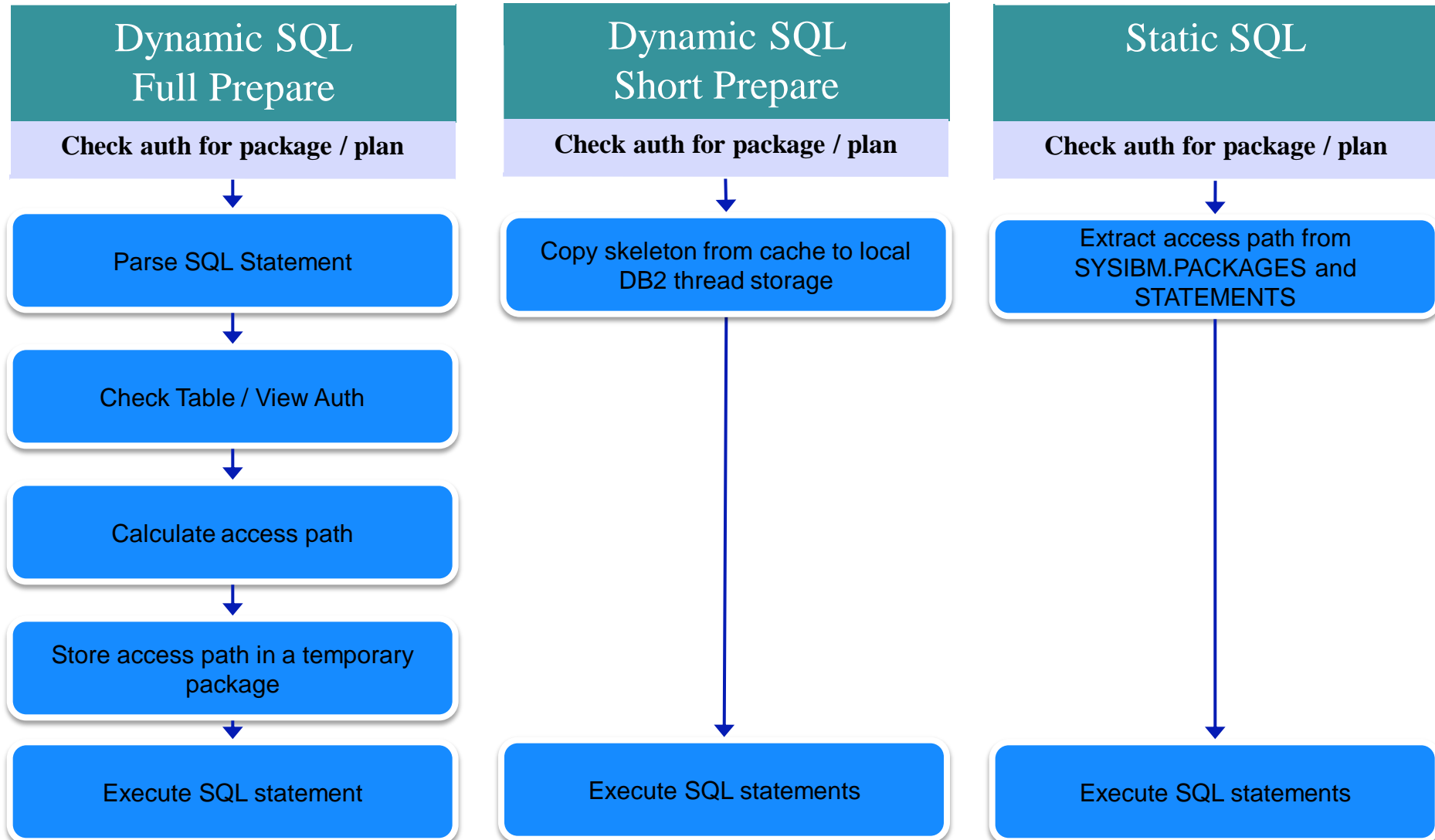


"The ability to use static SQL with pureQuery is huge. Recently, I worked with a client who could reduce CPU usage by 7 percent thanks to this one feature."

— David Beulke, Pragmatic Solutions Inc.



Dynamic vs. Static Execution



Improving Throughput with pureQuery, a z/OS Example

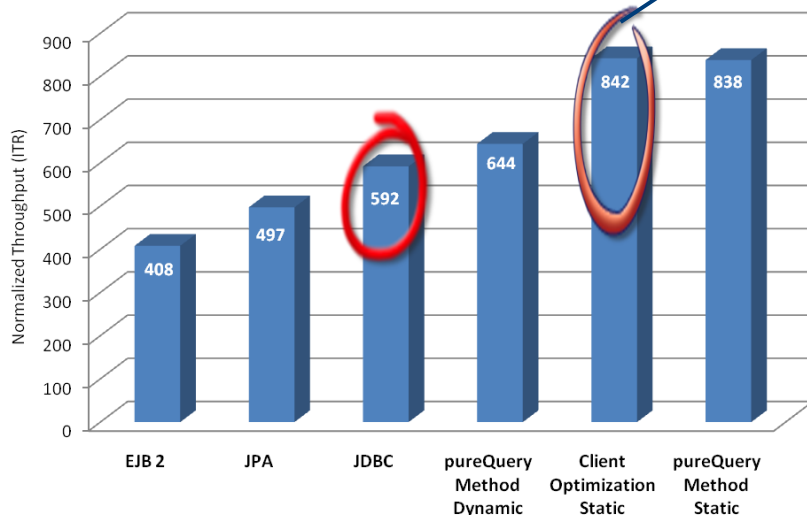


- In-house testing shows **over 40% reduction** in CPU costs over dynamic JDBC using pureQuery and DB2 for z/OS (type-2)
 - Read [IBM Optim pureQuery Runtime for z/OS Performance](#)
 - IRWW – an OLTP workload, cache hit ratio between 70 and 85%

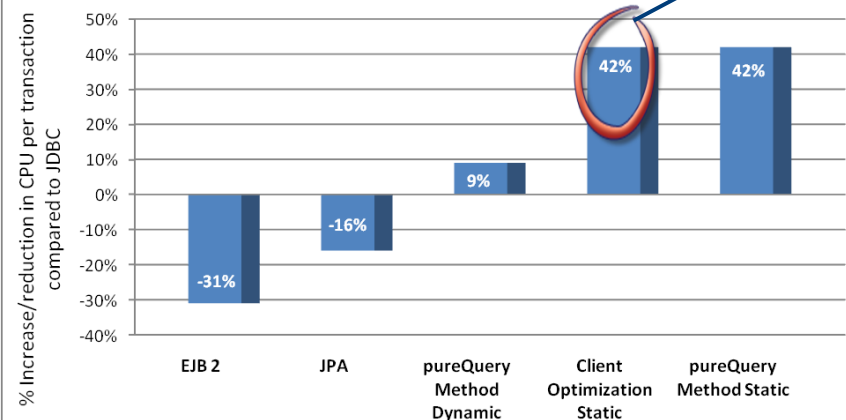
Preset application path never varies at runtime

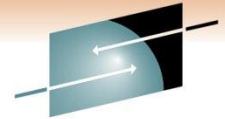
Reduced CPU per transaction means more growth on existing resources

Normalized Throughput by API for JDBC Type 2 Driver



% Increase/Reduction in CPU per Transaction Compared to JDBC Type 2 Driver

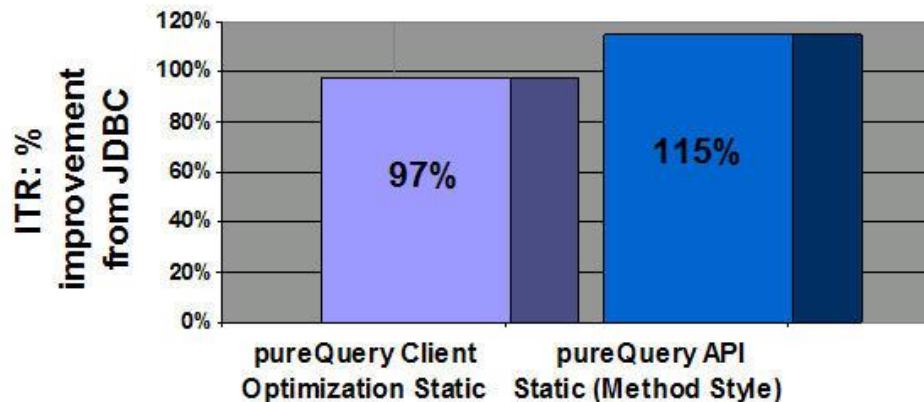




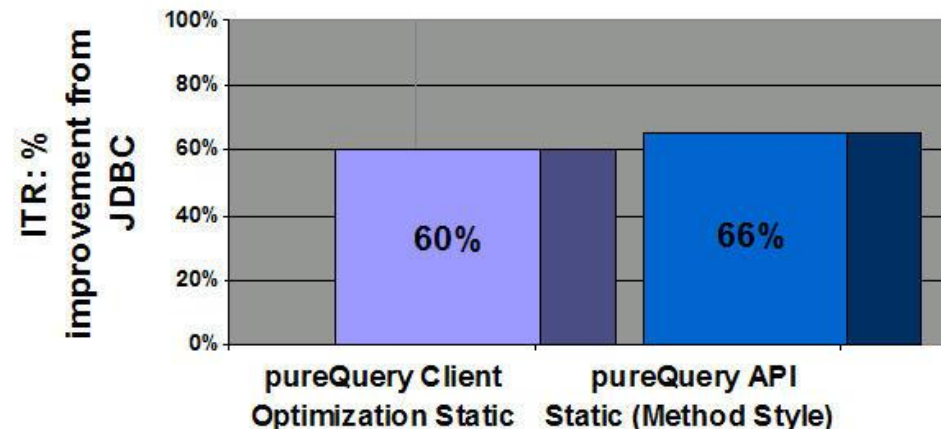
Improving Throughput with pureQuery

- In-house testing shows almost a *doubled throughput* over the existing JDBC application
- The new application that uses pureQuery method style API *more than doubled* the database transaction throughput

90% cache hit ratio

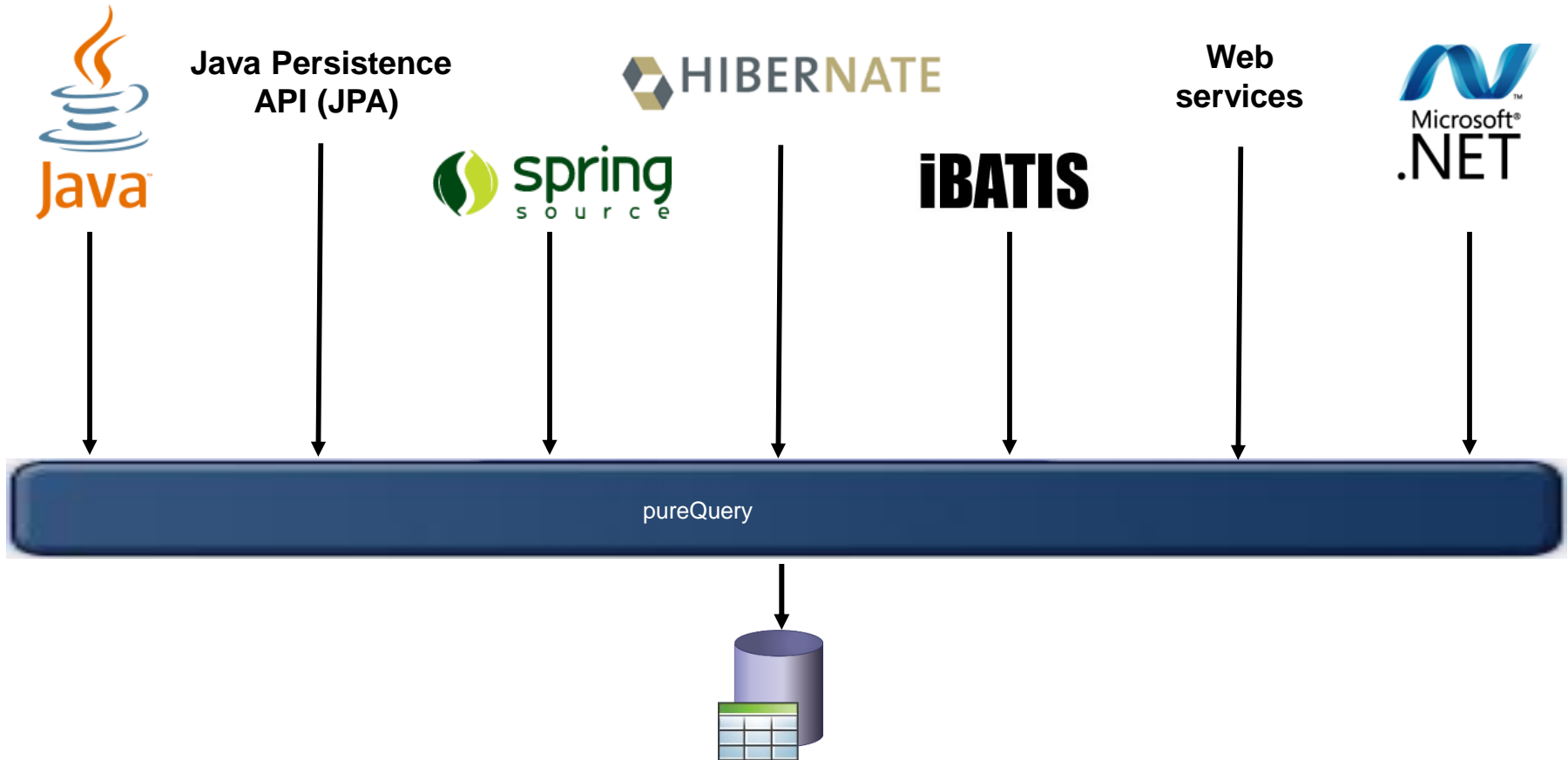


95% cache hit ratio



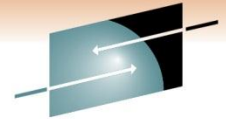
Java Database Access and pureQuery

Many on-ramps for new and existing apps

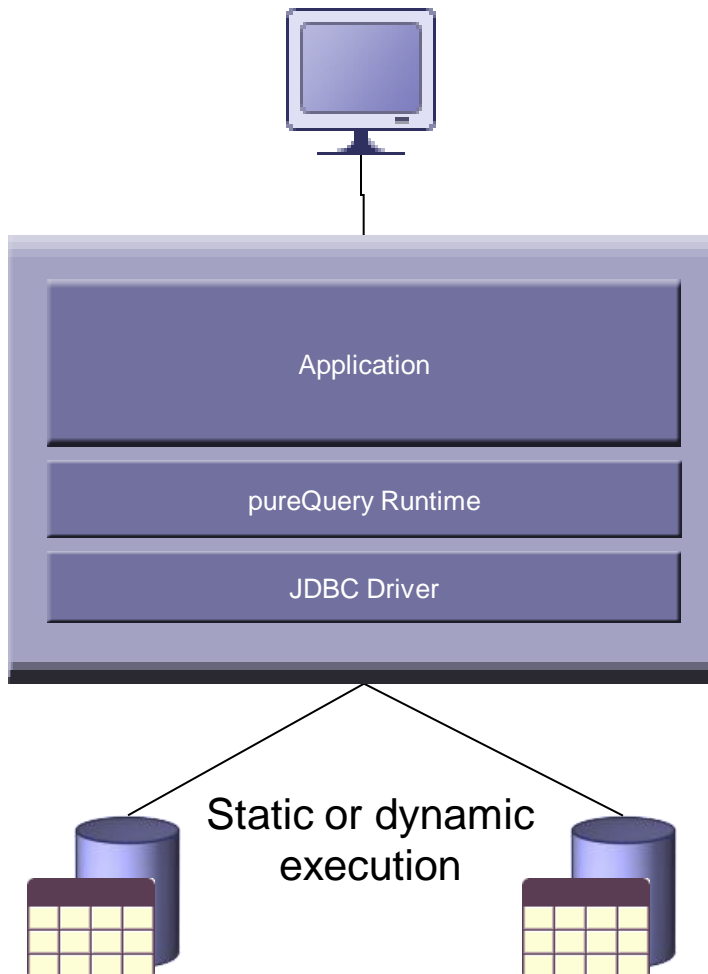


DB2 (z/OS, i & LUW), Informix, and Oracle now
More coming





Deploying with pureQuery Runtime

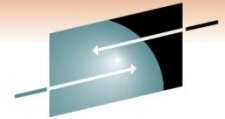


Application tier:

- z/OS, Linux, UNIX, Windows

Database tier:

- DB2 for z/OS
- DB2 for i
- DB2 for Linux, UNIX, and Windows
- Informix Dynamic Server
- Oracle



Unique Package Names Improves PD

- Most dynamic Java or .NET applications use packages **SYSLNx00** or **SYSshxyy** making it hard to identify specific programs

- Statement Operations

Unique statement identifier	Unique internal identifier for an SQL statement text	Application ID	Application Creator	Package Name	Section Number	Cursor Name	SQL Statement Text
<i>stmt_id</i>	<i>stmt_text_id</i>	<i>appl_id</i>	<i>creator</i>	<i>package_name</i>	<i>section_number</i>	<i>cursor_name</i>	<i>stmt_text</i>
1	1	127.0.0.1.44300.090112223830	NULLID	CustData2		1 DB2JCCCURSOR1	DECLARE DB2JCCCT

1	1	127.0.0.1.44300.090112223830	NULLID	SYSshxyy		1 DB2JCCCURSOR1	DECLARE DB2JCCCT
---	---	------------------------------	--------	-----------------	--	-----------------	------------------

Static
pureQuery
Java SQL

Dynamic
Java SQL

```
> M-TRIGGERS N-SYSPLEX U-ENCLAVES P-WORKSTA
=====
> ALL THREADS CONNECTED TO DB2
PTHDA FLTR ON
+
+ *
+ Elapsed Package CPU Status GetPg Update Commit CORRID
+ -----
+ 00:00:13.6 PAW_OR_0 00.0% IN-DB2 25 0 0 db2jcc_appli
+ 00:02:27.3 SYSLN200 00.0% IN-DB2 897 0 0 db2jcc_appli
+ 00:02:52.3 SYSLN200 00.0% IN-DB2 1025 0 0 db2jcc_appli
+ 00:03:05.8 SYSLN200 00.0% IN-DB2 1324 0 0 db2jcc_appli
+ 00:02:32.7 SYSLN200 00.0% IN-DB2 961 0 0 db2jcc_appli
+ 00:02:59.2 SYSLN200 00.0% IN-DB2 1046 0 0 db2jcc_appli
=====
```

Static SQL for security – administering table privileges

- Dynamic SQL
 - Table privileges granted directly to users(groups)/secondary authids
 - Security exposure and administrative burden



```
GRANT SELECT
ON TABLE PAYROLL
TO DEPT_D47
```



PAYROLL

NAME	POSITION	SALARY	...

- Static SQL (pureQuery)
 - Users get no table privileges



```
GRANT SELECT
ON PAYROLL
TO BIND_ADMIN
```

```
GRANT EXECUTE
ON PACKAGE
POSITION_REPORT
TO DEPT_D47
```

BIND

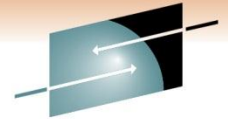
PAYROLL

NAME	POSITION	SALARY	...

```
PACKAGE
SELECT NAME,
POSITION FROM
PAYROLL...
```



More Visibility and Control of Application SQL



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- Capture SQL
- Share, review, and optimize SQL
- Revise and validate equivalency
- Bind for static execution or run dynamically
- Restrict SQL to eliminate SQL injection



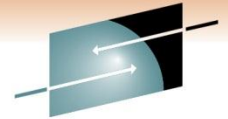
IT PRO has been watching and charting the progress of what is one of the biggest and most high profile web security threats of this year - the SQL injection.

By Asavin Wattanajanttra, 4 Aug 2008 at 11:55



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Capture Application SQL: At Development or Later

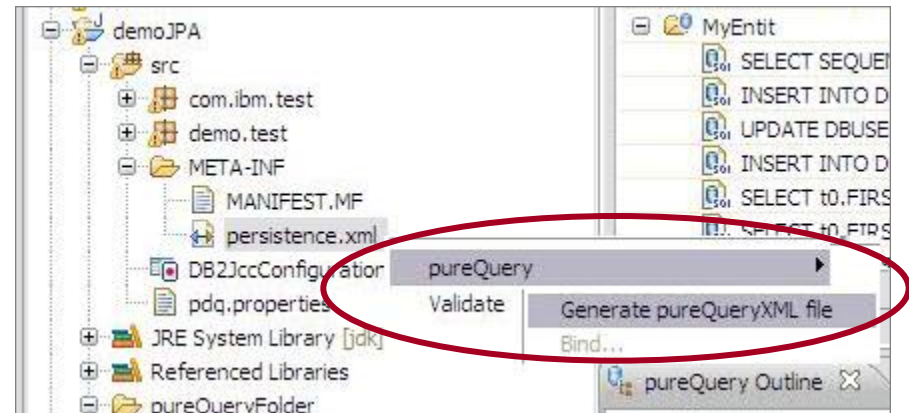


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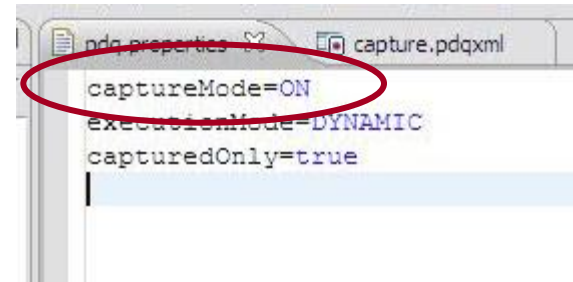


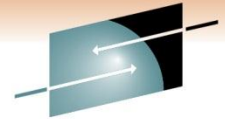
Three methods

1. Use pureQuery API
2. Use JPA and generate the pureQuery file
3. Set captureMode=ON and execute the program



**IBM Optim
Development
Studio**





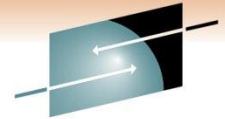
Visualize Application and SQL Metadata



- Review the captured SQL
- View metrics about execution frequency and duration
- Share captured SQL with DBA

The screenshot shows the IBM Optim Development Studio interface. The top toolbar includes buttons for Problems, Data Source Explorer, pureQuery Outline, Console, Properties, and SQL Results. The main window displays a list of captured SQL statements under a package named 'testCO'. An arrow points from the 'IBM Optim Development Studio' text to the application window. Below the SQL list, a table shows execution metrics for a specific client.

	Execution Count	Max Time	Average	Min
ClientOptimizerDemo				
database				
DepartmentJDBCSample.java				
Line# 116: SELECT DEPTNO, DEPTNAME, MGRNO, LOCATION	49	12625627	5366204.755102041	41
Line# 123: getSql()	0	0	0.0	
Line# 108: SELECT DEPTNO, DEPTNAME, MGRNO, ADMRDEP	54	214289805	9491409.166666666	41
Line# 100: SELECT DEPTNO FROM DEPARTMENT	32	17681018	5702409.53125	41
Line# 124: SELECT DEPTNAME FROM DEPARTMENT	0	0	0.0	



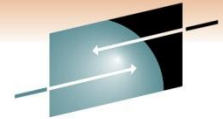
SQL Outline

Speed up PD – even when using frameworks

- Capture application-SQL-data object correlation (with or without the source code)
- Trace SQL statements to using code for faster problem isolation
- Enhance impact analysis identifying application code impacted due to database changes
- Answer “Where used” questions like “Where is this table used within the application?”
- Use with modern Java frameworks e.g. Hibernate, Spring, iBatis, OpenJPA

The screenshot displays the IBM Optim Development Studio interface. The top pane shows a Java code editor with a SQL query highlighted: `SELECT CUST_CODE, STDDEV(ORD_STOT_COST) AS TOTAL, CUST_CODE FROM GOSALESC`. The bottom pane shows the 'Performance Data Set' for 'Current Data'. A table lists various SQL queries and their performance metrics.

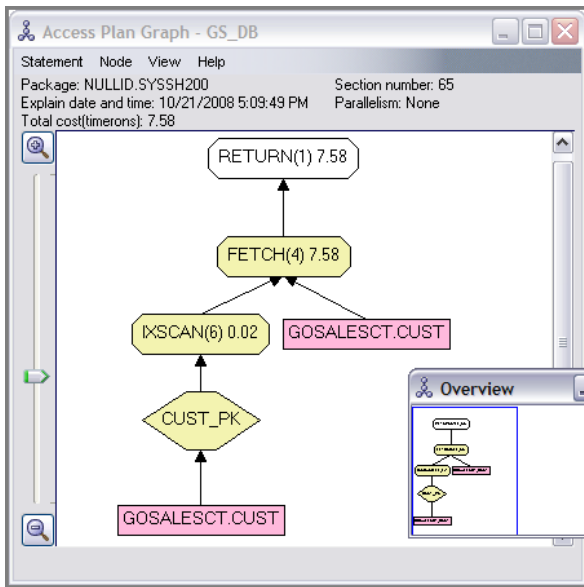
Schemas	Number of Times Run	Total Time	Max Time	Average Time	Min Time
GOSALESCST					
CUST					
SELECT CUST_CODE, CUST_FRST_NAME, CUST_LAST_NAME, CU	1	90.92	90.92	90.92	90.92
SELECT CUST_CODE, CUST_FRST_NAME, CUST_LAST_NAME, CU	2	297.06	273.61	148.53	23.45
SELECT CUST_CODE, CUST_CITY FROM GOSALESCST.CUST ORDE	3	20.09	7.99	6.70	4.97
SELECT CUST_CODE, CUST_FRST_NAME, CUST_LAST_NAME, CU	1	2.70	2.70	2.70	2.70
SELECT count(CUST_CODE) FROM GOSALESCST.CUST	14	61.04	40.82	4.36	1.20
SELECT count(CUST_CODE) FROM GOSALESCST.CUST where C	14	61.04	40.82	4.36	1.20
ReportGenerator					
CUST_ORD					
SELECT CUST_CODE, STDDEV(4	7.11	2.18	1.78	1.35
SELECT ORD_NBR AS ORDER_I	5853	3335.63	46.98	0.57	0.22
SELECT CUST_CODE, SUM(ORD	3	5.80	2.38	1.93	1.63
SELECT CUST_CODE, AVG(ORD	4	5.17	1.40	1.29	1.14
SELECT CUST_CODE, CORRELA	3	3.24	1.20	1.08	1.00



Optimize SQL



- **Launch Visual Explain**



- **Copy SQL to Optim Query [Workload] Tuner**

Project	SQL	Number of Times Run	Total Time	Max Time	Average Time	Min Time
QTProject	select ss_item_sk,	10	5309.07	1339.02	530.91	432.8
QTProject	set current schema	1	37.64	37.64	37.64	37.6
QTProject	select ss_item_sk,	1	457.01	457.01	457.01	457.0
QTProject	select l_brand, s_s	1	783.09	783.09	783.09	783.0
QTProject	with dt(cost) as (s	1	347.35	347.35	347.35	347.3

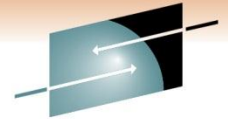
Launch Query Tuner for frequently run queries

Optimization Service Center (the fate of) (DB2 for z/OS only)



- Current OSC remains supported through DB2 9
- OSC functionality will be split among the following offerings:
 - Data Studio (no charge)
 - Query Tuner (single query tuning capabilities already overlap with Q[W]T today)
 - Base function in DB2 for z/OS customers
 - SQL environment capture
 - ~~Profile monitoring~~

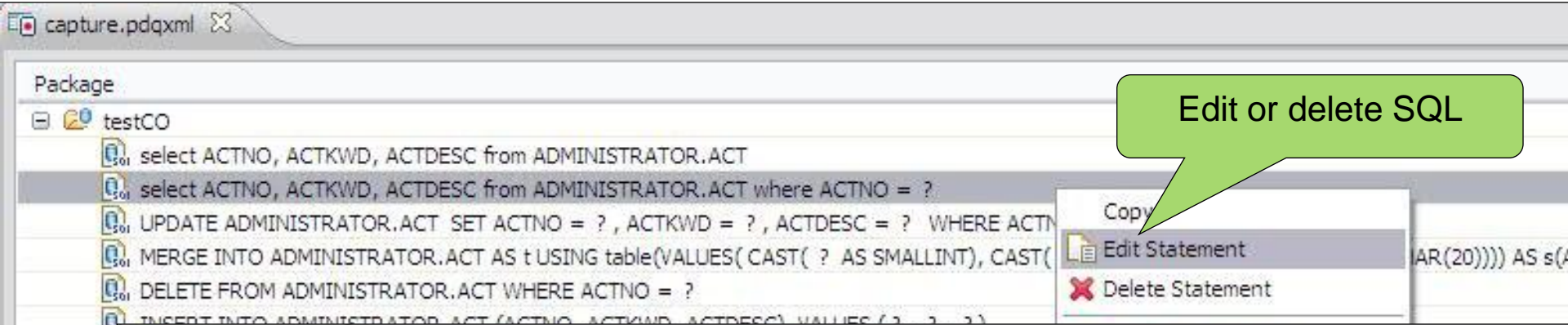
Contents of Eclipse-based Query Tuning offerings



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	Data Studio	Optim Query Tuner for z/OS	Optim Query Workload Tuner for z/OS
Queries from all sources	✓	✓	✓
Reports	✓	✓	✓
Query Formatter	✓	✓	✓
Access Plan Graph	✓	✓	✓
Query Statistics Advisor	✓	✓	✓
Query Annotation		✓	✓
Visual Plan Hint		✓	✓
Query Index Advisor		✓	✓
Query Advisor		✓	✓
Access Path Advisor		✓	✓
Workload Statistics Advisor			✓
Workload Index Advisor			✓
Workload Query Advisor			✓

Revise SQL Without Modifying the Application



capture.pdqxml

Package

- testCO
 - select ACTNO, ACTKWD, ACTDESC from ADMINISTRATOR.ACT
 - select ACTNO, ACTKWD, ACTDESC from ADMINISTRATOR.ACT where ACTNO = ?
 - UPDATE ADMINISTRATOR.ACT SET ACTNO = ? , ACTKWD = ? , ACTDESC = ? WHERE ACTNO = ?
 - MERGE INTO ADMINISTRATOR.ACT AS t USING table(VALUEs(CAST(? AS SMALLINT), CAST(? AS VARCHAR(20)))) AS s(ACTNO, ACTKWD, ACTDESC)
 - DELETE FROM ADMINISTRATOR.ACT WHERE ACTNO = ?
 - INSERT INTO ADMINISTRATOR.ACT (ACTNO, ACTKWD, ACTDESC) VALUES (?, ?, ?)

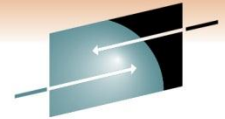
capture.pdqxml

Package

- testCO
 - select ACTNO, ACTKWD, ACTDESC from ADMINISTRATOR.ACT
 - select ACTNO, ACTKWD, ACTDESC from ADMINISTRATOR.ACT where ACTNO = ?
 - select ACTNO, ACTKWD, ACTDESC from ADMINISTRATOR.ACT where ACTNO = ?
 - UPDATE ADMINISTRATOR.ACT SET ACTNO = ? , ACTKWD = ? , ACTDESC = ? WHERE ACTNO = ?
 - MERGE INTO ADMINISTRATOR.ACT AS t USING table(VALUEs(CAST(? AS SMALLINT), CAST(? AS CHAR(6)), CAST(? AS VARCHAR(20)))) AS s(ACTNO, ACTKWD, ACTDESC)
 - DELETE FROM ADMINISTRATOR.ACT WHERE ACTNO = ?
 - INSERT INTO ADMINISTRATOR.ACT (ACTNO, ACTKWD, ACTDESC) VALUES (?, ?, ?)

Callout: Edit or delete SQL

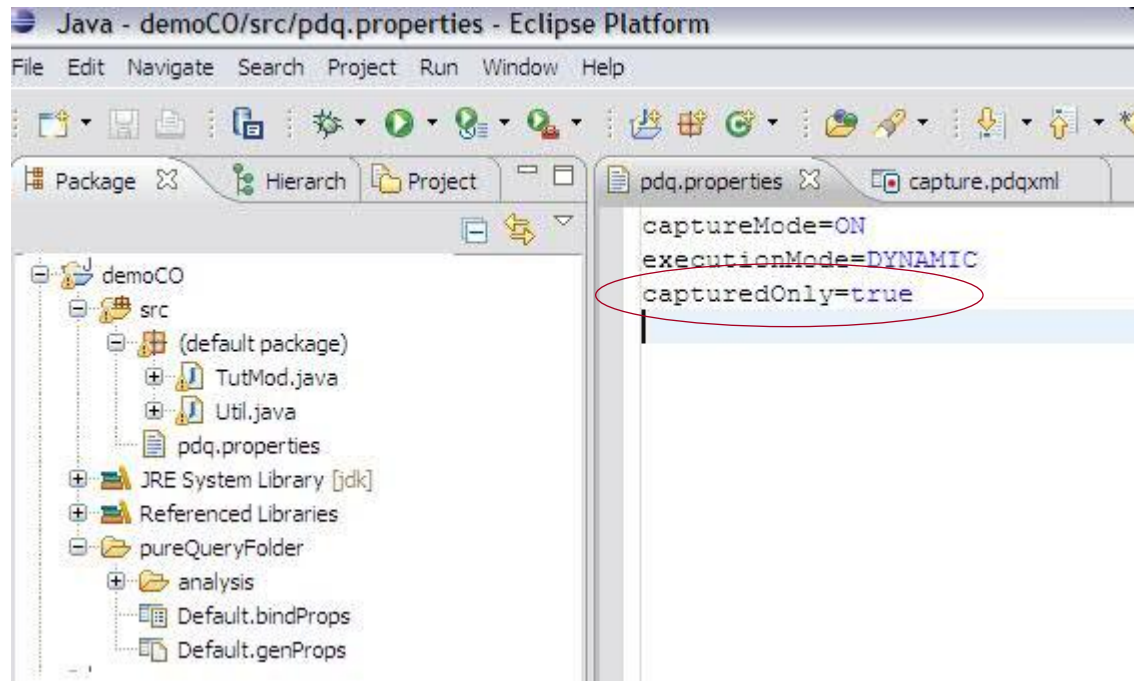
Callout: Tooling validates equivalent SQL Shows replaced

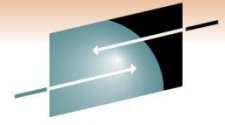


Eliminate SQL Injection



- Restrict SQL execution to only those statements captured
- Set capturedOnly=true in pdq.properties
- pureQuery Runtime looks for it in the classpath





Optimize for WebSphere and DB2 with pureQuery

Capture metadata from existing applications

- Capture from JPA without executing
- Derive performance, costs, security and manageability value

Jump start application design

- Generate SQL and Code from Database Objects
- Setup basic DAO Pattern

Enhance development productivity

- Code generation, content assist
- Database aware, Java SQL Editor

Simplify impact analysis

- Categorize by Java, SQL, Database, Packages, track back to line of code

Focus tuning efforts

- Find and sort by query elapsed time from Java

Enhance performance

- Leverage best practices, automatically for JPA
- Use static execution, automatically for JPA
- Lock in access plans for consistent performance

Reduce HW and SW costs

- Up to 42% lower CPU/Trans
- Move workload to zIIP and zAAP

Replace SQL without changing the source

- Editor validates equivalency

Speed up problem resolution

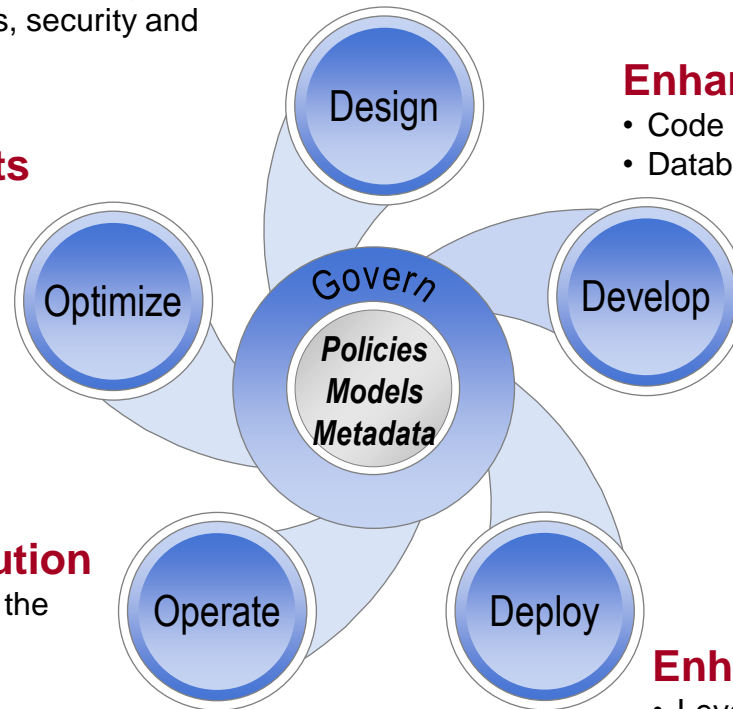
- Trace SQL back to line of code in the application

Prevent SQL Injection

- Lock down SQL for dynamic or static execution

Reduce security exposure

- Grant access to queries, not tables



Optim Development Studio and pureQuery Runtime



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Download Optim Development Studio, which provides an integrated database development environment for Oracle, DB2, and Informix. Optim Development Studio improves development productivity up to 50% for developing and testing SQL and XQuery queries, stored procedures, Web services, and Java data access layers.

Trial download

The evaluation period for this trial is 30 days. All of the product's features are enabled.

A trial version of Optim pureQuery Runtime V2.2 is available within the Optim Development Studio V2.2 trial package for use on the same Windows or Linux machine. To try the pureQuery Runtime on another platform, contact your IBM sales representative or IBM Business Partner.

➔ [System requirements](#)

The estimated download time using Download Director over a 1.5Mbps connection is 1 hour and 24 minutes; 43 minutes using Installation Manager.

Choose one of these options to download the trial. A Web install downloads and installs the product from a Web based repository. A local Install downloads and installs the product to your local hard drive.

Operating system	Version	Size	Download method
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Web install if you already have IBM Installation Manager installed Windows	V2.2	372MB	

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Tivoli

WebSphere

Java™ technology

Linux

Open source

SOA and Web services

Web development

XML

Download it today!

Query management enhancements in version 2.2.0.3 of pureQuery Runtime available June 10th, 2010



- Configuration Database to store captured SQL and pureQuery properties. Properties and captured SQL can be stored and managed centrally in a database.
- Control pureQuery behavior by updating records in the configuration database.
- Add SQL from SQL script files and Java source files to captured SQL data. Applications can realize benefits of static package without first running capture.
- Organize SQL into separate database packages during configure. SQL that shares use the same tables can be grouped together.
- Automatically remove unused SQL during merge or configure. Obsolete SQL no longer take up space in the database packages.
- Command line and GUI to manage data stored in the repository such as create, update, remove, grant and revoke privileges to the repository tables.

DB2 Developer Workbench vs. Data Studio



before

now

IBM DB2 Developer Workbench V9.1

- SQL Query Editor
- SQLJ Editor
- SQL Builder
- XQuery Builder
- SQL Routine Debugger
- Java Routine Debugger
- XML Editor
- XML Schema Editor
- Data Management
- Visual Explain
- Project Management

Data Studio is a full replacement of DB2 Developer Workbench plus much more

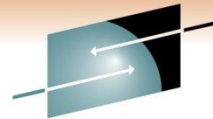
- **DB2 for Linux, Unix, Windows v8.x, v9.x**
- **DB2 for z/OS v8, v9, v10**
- **DB2 for i5/OS v5r2, v5r3, v5r4**
- **Informix Dynamic Server (IDS) v9.x, v10.x, v11**

IBM Data Studio V2.2

- Integrated Query Editor – SQL + XQuery
 - SQLJ Editor
 - SQL Builder
 - XQuery Builder
 - SQL Routine Debugger
 - Java Routine Debugger
 - XML Editor
 - XML Schema Editor
 - Data Management
 - Visual Explain
 - Project Management
- ER Diagramming
 - Data Distribution Viewer
 - Object Management
 - Browse & Update Statistics
 - Security Access Control
 - Connection Management integration with Kerberos and LDAP
 - Data Web Services
 - IDS Server Support

No-charge

Data Studio is no longer used as a brand



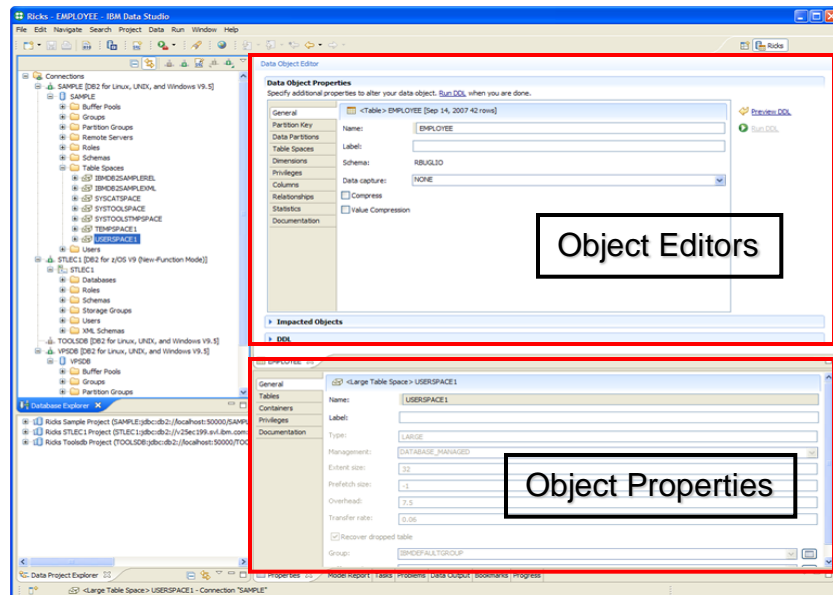
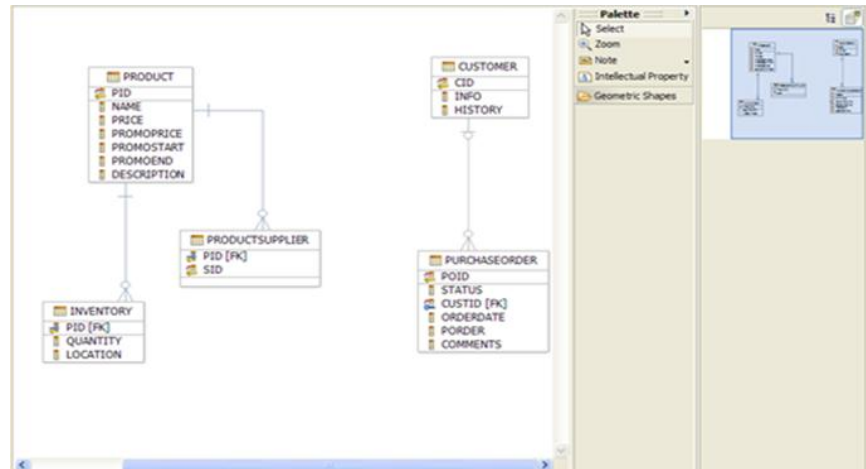
Data Studio: Data Modeling / App & DB Dev

A Consistent and Productive work environment

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Create, Alter, Drop, Browse and Filter database objects

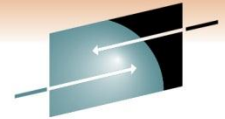
ER Diagramming



Integrated Query Editor

```
-- <ScriptOptions statementTerminator=";" />
XQUERY declare default element namespace "http://posample.org";
for $city in fn:distinct-values(db2-fn:xmlcolumn('CUSTOMER.INFO')/custo
return
<city name ='({$city})'>
(
for $cust in db2-fn:xmlcolumn('CUSTOMER.INFO')/customerinfo[addr
let $po := db2-fn:sqlquery("SELECT XMLELEMENT( NAME ""pos"",
(XMLCONCAT( XMLELEMENT(NAME ""custid"", c.custid),
XMLCONCAT( NAME ""order"", c.porder)))
FROM purchaseorder AS c")
let $id := $cust/@Cid,
$order := $po/pos[custid=$id]/order
return
<customer id='({$id})'>
```

- Express yourself with optimal queries
 - Content assistance for database objects
 - Rapid interactive end-user feedback
 - Extensible templates
 - Multiple SQL statement testing
 - SQL assistance and XQuery assistance



Unleash SQL in your Java IDE

- SQL content assist

```
// Select GOSALEST.CUST by parameters
@Select(sql = "SELECT CUST_CODE, CUST_FRST_NAME, CUST_LAST_NAME, CUST_ADDR1,"
+ " CUST_ADDR2, CUST_CITY, CUST_POST_ZONE, CUST_CTRY_CODE, CUST_PHN_NBR,"
+ " CUST_INFO, CUST_EMAIL, CUST_GNDR_CODE, CUST_PROV_STATE"
+ " FROM GOSALEST.CUST"
+ " WHERE ")
Cust getCust(int cust_code)
```

Press CTRL-SPACE to invoke content assist or auto complete

- CUST_ADDR1 - VARCHAR(128)
- CUST_ADDR2 - VARCHAR(128)
- CUST_CITY - VARCHAR(128)
- CUST_CODE - INTEGER
- CUST_CTRY_CODE - VARCHAR(128)
- CUST_EMAIL - VARCHAR(128)
- CUST_FRST_NAME - VARCHAR(128)
- CUST_GNDR_CODE - DECIMAL(3, 0)
- CUST_INFO - CLOB(32768)

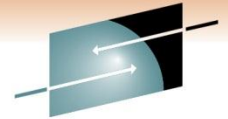
Press 'Ctrl+Space' to show SQL Proposals

- SQL validation

```
// Select GOSALEST.CUST by parameters
@Select(sql = "SELECT CUST_CODE, CUST_FRST_NAME, CUST_LAST_NAME, CUST_ADDR1,"
+ " CUST_ADDR2, CUST_CITY, CUST_POST_ZONE, CUST_CTRY_CODE, CUST_PHN_NBR,"
+ " CUST_INFO, CUST_EMAIL, CUST_GNDR_CODE, CUST_PROV_STATE"
+ " FROM GOSALEST.CUST"
+ " WHERE CUST_CODE = ?")
Cust getCust(int cust_code)
```

Table "CUST" does not contain column "CUST_CODE".
Press 'F2' for focus.

Unleash SQL in your Java IDE



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- Run SQL at design time without the need to compile the program
- Launch Visual Explain

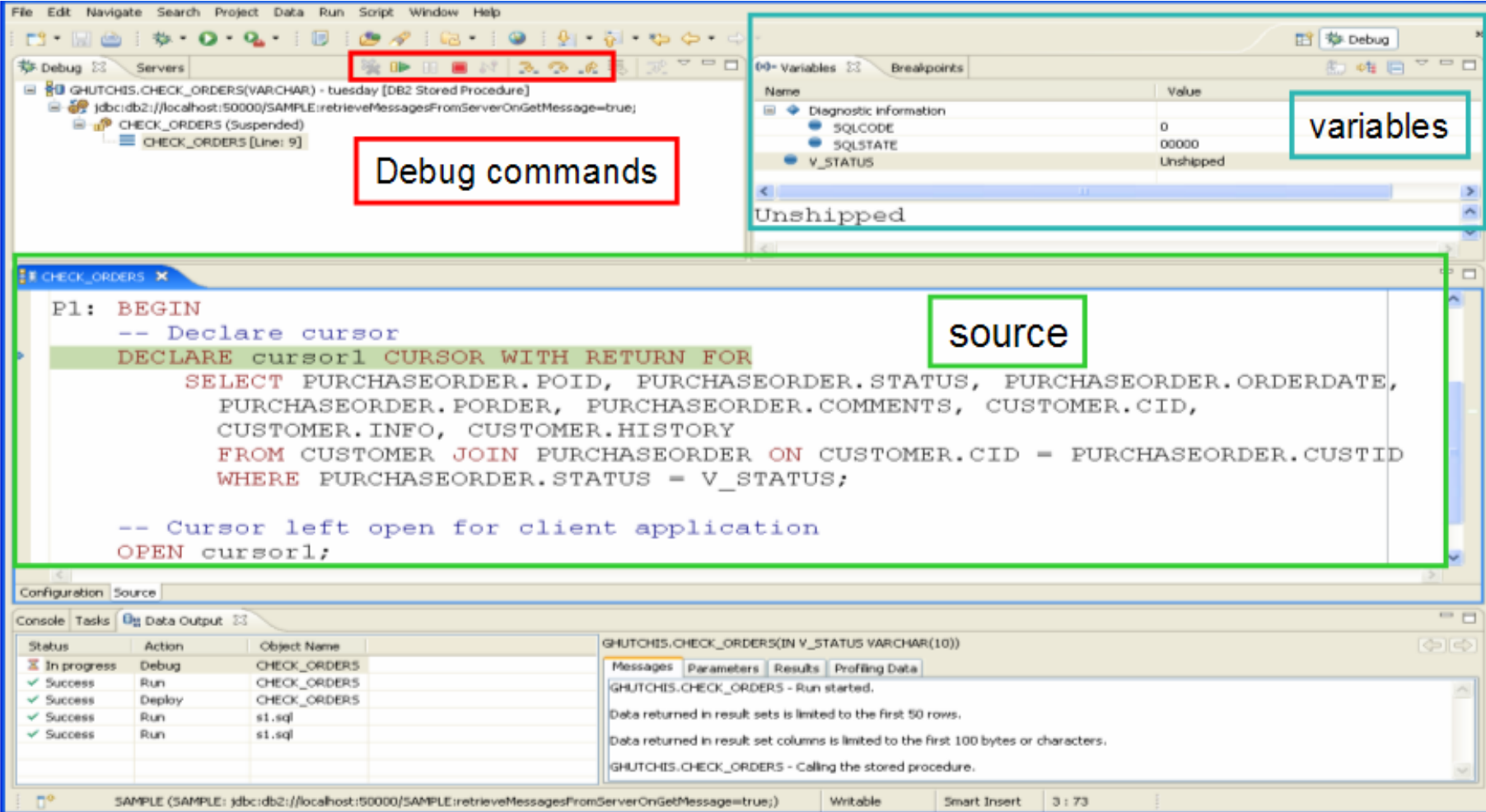
The screenshot illustrates the workflow for running SQL in a Java IDE. It shows the following steps and components:

- SQL Editor:** A SQL query is being edited: `@Select(sql = "SELECT CUST_CODE, CUST_FRST_NAME, CUST_LAST_NAME, CUST_ADDR1, " + " CUST_ADDR2, " + " CUST_INFO, " + " FROM GOSALECT.CUST WHERE CUST_CODE = 100");`. A context menu is open over the query, showing options like "Undo Typing", "Revert File", "Save", "Open Declaration", and "Create Stored Procedure...".
- Run SQL:** A "Run SQL" button (Shift+F6) is highlighted in the IDE's toolbar.
- Specify Host Variable Values:** A dialog box titled "Specify Host Variable Values" is shown. It contains a table for "Host Variable Values" with the following data:

Name	Type	Value
?	INTEGER	100
- Launch Visual Explain:** A "Launch Visual Explain" button is highlighted in the IDE's toolbar.
- Data Output:** A "Data Output" window shows the results of the query in a table:

CUST_CODE	CUST_FRST...	CUST_LAS...	CUST_ADD...	CUST_P
100	John	Smith	77 Story R...	95141
- Visual Explain Plan:** A "Visual Explain" window displays a query execution plan. The plan shows a sequence of operations: `GOSALESC.T.CUST` (table scan), `CUST_PK` (index access), `GOSALESC.T.CUST` (table scan), `IXSCAN(6) 0.02` (index scan), `FETCH(4) 7.58` (fetch), and `RETURN(1) 7.58` (return). An "Overview" window is also visible in the bottom right corner.

Stored Procedure Support SQL and Java Debugger



Debug commands

variables

```
P1: BEGIN
-- Declare cursor
DECLARE cursor1 CURSOR WITH RETURN FOR
SELECT PURCHASEORDER.POID, PURCHASEORDER.STATUS, PURCHASEORDER.ORDERDATE,
PURCHASEORDER.PORDER, PURCHASEORDER.COMMENTS, CUSTOMER.CID,
CUSTOMER.INFO, CUSTOMER.HISTORY
FROM CUSTOMER JOIN PURCHASEORDER ON CUSTOMER.CID = PURCHASEORDER.CUSTID
WHERE PURCHASEORDER.STATUS = V_STATUS;

-- Cursor left open for client application
OPEN cursor1;
```

source

Status	Action	Object Name
In progress	Debug	CHECK_ORDERS
Success	Run	CHECK_ORDERS
Success	Deploy	CHECK_ORDERS
Success	Run	s1.sql
Success	Run	s1.sql

GHUTCHIS.CHECK_ORDERS(IN V_STATUS VARCHAR(10))

Messages Parameters Results Profiling Data

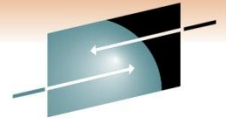
GHUTCHIS.CHECK_ORDERS - Run started.

Data returned in result sets is limited to the first 50 rows.

Data returned in result set columns is limited to the first 100 bytes or characters.

GHUTCHIS.CHECK_ORDERS - Calling the stored procedure.

Integrated editor and debugger for SQL PL and Java (JDBC or SQLJ) in Anaheim

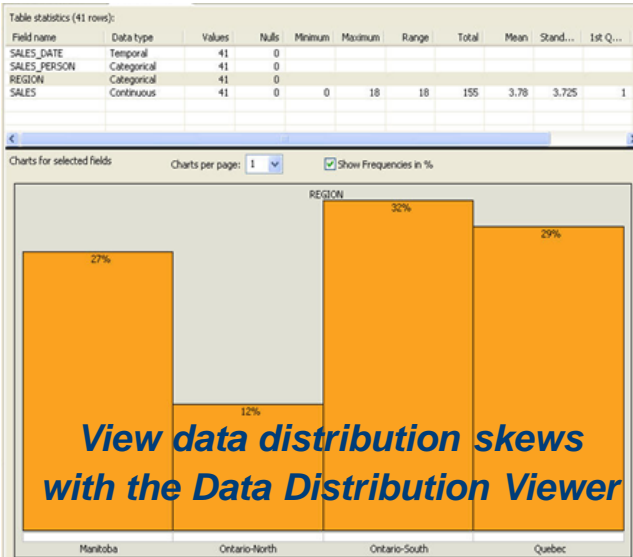


Data Management

Edit Data

EMPNO [CHAR(6)]	FIRSTNAME [VARCHAR(12)]	MIDINIT [CHAR(1)]	LASTNAME [VARCHAR(15)]	WORKDEPT [CHAR(3)]	PHONENO [CHAR(4)]	HIREDATE [DATE]	JOB
000030	CHRISTINE	I	HAAS	A00	3978	1/1/95	PRES
000020	MICHAEL	L	THOMPSON	B01	3476	10/10/03	MANU
000030	SALLY	A	KWIAN	C01	4738	4/5/05	MANU
000050	JOHN	B	GEYER	E01	6789	8/17/79	MANU
000060	IRVING	F	STERN	D11	6423	9/14/03	MANU
000070	EVA	D	PULASKI	O21	7831	9/30/05	MANU
000090	EILEEN	W	HENDERSON	E11	5498	8/15/00	MANU
000100	THEODORE	E	SPEISER	E21	5972	6/19/00	MANU
000110	VINCENZO	Q	LUCCHESI	A00	3490	5/16/88	SALE
000120	SEAN	M	O'CONNELL	A00	2167	12/5/93	CLER
000130	DELORES	M	QUINTANA	C01	4578	7/28/01	ANAL
000140	HEATHER	A	NOCHOLS	C01	1793	12/15/06	ANAL
000150	BRUCE	E	ADAMSON	D11	4510	2/12/02	DESD
000160	ELIZABETH	R	PIANKA	D11	3782	10/11/06	DESD
000170	MASATOSHI	J	YOSHIDAURA	D11	2890	9/15/99	DESD
000180	MARILYN	S	SCOUTTEN	D11	1682	7/7/03	DESD
000190	JAMES	H	WALKER	D11	2986	7/26/04	DESD
000200	DAVID	B	BROWN	D11	4901	3/3/02	DESD
000210	WILLIAM	T	JONES	D11	0942	4/11/98	DESD
000220	JENNIFER	K	LUTZ	D11	0672	8/29/98	DESD
000230	JAMES	J	JEFFERSON	O21	2094	11/21/96	CLER
000240	SALVATORE	M	MARINO	D21	3780	12/5/04	CLER
000250	DANIEL	S	SMITH	O21	0961	10/30/99	CLER
000260	SYBIL	P	JOHNSON	O21	8953	9/11/05	CLER
000270	MARIA	L	PEREZ	O21	9001	9/30/06	CLER
000280	ETHEL	R	SCHNEIDER	E11	8997	3/24/97	OPER
000290	JOHN	X	PARKER	E11	4502	5/30/06	OPER
000300	PHILIP	K	SMITH	E11	2095	6/19/02	OPER
000310	MAURICE	F	SETTLIGHT	E11	3332	9/12/94	OPER
000320	RAMLAL	V	MEHTA	E21	9990	7/7/95	PEBL
000330	WING	L	LEE	E21	2103	2/23/06	PEBL
000340	JASON	R	GOUNOT	E21	5698	5/5/77	PEBL
000010	RYAN	T	HFMATHYCFR	A00	1978	1/1/94	SAI F

Data Distribution Editor

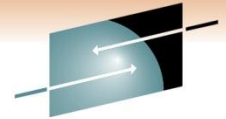


Roles, Users, Privileges

The screenshot shows the IBM Data Studio interface with several key components highlighted:

- Database Explorer:** Shows the tree structure of the database, including Schemas, Roles, and Tables. A red box highlights the 'Roles' folder, with a text box labeled 'Manage Roles' overlaid.
- Data Object Properties:** A dialog box for configuring a data object. A red box highlights the 'Privileges' tab, which lists various privileges (such as EXECUTE, INSERT, UPDATE) and their grantors. A text box labeled 'Privileges By User' is overlaid on this section.
- Table Properties:** A dialog box for configuring a table. A red box highlights the 'Privileges' tab, which lists privileges for different users. A text box labeled 'Privileges By Object' is overlaid on this section.

IBM Data Studio



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- ISVs
- Developers

IBM Data Studio (stand-alone)



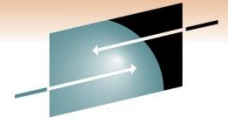
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<input type="radio"/> IBM Data Studio Version 2.2 Languages: English	Windows Vista Business Windows Vista Enterprise Windows Vista Ultimate Windows XP Professional	download

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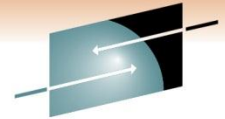


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More resources

- Community page: Integrated Data Management (Optim and Data Studio); articles, tutorials, blogs, forums ...
<http://www.ibm.com/developerworks/spaces/optim>
- IBM Optim Development Studio and pureQuery Runtime forum
<http://www.ibm.com/developerworks/forums/forum.jspa?forumID=1797>
- pureQuery for DB2 for z/OS demo (Improving ROI for existing applications)
<http://www.ibm.com/developerworks/offers/lp/demos/summary/im-purequery4zos.html>
- Optim Performance Management Solution
<http://www.ibm.com/developerworks/offers/lp/demos/summary/im-performmgtsolution.html>

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Session Xxx

An Introduction to IBM's pureQuery

