

IBM Data Studio – Next Generation Application Development and Admin for IDS

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Session C04

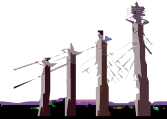
Mon, April 28, 2008 • 02:10 p.m. – 03:10 p.m.

2008 IIUG Inform*i*x Conference



Agenda

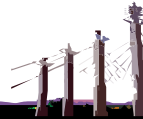
- IBM Data Studio
 - An overview of the new data server tooling solution
- Future Direction
 - Insight into the direction of the new data server tooling



IBM Data Studio

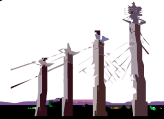
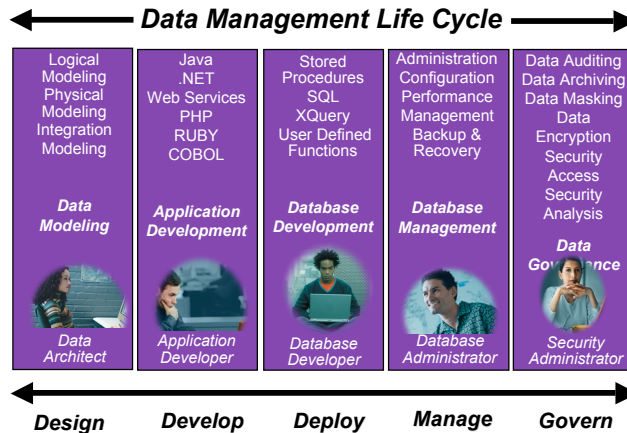
What is it ?

IBM Data Studio is a comprehensive data management solution that empowers you to effectively design, develop, deploy and manage your data, databases and database applications throughout the data management life cycle utilizing a consistent and integrated user interface

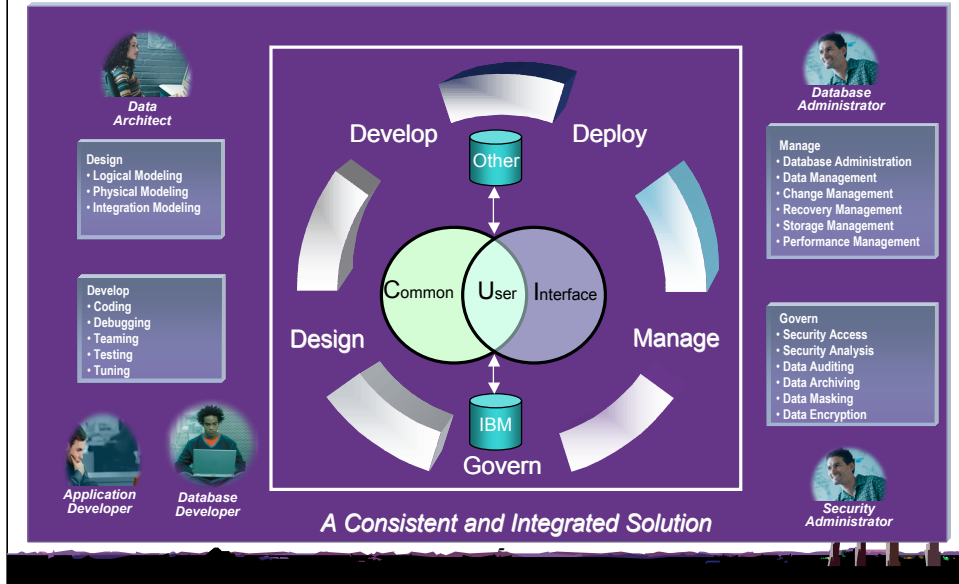


IBM Data Studio

Who will use it ?



IBM Data Studio



Why IBM Data Studio ?

Key Benefits

Increase productivity for all roles throughout the data life cycle

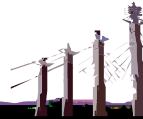
- Slash development time up to 50% with an integrated data management environment
- Promote collaboration across roles to optimize data server and application performance
- Accelerate Java development productivity with new pureQuery data access
- Simplify development of applications implementing industry specific XML standards
- Monitor data server operation & performance anywhere, anytime from a Web browser

Simplify and speed development of new skills

- Learn once, use with all supported data servers
- Easy-to-use and integrated user interface, compatible with Rational Software Development Platform
- Extensible with Eclipse plug-ins to customize the environment for each team member

Superior monitoring and problem determination for WebSphere

- pureQuery Java API support, end-to-end monitoring, and more
- Develop and publish data as a Web service without programming
- Info 2.0 Ready - support for Web 2.0 protocols and format



IBM Data Studio v1.1

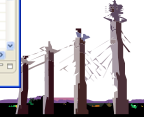
- Empowering developers and database administrators
- Complimentary and available in October of 2007
- Support for DB2 on all platforms and IDS

DB2 for LUW	DB2 for z/OS	DB2 for i5/OS	IDS
• Physical Data Modeling • Data Distribution Viewer • Integrated Query Editor • SQL Builder • SQL Routine Debugger • Java Routine Debugger • XML Editor • XML Schema Editor • pureQuery for Java • Data Web Services • Object Management • Data Management • Update Statistics • Health Monitoring * • Visual Explain • Security Access Controls • Project Management	• Physical Data Modeling • Data Distribution Viewer • Integrated Query Editor • SQL Builder • SQL Routine Debugger • Java Routine Debugger • XML Editor • XML Schema Editor • pureQuery for Java • Data Web Services • Object Management • Data Management • Update Statistics • Visual Explain • Security Access Controls • Project Management	• Physical Data Modeling • Data Distribution Viewer • Integrated Query Editor • SQL Builder • SQL Routine Debugger • Java Routine Debugger • XML Editor • XML Schema Editor • pureQuery for Java • Data Web Services • Object Management • Data Management • Security Access Controls • Project Management	• Physical Data Modeling • Data Distribution Viewer • Integrated Query Editor • SQL Builder • XML Editor • XML Schema Editor • pureQuery for Java • Data Web Services • Object Management • Data Management • Security Access Controls • Project Management

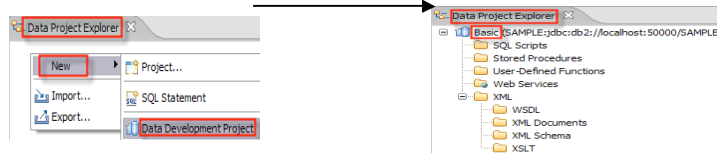
* Technical Preview

Consistent, Integrated, Productive Work Environment

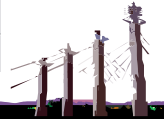
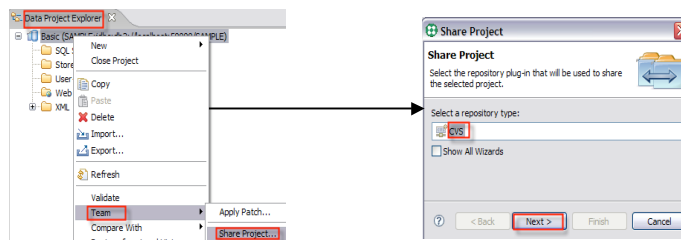
Consistent, Integrated, Productive Work Environment



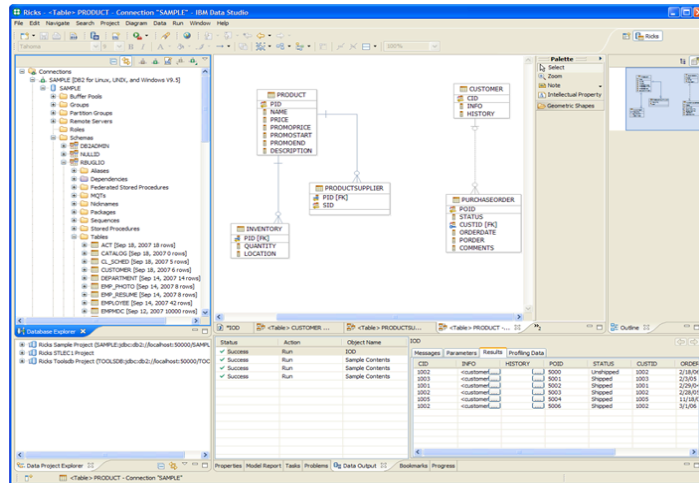
Project Management



Teaming options to share projects



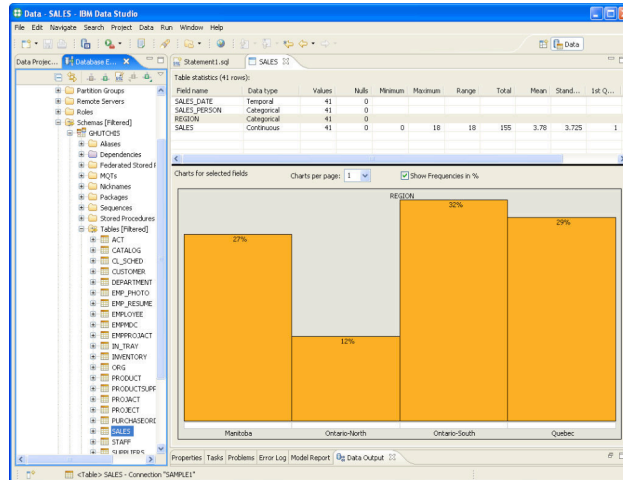
Data Modeling



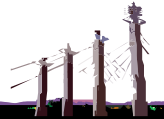
Easy and robust physical data modeling capabilities



Data Distribution Viewer



Easily view table column distribution skews



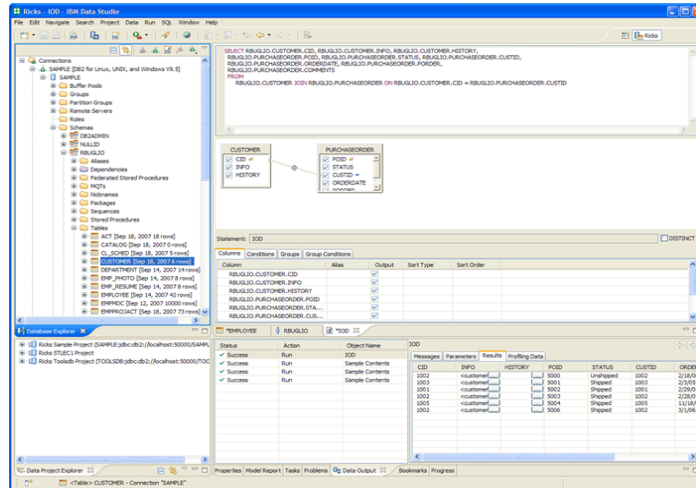
[illegible]

- 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



SQL and XQuery together

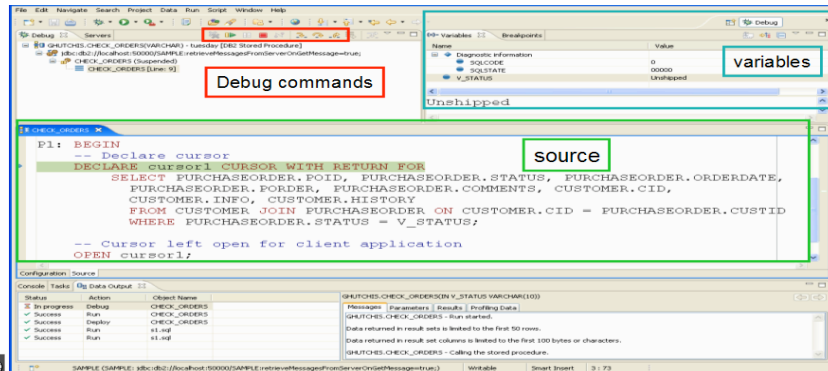
SQL Builder



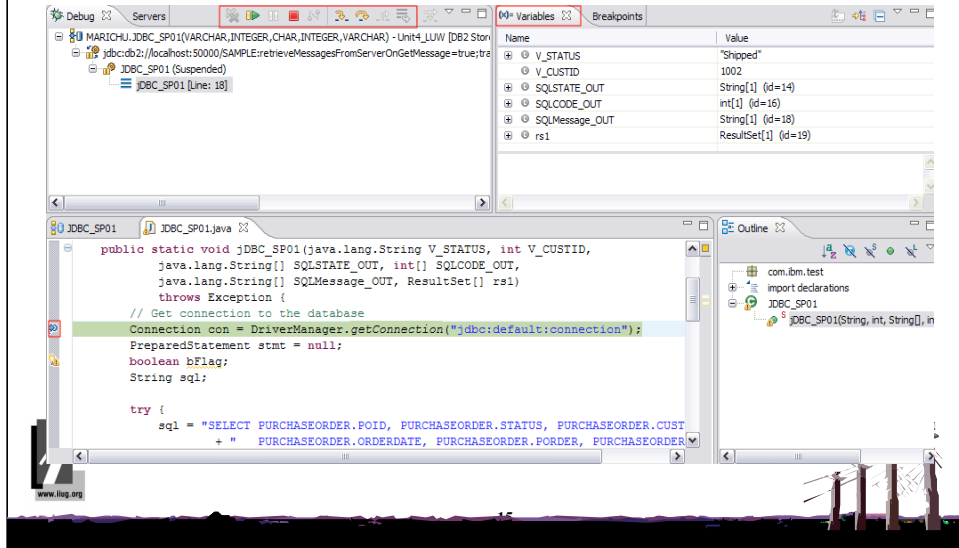
Easily build and test SQL Queries



SQL Routine Debugger



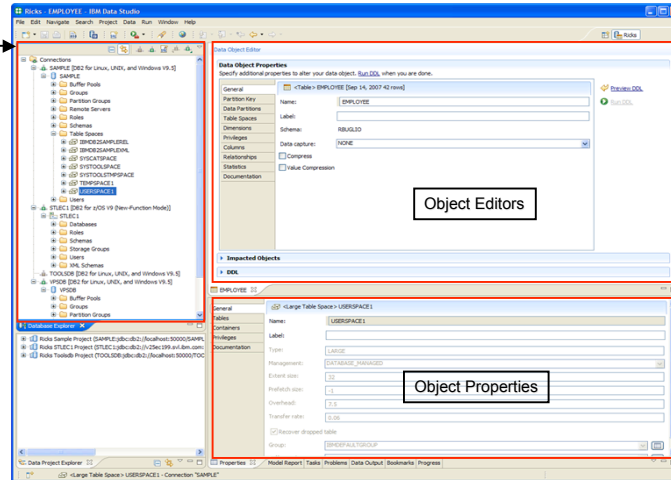
Java Routine Debugger



Object Management

Database Explorer

- Buffer Pools
- Groups
- Partition Groups
- Remote Servers
- Roles
- Schemas
- Aliases
- Dependencies
- Federated SPs
- MQTs
- Nicknames
- Packages
- Sequences
- Stored Procedures
- Tables
- UDFs
- UDTs
- Views
- XML Schemas
- Table Spaces
- Users



Create, Alter, Drop, Browse and Filter database objects

Data Management

The screenshot displays the IBM Data Studio interface. On the left, the 'Database Explorer' pane shows a tree view of the database structure, including tables, views, and procedures. A red box highlights the 'Update Statistics' option in the context menu. The main window shows a table with columns: EMPNO, FIRSTNAME, MIDDLENAME, LASTNAME, WORKDEPT, INCHENNO, and HIRE. A red box highlights the 'Edit Data' button. Below the table, a 'Load and Extract Data' dialog box is open, showing options for loading data from a file or database. A red box highlights the 'Browse Data' button. The bottom status bar shows the current table: 'Data Project Explorer -> EMPLOYEE - Connection: SAMPLE'.

EMPNO	FIRSTNAME	MIDDLENAME	LASTNAME	WORKDEPT	INCHENNO	HIRE
000001	CHRISTINE	L	HARRIS	ADM	3978	1/1/91
000002	CHRISTINE	L	THOMPSON	ADM	3478	1/1/91
000003	DALY	A	KEVIN	CRM	4738	4/5/93
000004	JOHN	B	GEYER	ADM	3789	8/17/91
000005	JOHN	B	STERN	CRM	5433	9/14/93
000006	JOHN	B	FLAHERTY	CRM	3831	9/26/91
000007	JOHN	B	FLAHERTY	CRM	5111	9/1/91
000008	THEODORE	Q	SPENCER	CRM	5972	8/19/91
000009	THEODORE	Q	LUCKWESSE	ADM	3490	9/16/91
000010	SEAN	M	QUINN	ADM	2187	12/28/91
000011	SEAN	M	QUINN	CRM	4578	12/28/91
000012	HEATHER	A	NICHOLS	CRM	1793	12/15/91
000013	BRUCE	A	ADAMSON	CRM	4532	12/15/91
000014	FRANK	A	SCOTTEN	CRM	1792	12/15/91
000015	FRANK	A	SCOTTEN	CRM	1792	12/15/91
000016	WILLIAM	V	JOHN	CRM	5982	12/15/91
000017	WILLIAM	V	JOHN	CRM	5982	12/15/91
000018	JAMES	M	WALKER	CRM	2986	12/15/91
000019	JAMES	M	WALKER	CRM	2986	12/15/91
000020	JAMES	M	WALKER	CRM	2986	12/15/91
000021	JAMES	M	WALKER	CRM	2986	12/15/91
000022	JAMES	M	WALKER	CRM	2986	12/15/91
000023	JAMES	M	WALKER	CRM	2986	12/15/91
000024	JAMES	M	WALKER	CRM	2986	12/15/91
000025	JAMES	M	WALKER	CRM	2986	12/15/91
000026	JAMES	M	WALKER	CRM	2986	12/15/91
000027	JAMES	M	WALKER	CRM	2986	12/15/91
000028	JAMES	M	WALKER	CRM	2986	12/15/91
000029	JAMES	M	WALKER	CRM	2986	12/15/91
000030	JAMES	M	WALKER	CRM	2986	12/15/91
000031	JAMES	M	WALKER	CRM	2986	12/15/91
000032	JAMES	M	WALKER	CRM	2986	12/15/91
000033	JAMES	M	WALKER	CRM	2986	12/15/91
000034	JAMES	M	WALKER	CRM	2986	12/15/91
000035	JAMES	M	WALKER	CRM	2986	12/15/91
000036	JAMES	M	WALKER	CRM	2986	12/15/91
000037	JAMES	M	WALKER	CRM	2986	12/15/91
000038	JAMES	M	WALKER	CRM	2986	12/15/91
000039	JAMES	M	WALKER	CRM	2986	12/15/91
000040	JAMES	M	WALKER	CRM	2986	12/15/91
000041	JAMES	M	WALKER	CRM	2986	12/15/91
000042	JAMES	M	WALKER	CRM	2986	12/15/91
000043	JAMES	M	WALKER	CRM	2986	12/15/91
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000046	JAMES	M	WALKER	CRM	2986	12/15/91
000047	JAMES	M	WALKER	CRM	2986	12/15/91
000048	JAMES	M	WALKER	CRM	2986	12/15/91
000049	JAMES	M	WALKER	CRM	2986	12/15/91
000050	JAMES	M	WALKER	CRM	2986	12/15/91

Extract, Load, Browse, Edit, Update Statistics



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The screenshot displays the SQL Developer interface with several key components highlighted:

- Connections Panel (Left):** A tree view showing database connections. A red box highlights the 'Roles' folder under the 'Sample' connection, with a callout box labeled "Manage Roles".
- Database Object Properties Panel (Right):** A panel showing properties for a selected object. A red box highlights the 'Privileges' tab, which lists various privileges granted to users. A callout box labeled "Privileges By User" points to this tab.
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Manage Roles and Users – Grant and Revoke Privileges

IBM Data Web Services

Point-and-Click SOA

Web service creation embedded in "Data" perspective

- No programming required
- Easy conversion of SQL statements and stored procedures into Web service operations

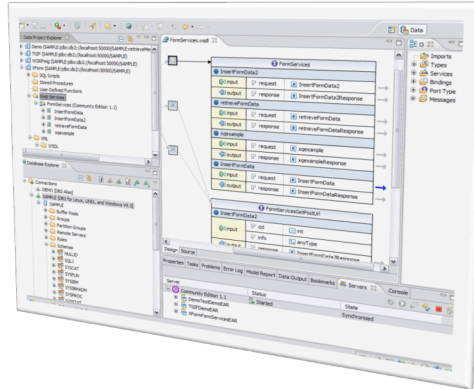
Usage of many default settings

- Makes generation of Web service quick and easy
- More complex customization possible

Automated artifact generation

- WSDL, data source configuration, runtime artifacts

Integrated deploy and test environment

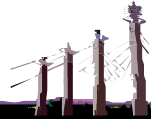


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IBM Data Studio Administration Console

- What is it ?
 - An integral set of features and functions within Data Studio
 - A web based interface to perform operational database administration tasks
 - Immediate access to critical data server information and functions from anywhere
- What's available in the first release
 - *Technical Preview in October 2007 !*
 - Health and availability monitoring
 - DB2 for LUW V9.5
 - Problem determination
 - Problem recommendations
 - 72 Hours of History
 - Ability to monitor up to 100 data servers
 - Q Replication monitoring and administration
- What will be available in the future?
 - Support for all IBM data servers – IDS and DB2 on all platforms
 - The future home for commonly performed operational data management functions
 - Query Analysis, Query Tuning
 - Workload Management
 - Configuration Management
 - Utility Management, Storage Management
 - Data Governance



Quick & Easy Problem Determination

Heatchart – Overall Health Status

Where are the most important
hotspots that need my attention?

**Administrator****Dashboard – Adhoc Investigation**

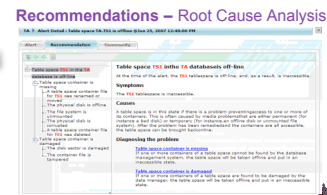
Something doesn't seem quite right. I
wonder what's happening?

Alert List – Historical Investigation

Severity	Alert Type	Timestamp	Database
High	CPU utilization of 94.0%	07/11/2008	Database101
High	CPU utilization of 94.0%	08/11/2008	Database101
High	CPU utilization of 94.0%	09/11/2008	Database101
High	Application timeout	07/11/2008	Database101
High	Application timeout	08/11/2008	Database101
High	Application timeout	09/11/2008	Database101
High	Application timeout	10/11/2008	Database101
High	Application timeout	11/11/2008	Database101
High	Application timeout	12/11/2008	Database101
High	Application timeout	13/11/2008	Database101
High	Application timeout	14/11/2008	Database101
High	Application timeout	15/11/2008	Database101
High	Application timeout	16/11/2008	Database101
High	Application timeout	17/11/2008	Database101
High	Application timeout	18/11/2008	Database101
High	Application timeout	19/11/2008	Database101
High	Application timeout	20/11/2008	Database101
High	Application timeout	21/11/2008	Database101
High	Application timeout	22/11/2008	Database101
High	Application timeout	23/11/2008	Database101
High	Application timeout	24/11/2008	Database101
High	Application timeout	25/11/2008	Database101
High	Application timeout	26/11/2008	Database101
High	Application timeout	27/11/2008	Database101
High	Application timeout	28/11/2008	Database101
High	Application timeout	29/11/2008	Database101
High	Application timeout	30/11/2008	Database101
High	Application timeout	01/12/2008	Database101
High	Application timeout	02/12/2008	Database101
High	Application timeout	03/12/2008	Database101
High	Application timeout	04/12/2008	Database101
High	Application timeout	05/12/2008	Database101
High	Application timeout	06/12/2008	Database101
High	Application timeout	07/12/2008	Database101
High	Application timeout	08/12/2008	Database101
High	Application timeout	09/12/2008	Database101
High	Application timeout	10/12/2008	Database101
High	Application timeout	11/12/2008	Database101
High	Application timeout	12/12/2008	Database101
High	Application timeout	13/12/2008	Database101
High	Application timeout	14/12/2008	Database101
High	Application timeout	15/12/2008	Database101
High	Application timeout	16/12/2008	Database101
High	Application timeout	17/12/2008	Database101
High	Application timeout	18/12/2008	Database101
High	Application timeout	19/12/2008	Database101
High	Application timeout	20/12/2008	Database101
High	Application timeout	21/12/2008	Database101
High	Application timeout	22/12/2008	Database101
High	Application timeout	23/12/2008	Database101
High	Application timeout	24/12/2008	Database101
High	Application timeout	25/12/2008	Database101
High	Application timeout	26/12/2008	Database101
High	Application timeout	27/12/2008	Database101
High	Application timeout	28/12/2008	Database101
High	Application timeout	29/12/2008	Database101
High	Application timeout	30/12/2008	Database101
High	Application timeout	31/12/2008	Database101

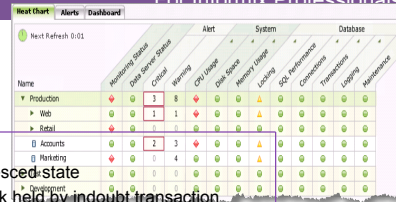


What happened when I was out for
lunch? ... Away for weekend?

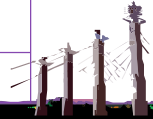


Guide me to the root cause and help
me fix it properly; I need to know all the
relevant info to make the best decision.

The Heatchart Overall Health Status

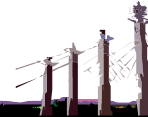
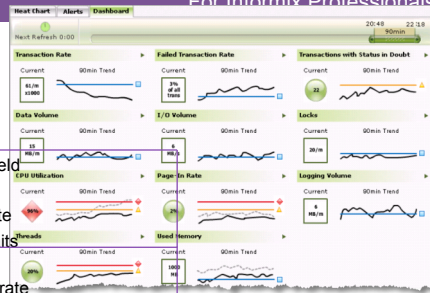


Locking	- Application causing lock escalation - Table space inaccessible due to quiesced state - Application waiting indefinitely for lock held by indoubt transaction
Database Storage	- Table space inaccessible because it is offline - Running out of database storage - Storage I/O problem
Recovery	- Database inaccessible because recovery is incomplete or failed - Table space cannot be updated because it is in backup pending state - Table space inaccessible because it is in drop pending state
System	- Bad response times due to high CPU usage - Bad response times due to high memory usage
Logging	- Long running app is using too much log space - Transaction log access problems - Full log held by indoubt transaction - Reduced application performance due to logging problems
Monitor Status	- Monitor agent offline - Monitoring turned off by user
Data Server Status	Data server not responding



The Dashboard Adhoc Investigation

Locking	• Number of locks held • Deadlock rate • Lock escalation rate • Number of lock waits
Transaction Activity	• Transaction rate • Failed transaction rate • Number of in doubt transactions
I/O Activity	• Data Volume • I/O Volume
Connections	• Number of connections • High-water-mark of connection
System	• CPU load % • Used / Free real memory • Used / Free virtual memory • Used / Free swap memory
Logging	• Logging volume
Recovery	• Days since last backup

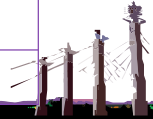


The Alert List Historical Analysis

Severity	Alert Type	Timestamp	Database
High	CPU Utilization of UPA00000000	05:00am	Supervisors
High	CPU Utilization of UPA00000000	04:30am	Accounts
High	CPU Utilization of UPA00000000	08:07am	Accounts
High	Application thread	07:12am	Supervisors
High	Application thread	05:46am	Accounts
High	Application thread	04:30am	Supervisors
High	Application thread	11:00am	Supervisors
High	Application thread	11:00am	Supervisors
High	Application thread	11:00am	Supervisors
High	CPU Utilization of UPA00000000	2007/05/04	Accounts
High	CPU Utilization of UPA00000000	2007/05/04	Accounts

Locking	- Application causing lock escalation - Table space inaccessible because its in a quiesced state - Application waiting indefinitely for lock held by indoubt transaction
Database Storage	- Table space inaccessible because it is offline - Running out of database storage - Storage I/O problem
Recovery	- Database inaccessible because recovery is incomplete or has failed - Table space cannot be updated because it is in backup pending state - Table space inaccessible because it is in drop pending state
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Monitor Status	- Monitor agent offline - Monitoring turned off by user
Data Server Status	Data server not responding

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Recommendations

Detailed Root Cause Analysis

TA ▶ Alert Detail : Table space TA.TS1 is offline @Jun 25, 2007 12:48:06 PM

Alert Recommendation Community

Table space TS1 in the TA database is off-line

Table space container is missing

- A table space container file for TS1 was renamed or moved
- The physical disk is offline
- The file system is unmounted
- The physical disk is corrupted
- A table space container file for TS1 was deleted

Table space container is damaged

- The disk sector is damaged
- The container file is tampered

Table space TS1 in the TA database is off-line

At the time of the alert, the TS1 tablespace is off-line, and, as a result, is inaccessible.

Symptoms

The TS1 tablespace is inaccessible.

Causes

A table space is in this state if there is a problem preventing access to one or more of its containers. This is often caused by media problems that are either permanent (for instance a bad disk) or temporary (for instance, an offline disk or unmounted file system). After the problem has been remedied and the containers are all accessible, the table space can be brought back online.

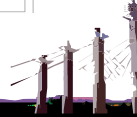
Diagnosing the problem

[Table space container is missing](#)

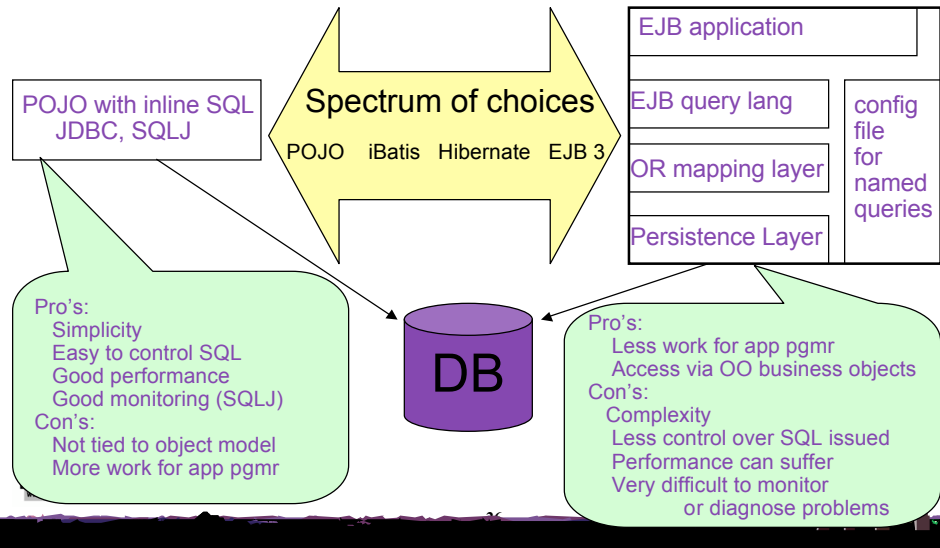
If one or more containers of a table space cannot be found by the database management system, the table space will be taken offline and put in an inaccessible state.

[Table space container is damaged](#)

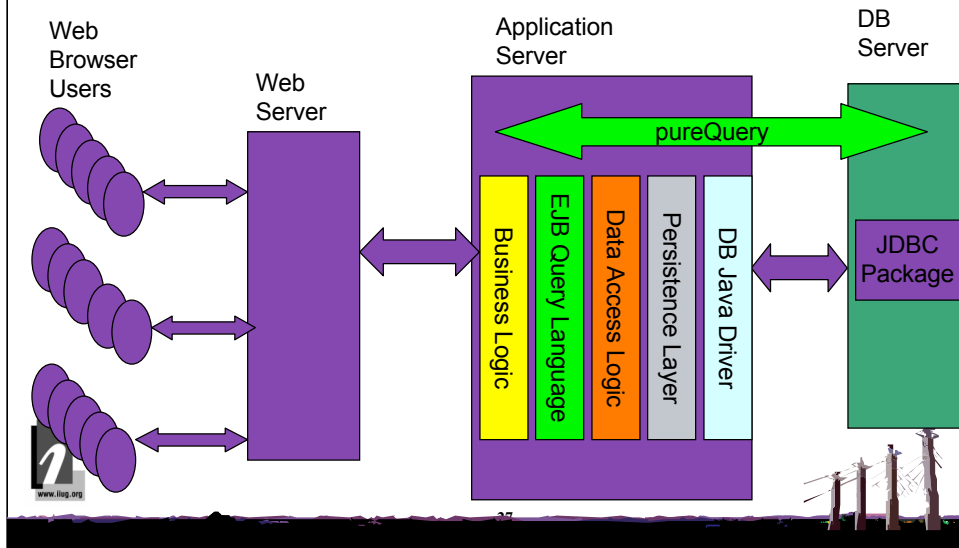
If one or more containers of a table space are found to be damaged by the data manager, the table space will be taken offline and put in an inaccessible state.



Java Data Access – many forms



Toughest issue for Web applications – Problem diagnosis and resolution



What performance/diagnosis challenges?

EJB Query Language:

```
SELECT object(e) FROM Employee e
WHERE e.dept=?1 AND e.salary>=?2
```

Query language is a subset of SQL. Doesn't have all the SQL features you want.

App query syntax is different from SQL query. How do you track problem SQL queries back to the app that issued the original query???

In most cases, queries map to JDBC. No ability to lock in access path at program deployment. No ability to search catalog to see which queries are issued by a given program.

Often, app query is intercepted by persistence layer, and the resulting SQL query looks nothing like the app query.

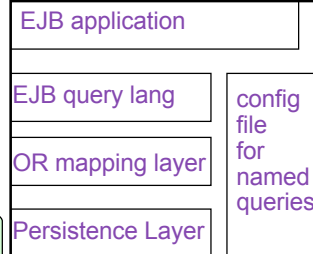
- Resulting query might perform badly.
- Changing app query might not result in a similar change in the SQL query...

SQL issued to database:

```
SELECT * FROM PROD.EMP
WHERE DEPT=? AND SALARY>?
```

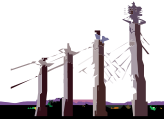


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pureQuery API “Styles”

- Support several API styles to fit well into all of the popular Java programming models/frameworks
 - Inline style (familiar JDBC and SQLJ approach)
 - Method style (similar to JDBC 4 ease of use enhancements)
 - Named query style (similar to iBatis/JDO/Hibernate/JPA)



Retrieve a single row from Database

pureQuery:

Automatically Optimizes for 1 row

```
addr = db.queryFirst("SELECT ADDRESS FROM EMP  
WHERE NAME=:name", String.class, name);
```

-or-

```
addr = getAddress(name);
```

XML file or Java annotation
SELECT ADDRESS FROM EMP
WHERE NAME=?1;

SQLJ:

```
#sql [con] { SELECT ADDRESS INTO :addr FROM EMP  
WHERE NAME=:name };
```

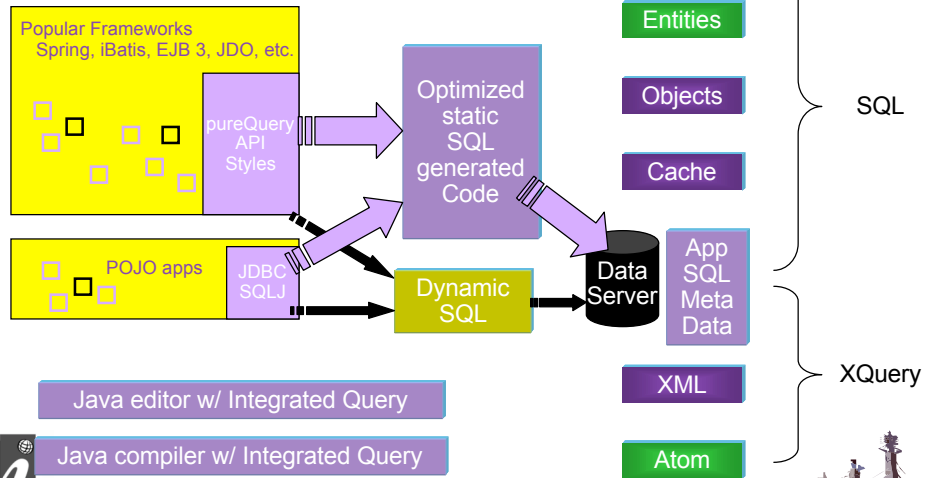
JDBC:

```
java.sql.PreparedStatement ps = con.prepareStatement(  
    "SELECT ADDRESS FROM EMP WHERE NAME=?");  
ps.setString(1, name);  
java.sql.ResultSet names = ps.executeQuery();  
names.next();  
addr = names.getString(1);  
names.close();
```

Most SQL statements in SQLJ are a one-line Java expression. These one-line expressions contain familiar "host variable" syntax that makes it easy for the programmer to issue SQL statements that reference Java variables.

JDBC is a much lower-level programming interface. The application programmer has to use set and get methods to associate Java program variables with SQL statements. A typical SQL SELECT statement can easily take 50-100 lines of code using JDBC. The same SQL statement is a one-line expression in SQLJ.

pureQuery Architecture



Problem Determination and Monitoring

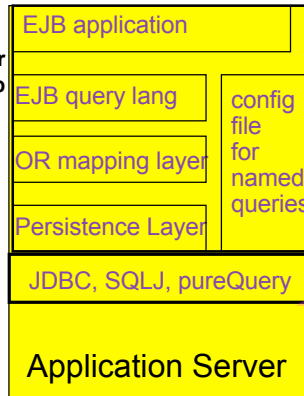
Original query issued by app
Java class and line number
XML filename and line number
Last compile date/time for app
Full history of all SQL issued
by each application

Generated static SQL
-- SQL after O/R mapping and
persistence
-- plan lockdown
-- package versioning

Set Client Information APIs
-- end user's ID
-- end user's IP address
-- application name
-- accounting chargeback data



pureQuery



App server IP address
App server connection pool userid
JDBC driver package name

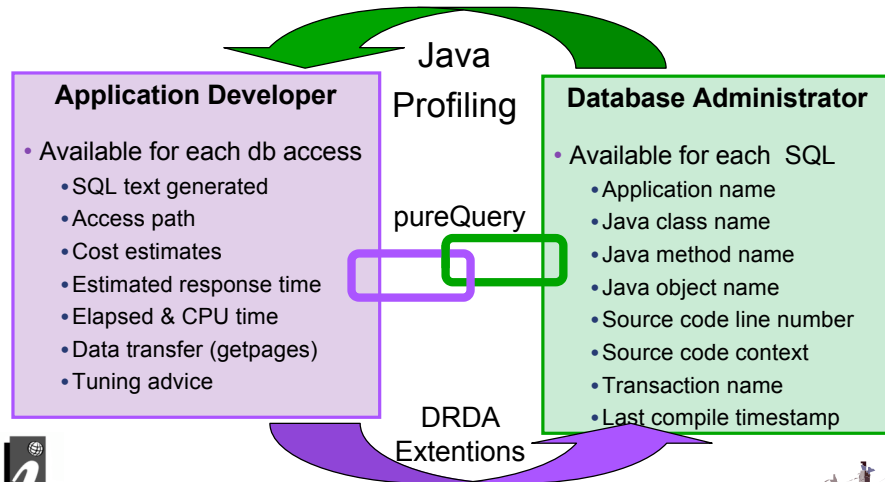
JDBC Static SQL Profiling
-- SQL after O/R mapping and
persistence
-- Java stack trace for SQL call
-- plan lockdown
-- package versioning

Set Client Information APIs
-- end user's ID
-- end user's IP address
-- application name
-- accounting chargeback data

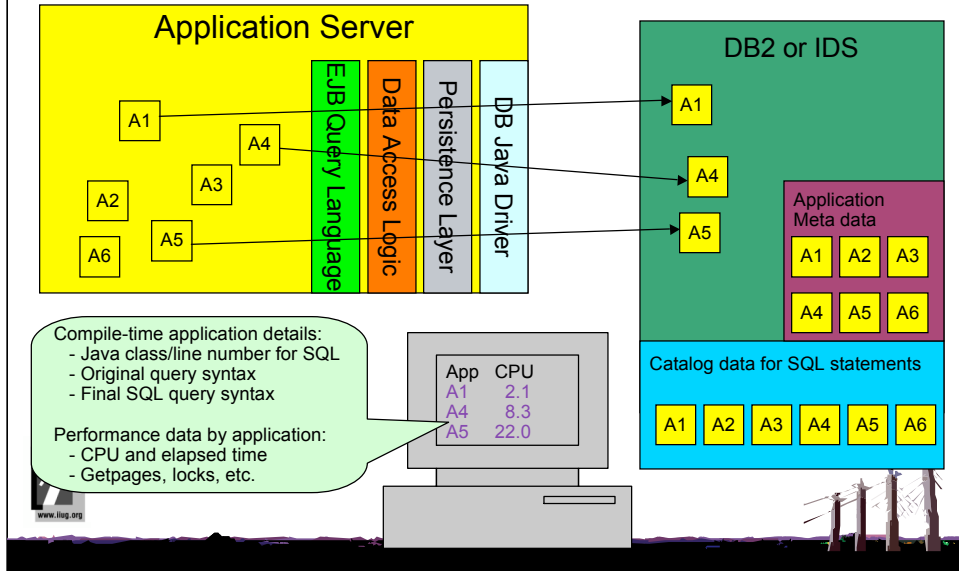
JDBC



Simplifying Problem Determination Scenario

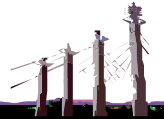


pureQuery with IBM Runtime/Tooling



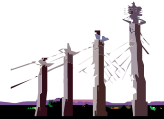
Top priorities for 2008/2009

- Reduce footprint of the client offerings:
 - Eclipse RCP version of Data Studio Developer for the Application DBA
 - SQL stored procedure create/debug, schema admin, etc.
 - No Java development tooling
 - Eclipse plug-in version for the Java developer
 - Plugs into Rational products (RAD, etc.)
 - Plugs into non-IBM Eclipse IDE solutions
- Greatly reduce Tivoli agent footprint

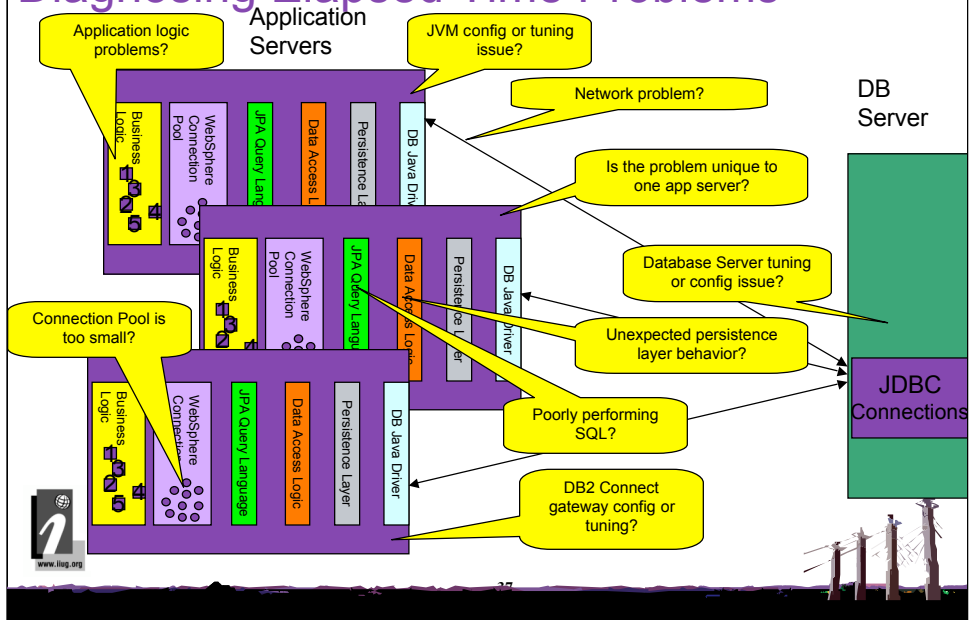


Top priorities for 2008/2009 -- continued

- Make DB2 and IDS the best choices for WebSphere:
 - pureQuery technology (tooling and runtime)
 - JDBC “capture” to enable pureQuery for any Java program
 - Significant performance monitoring and problem determination aids (added to DSAC and DB2 PE)
 - openJPA support for pureQuery accelerator
 - Spring, iBatis support for pureQuery

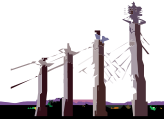


Diagnosing Elapsed Time Problems



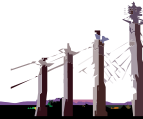
Top priorities for 2008/2009 -- continued

- Upgrade DB2 for z/OS and IDS support to current functionality levels
- Integrate key product offerings into Data Studio
 - DB2 Change Management Expert
 - DB2 Performance Expert
 - DWE
 - Princeton SoftTech

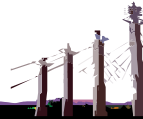


Where to get IBM Data Studio ?

- **IBM Data Studio**
 - www.ibm.com/software/data/studio
 - FAQs / Tutorials
 - Downloads
 - [Forum](#) / Blogs
 - Join the IBM Data Studio user community



Thank
You



Session C04
Data Studio -- Next
Generation Application
Development and Admin
for IDS

Curt Cotner

IBM

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