

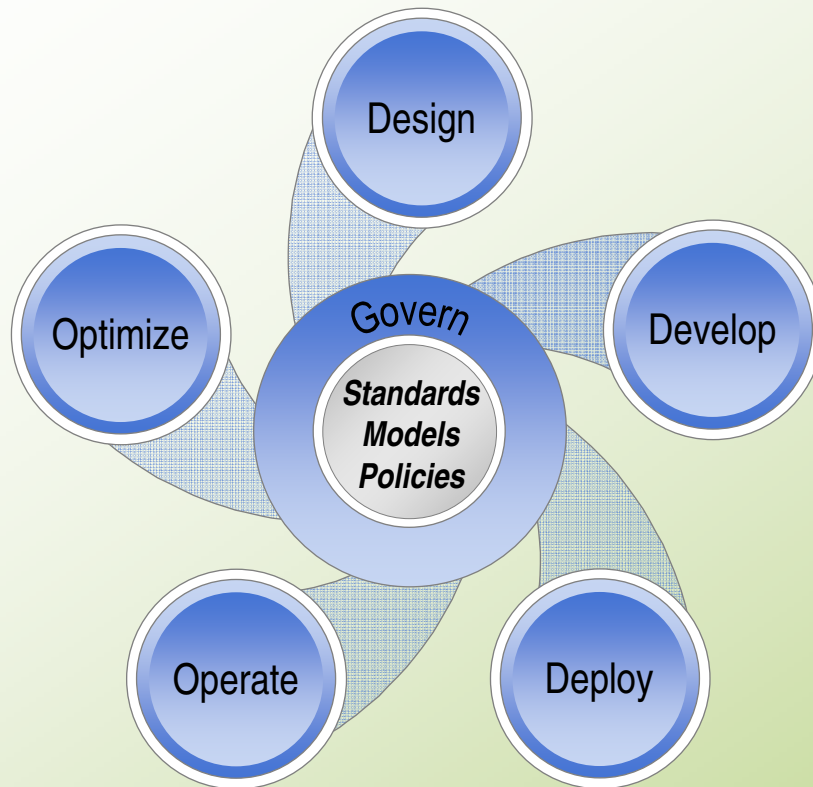


Integrated Data Management— Data Studio management of data and application life cycle

Information Management software

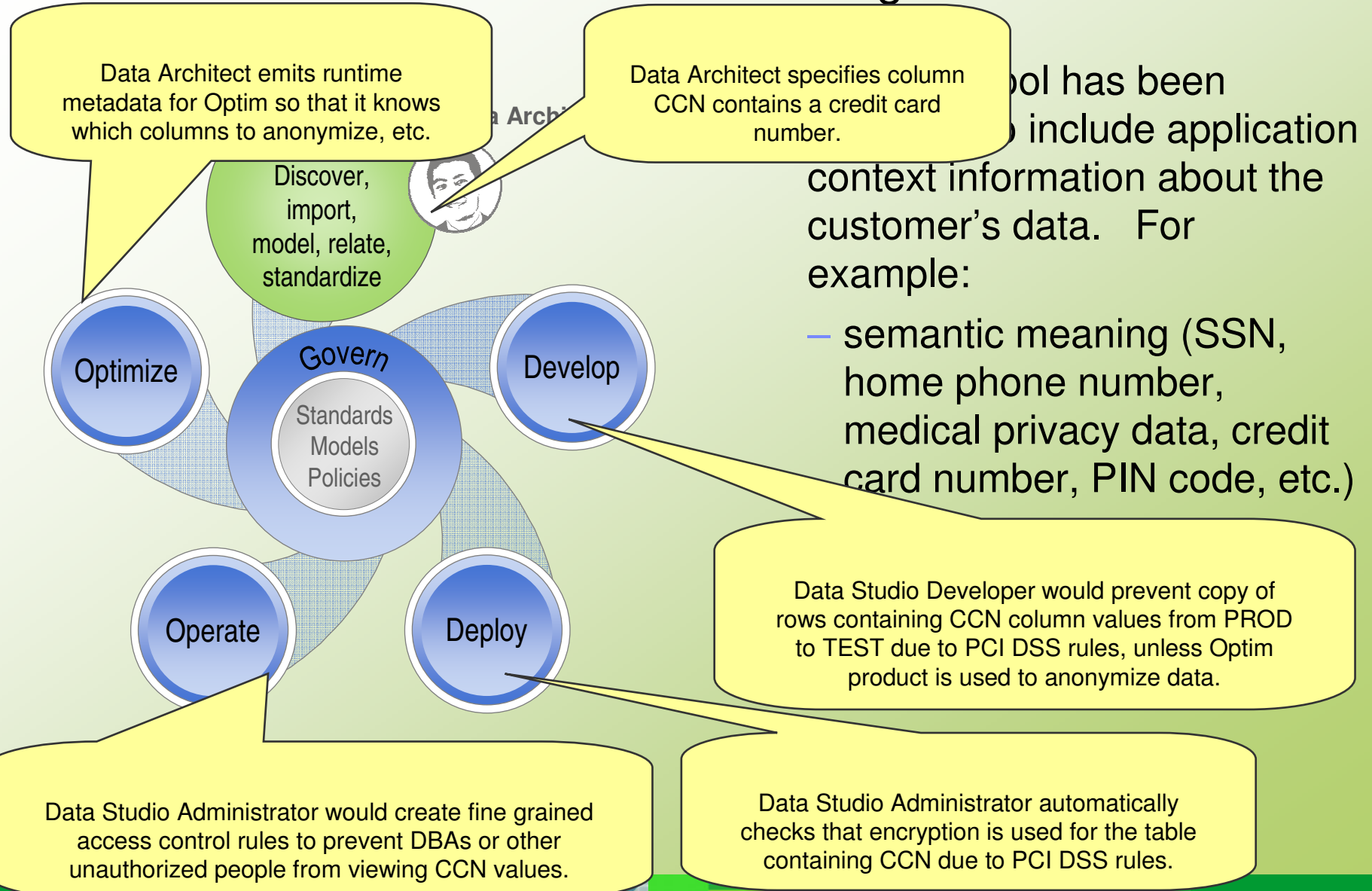


Vision for Data Studio

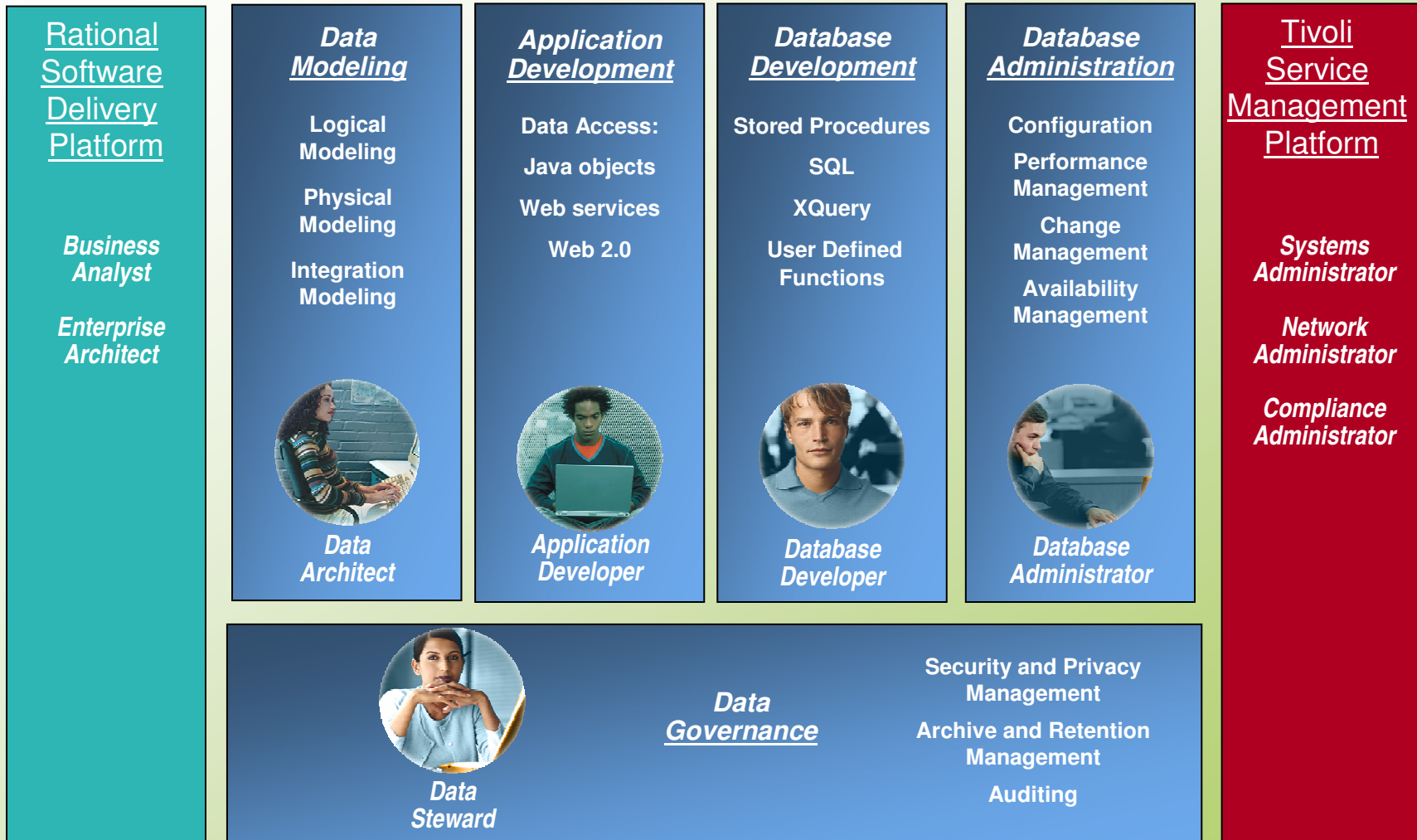


- A consistent integrated tool set that supports all the database products in your enterprise
 - Promotes portable skills
 - Minimizes training costs
- Data Studio will learn about your application and data, and use this information to automate subsequent process steps.
- Promotes collaboration among members of the IT staff, and attempts to bridge skill and knowledge gaps.
- Provides developers the tools they need to produce “enterprise ready” applications.

Model-driven Governance – Automating Governance Policies



Enabling Collaboration and Alignment Across Roles



IBM Data Studio v1.2 base

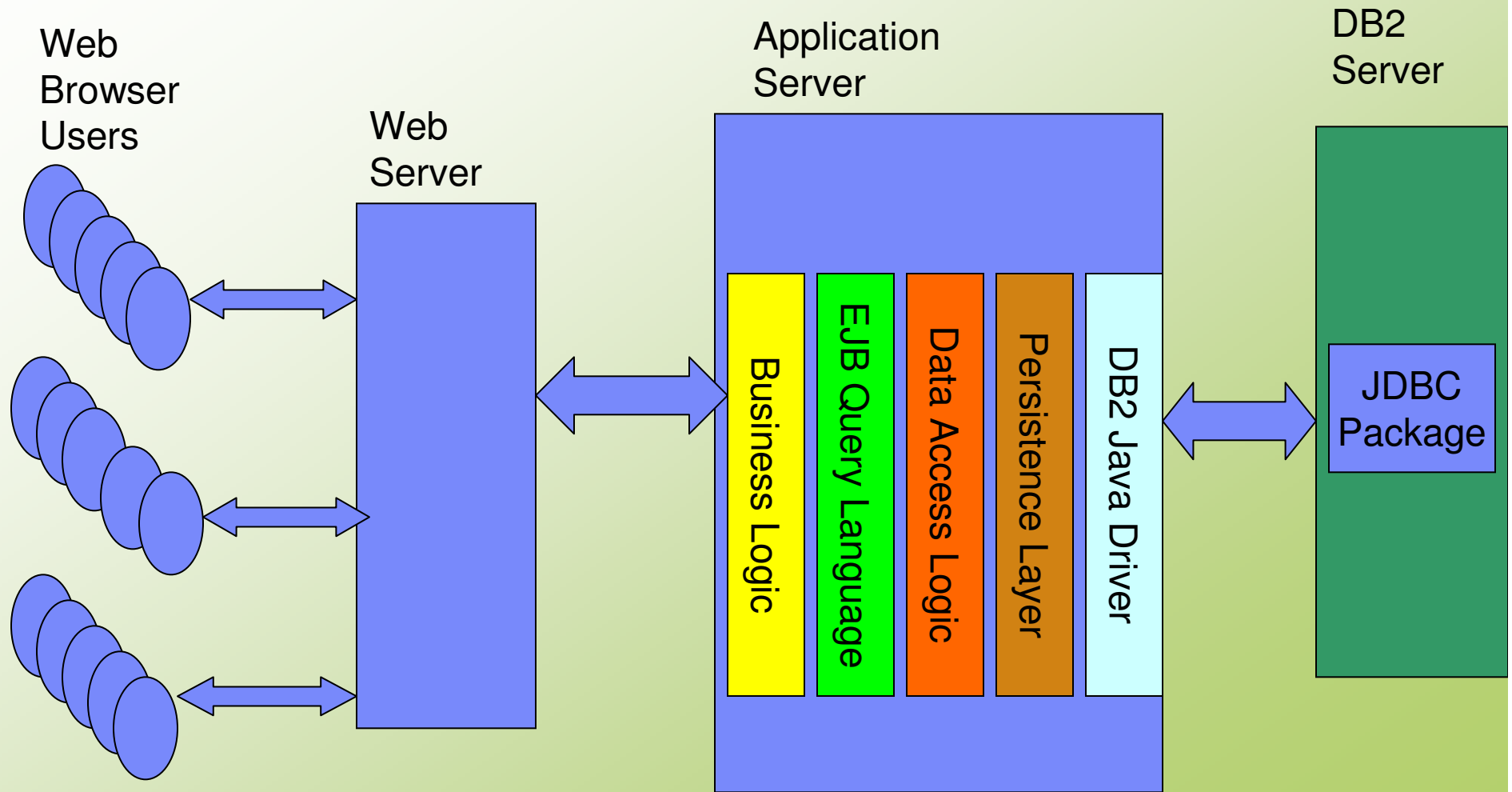
- Empowering developers and database administrators
- Complimentary and generally available
- Support for DB2 on all platforms and IDS

| DB2 for LUW | DB2 for z/OS | DB2 for i5/OS | IDS |
|---|---|---|--|
| <ul style="list-style-type: none"> ▪ 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 | <ul style="list-style-type: none"> ▪ 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 | <ul style="list-style-type: none"> ▪ 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 | <ul style="list-style-type: none"> ▪ 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 |

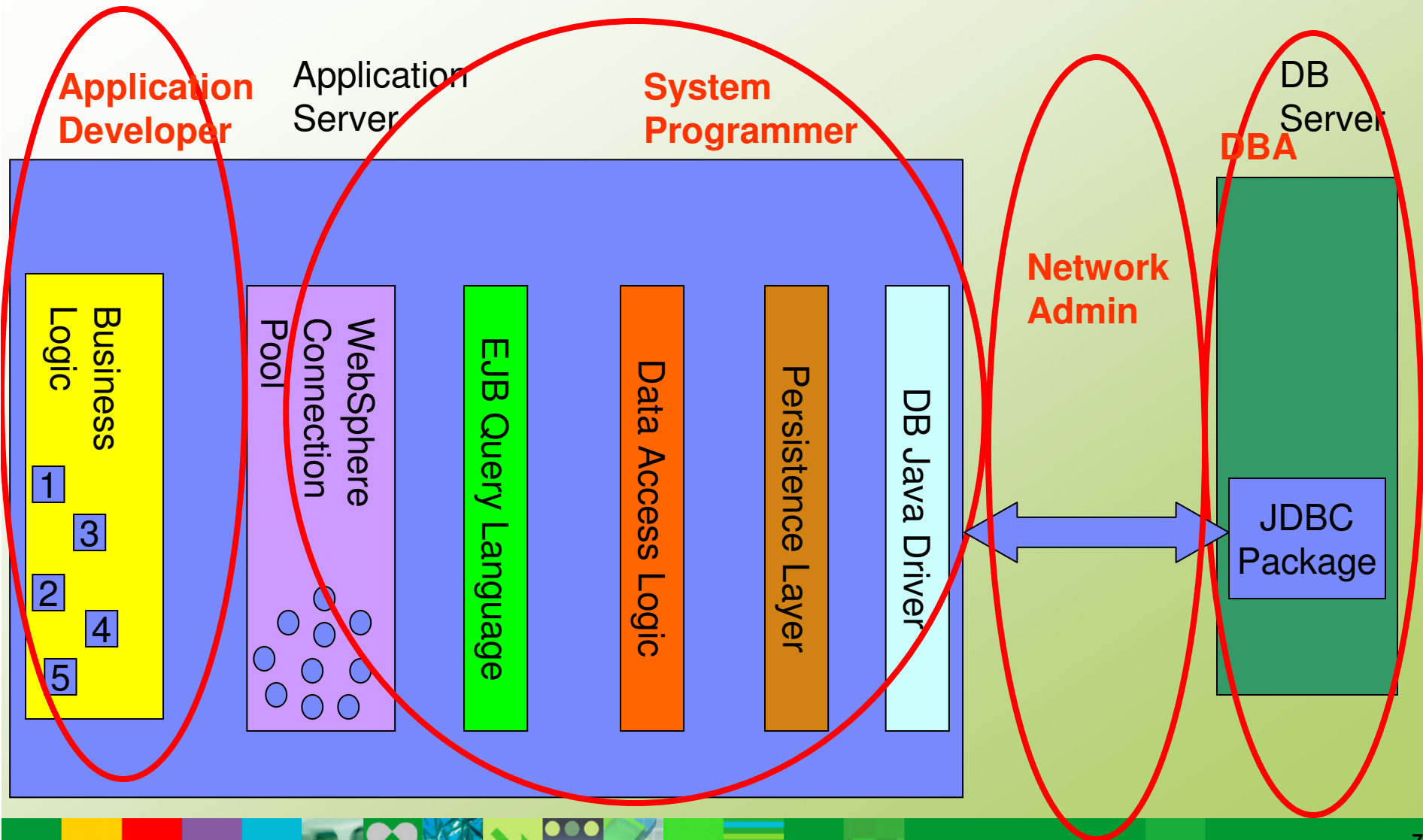
Data Studio Developer and pureQuery



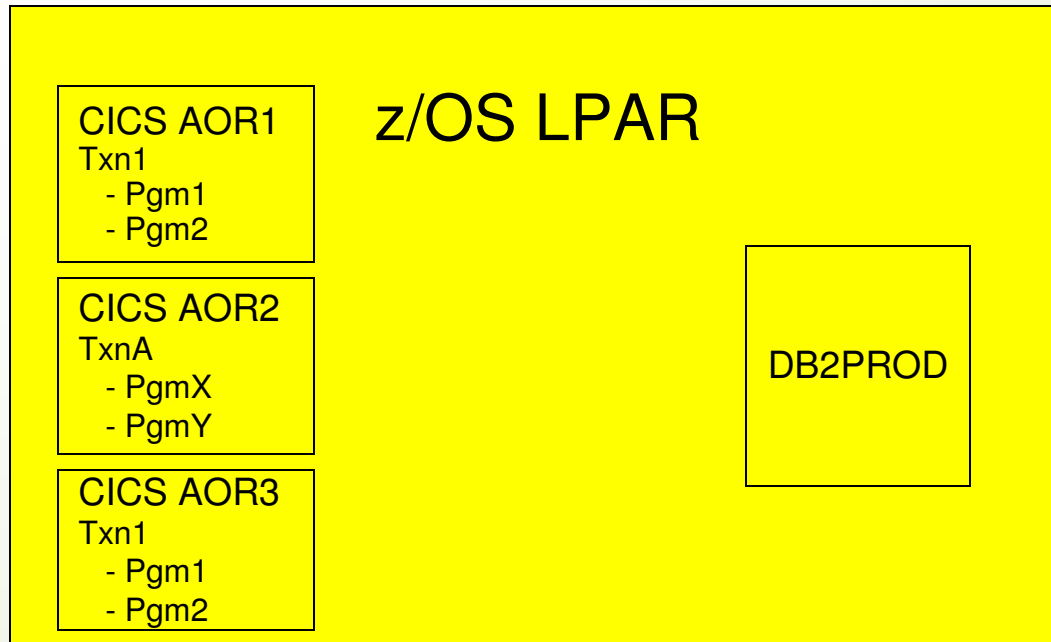
Toughest issue for Web applications – Problem diagnosis and resolution



Customer Job Roles – A Barrier to a “Holistic View”



What's so Great About DB2 Accounting for CICS Apps?



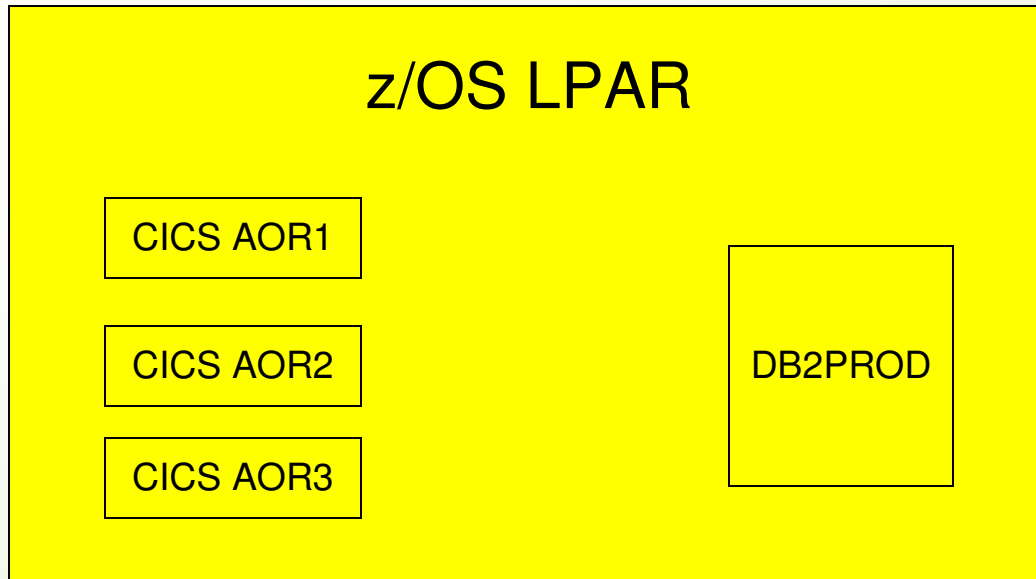
DB2 Accounting for CICS apps allows you to study performance data from many perspectives:

- By transaction (PLAN name)
- By program (package level accounting)
- By address space (AOR name)
- By end user ID (CICS thread reuse)

This flexibility makes it very easy to isolate performance problems, perform capacity planning exercises, analyze program changes for performance regression, compare one user's resource usage to another's, easily isolate deadlock or timeout locking events, etc.

| App | CPU | PLAN |
|------|-----|--------|
| Txn1 | 2.1 | TN1PLN |
| TxnA | 8.3 | TNAPLN |

What if we Handled DB2 Accounting for CICS Like This???



What if we took away the key monitoring tokens you use for CICS today and you only knew three things about the CICS workload?

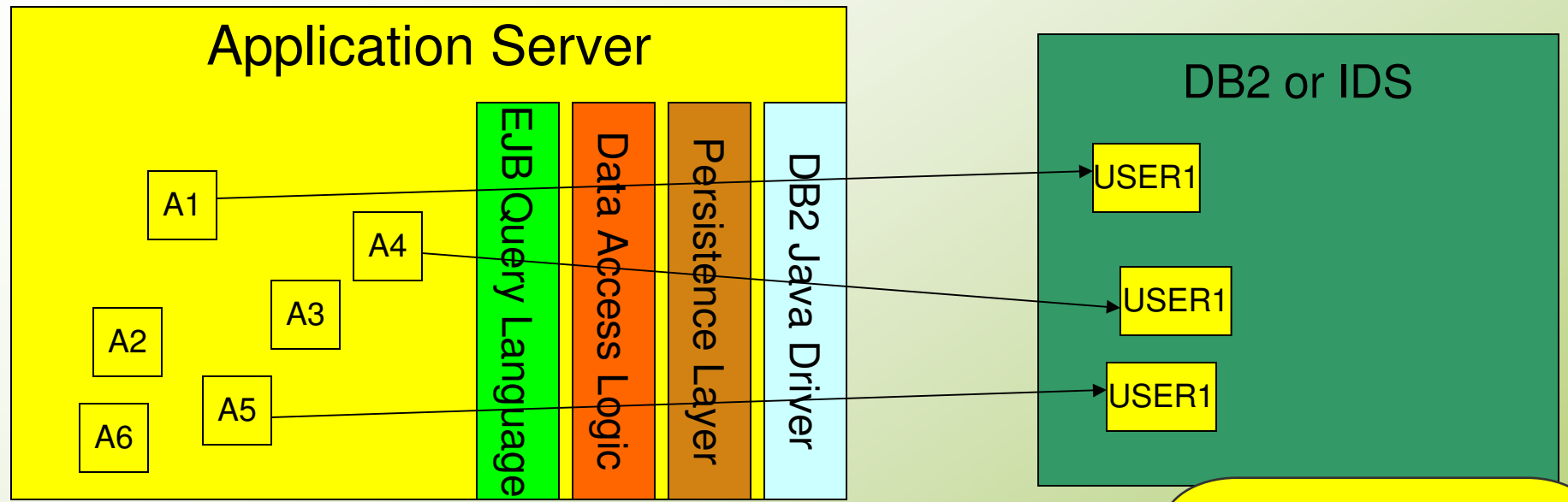
- only one plan name - COBOL
- the CICS AOR started task name
- no end user ID - just userid of the AOR started task

How would you know?

- which app is running?
- which user is running?
- which developer wrote the app?
- what other SQL does this app issue?
- when was the app last changed?
- how has CPU changed over time?
- etc.

| App | CPU | PLAN |
|------|------|-------|
| AOR1 | 2.1 | COBOL |
| AOR2 | 8.3 | COBOL |
| AOR3 | 22.0 | COBOL |

JDBC Performance Reporting and Problem Determination – Before pureQuery



- What is visible to the DBA?
- IP address of WAS app server
 - Connection pooling userid for WAS
 - app is running JDBC or CLI
- What is not known by the DBA?
- which app is running?
 - which developer wrote the app?
 - what other SQL does this app issue?
 - when was the app last changed?
 - how has CPU changed over time?
 - etc.

| User | CPU | PACK |
|-------|------|------|
| USER1 | 2.1 | JDBC |
| USER1 | 8.3 | JDBC |
| USER1 | 22.0 | JDBC |

Same issues exist for .NET, PHP, Ruby, and all the other "modern" runtimes.

What's so Great About Data Studio pureQuery Accounting for WebSphere Applications?

z/OS LPAR

CICS AOR2
TxnA (PLANA)
- PgmX
- PgmY

Unix or Windows

WAS 21.22.3.4
TxnA (Set Client App=TxnA)
- ClassX
- ClassY

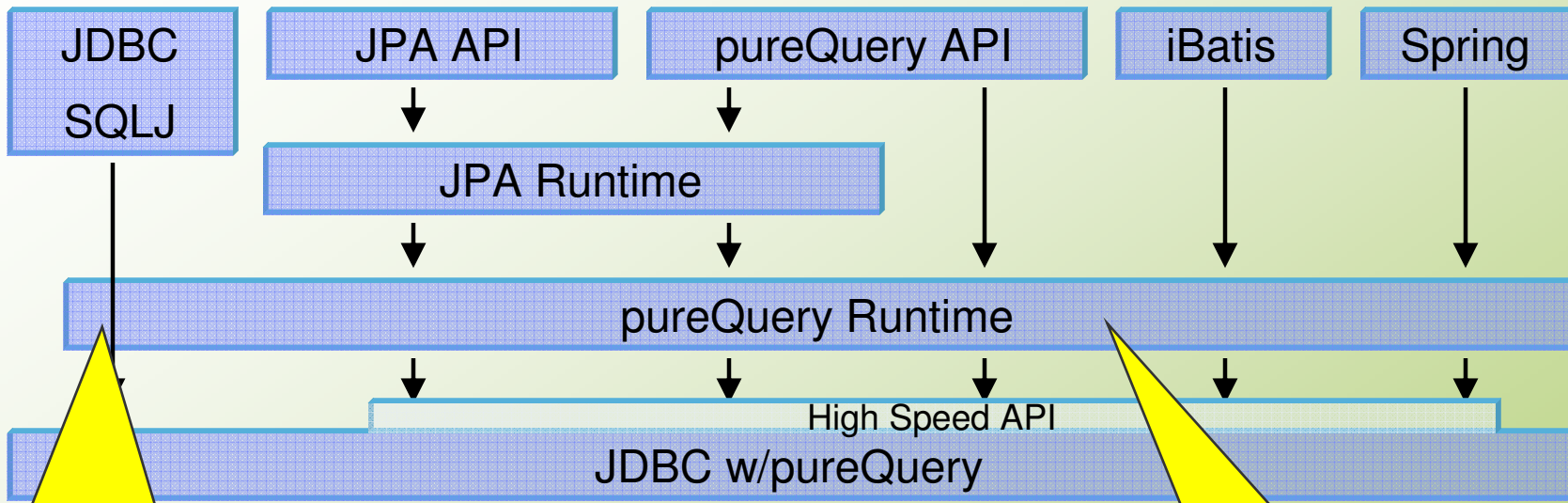
Data Studio and pureQuery provide the same granularity for reporting WebSphere's DB2 resources that we have with CICS:

- By transaction (Set Client Application name)
- By class name (program - package level accounting)
- By address space (IP address)
- By end user ID (DB2 trusted context and DB2 Roles)

This flexibility makes it very easy to isolate performance problems, perform capacity planning exercises, analyze program changes for performance regression, compare one user's resource usage to another's, etc.

| USER | CPU | Appl |
|-------|------|------|
| USER1 | 2.1 | TxnA |
| USER1 | 8.3 | TxnX |
| USER1 | 22.0 | TxnY |

Java Database Access Technologies with pureQuery



Our "client optimization" technology can apply pureQuery runtime to any JDBC application without modifying source code.

pureQuery runtime and tooling has monitoring probes that capture details about the client application and merge that information with the database server's performance metrics.



Retrieve a single row from Database

pureQuery:

```
Employee my_emp = db.queryFirst("SELECT Name, HomeAddress, HomePhone
FROM Employee WHERE Name=?name", Employee.class, my_emp);
```

-or-

```
Employee my_emp = getEmployee(name);
```

XML file or Java annotation
SELECT * FROM EMPLOYEE
WHERE NAME=?1;

SQLJ:

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

```
new Employee my_emp;
my_emp.setName(name);
my_emp.setHomeAddress(addr);
my_emp.setHomePhone(phone);
```

JDBC:

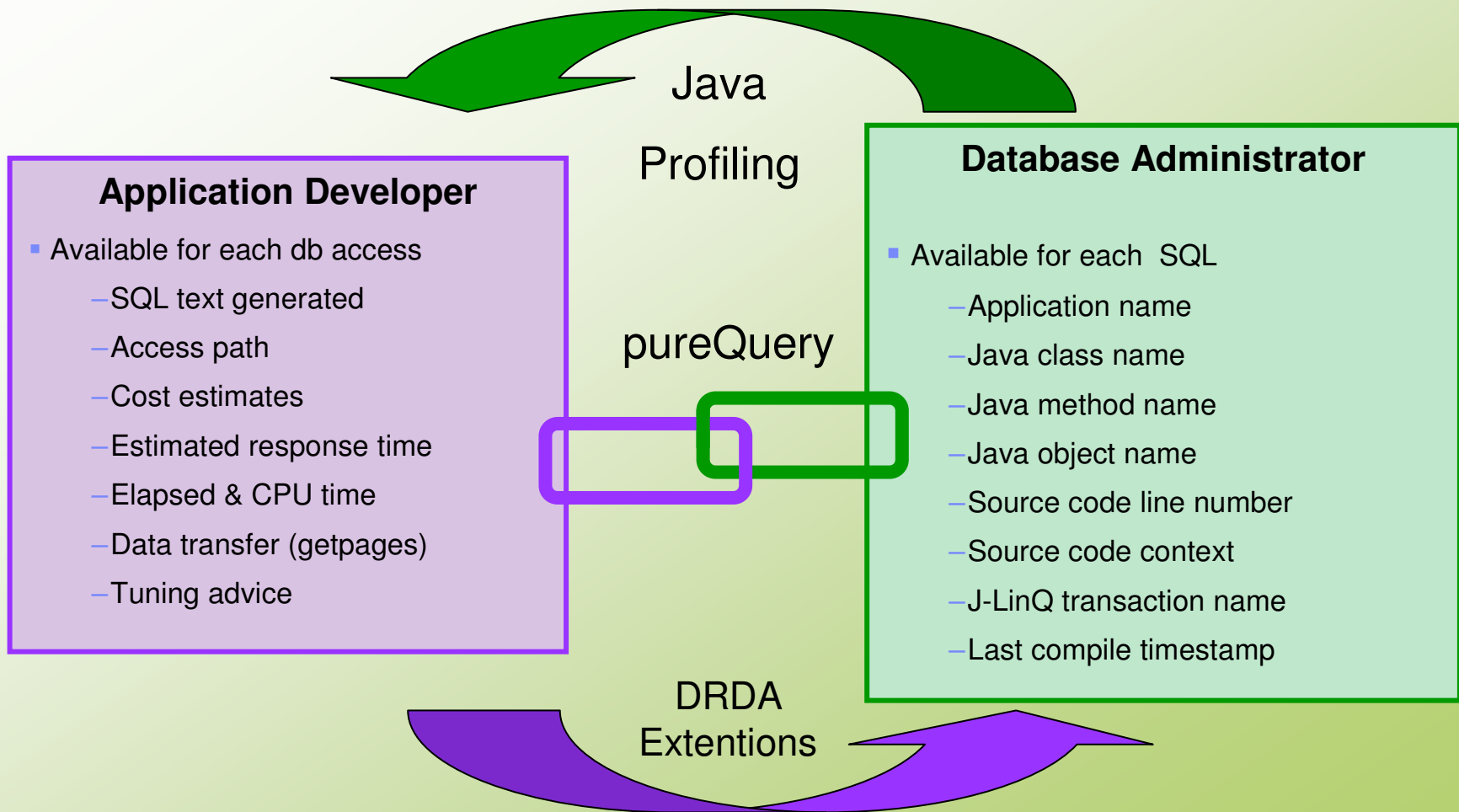
```
java.sql.PreparedStatement ps = con.prepareStatement(
"SELECT NAME, ADDRESS, PHONE_NUM FROM EMP
WHERE NAME=?");
```

```
ps.setString(1, name);
java.sql.ResultSet names = ps.executeQuery();
names.next();
new Employee my_emp;
my_emp.setName(names.getString(1));
my_emp.setHomeAddress(names.getString(2));
my_emp.setHomePhone(names.getString(3));
names.close();
```

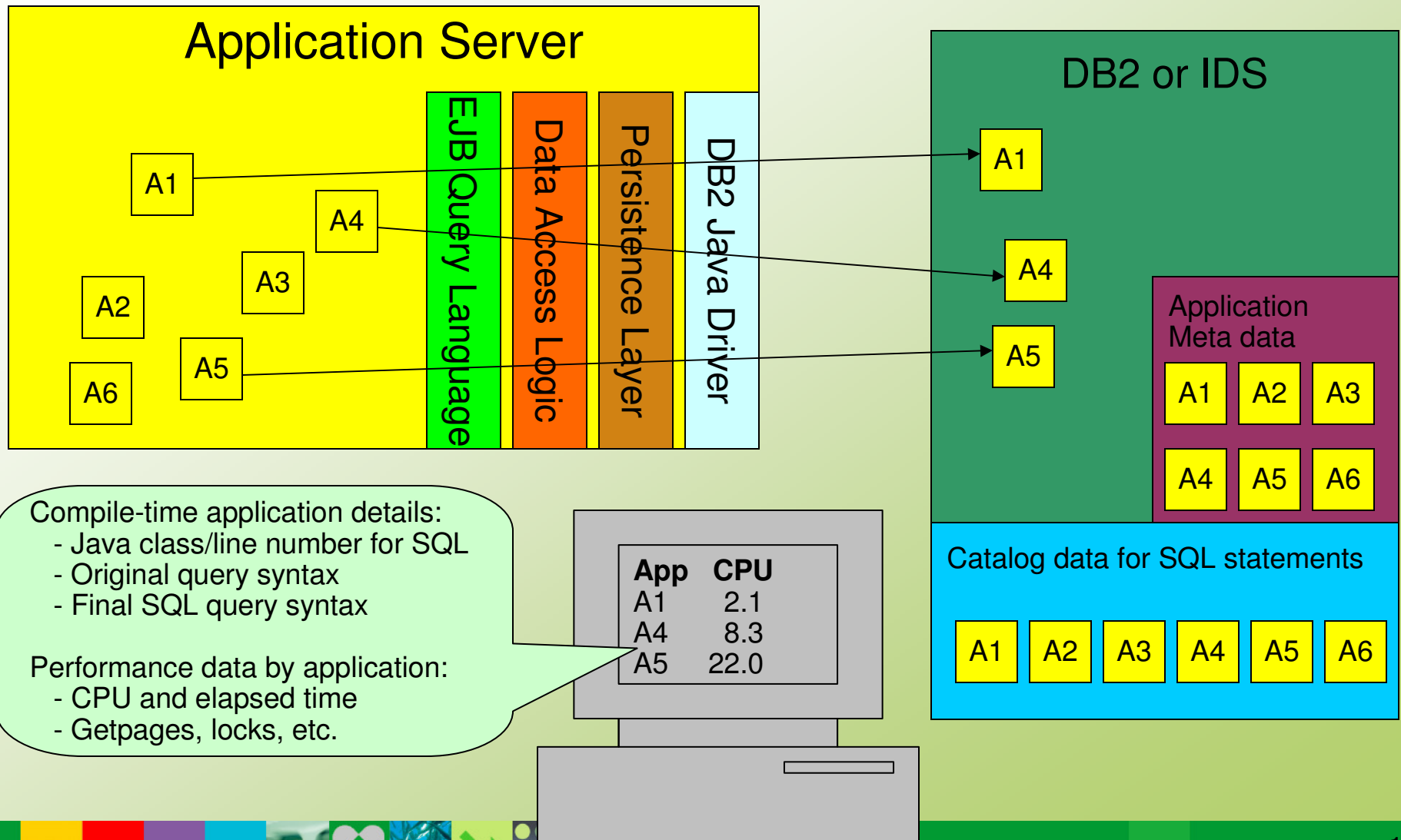
| Table | Column | Type |
|-------|-----------|-----------|
| EMP | NAME | CHAR(64) |
| EMP | ADDRESS | CHAR(128) |
| EMP | PHONE_NUM | CHAR(10) |

```
class Employee
{ public String Name;
  public String HomeAddress;
  public String HomePhone;
  ...
}
```

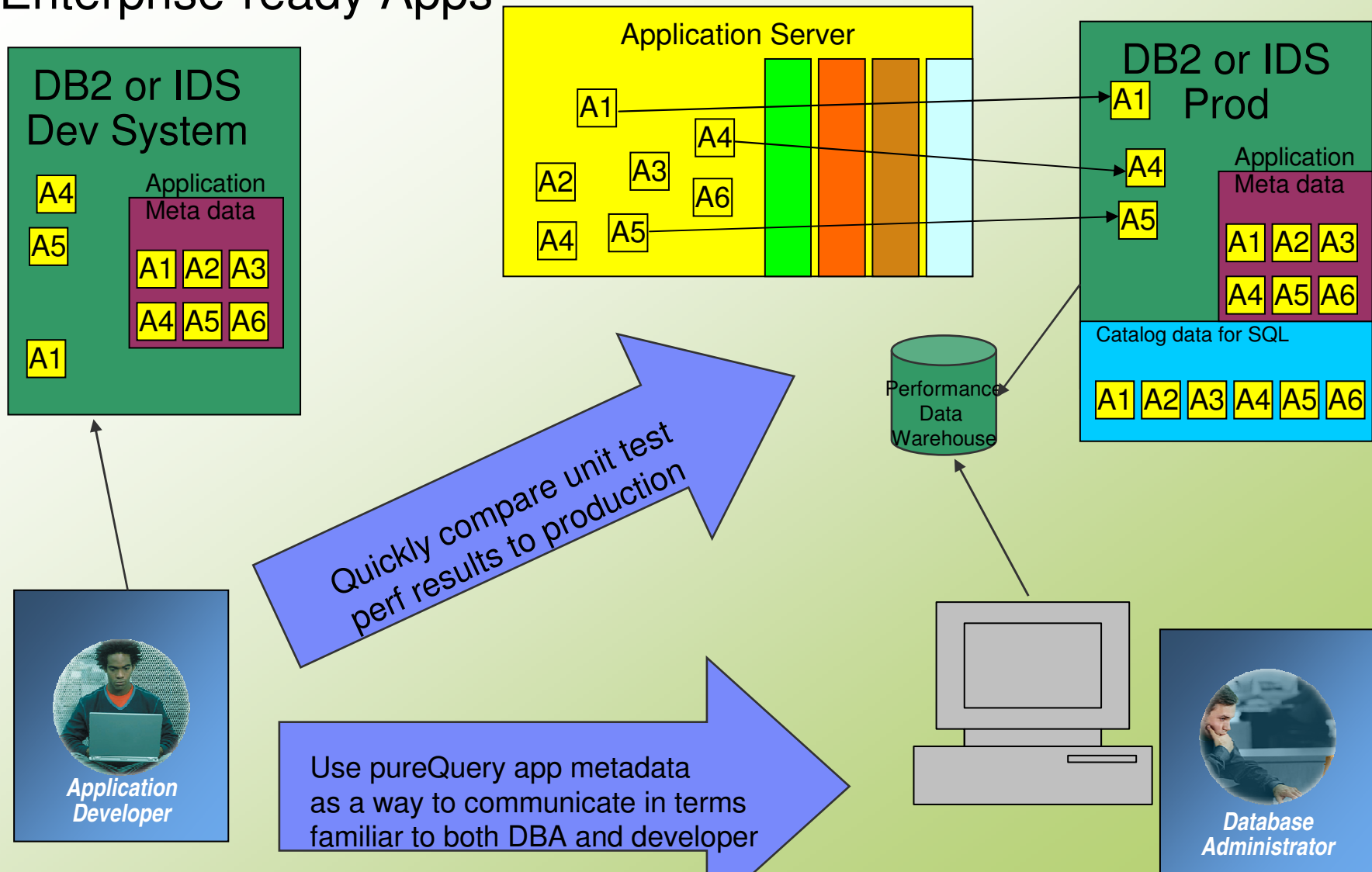
Simplifying Problem Determination Scenario



pureQuery with IBM Runtime/Tooling

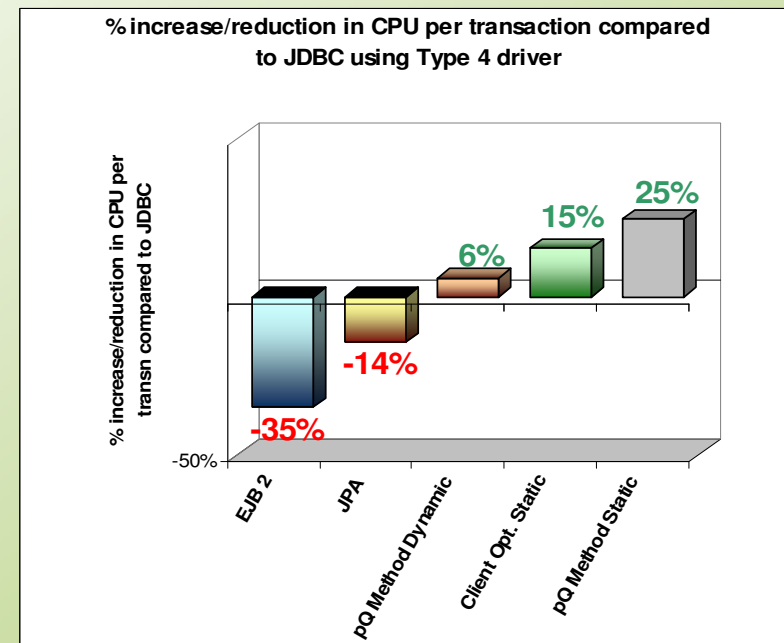
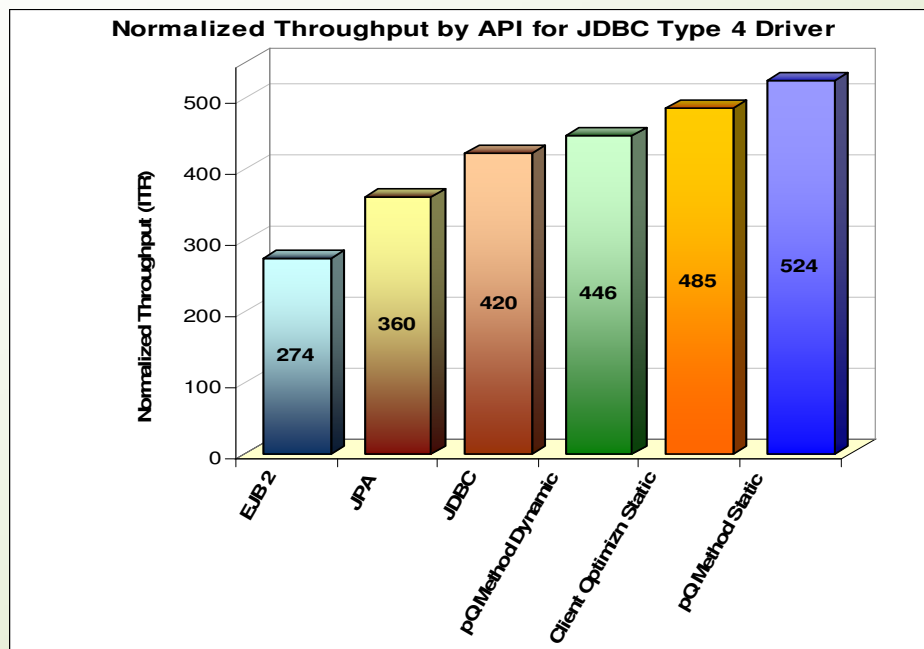


Using pureQuery to Foster Collaboration and Produce Enterprise-ready Apps



Data Studio pureQuery Runtime for z/OS

- In-house testing shows double-digit reduction in CPU costs over dynamic JDBC



- Cache hit ratio between 70 and 85%
- 15% - 25% reduction on CPU per txn over dynamic JDBC**

Have You Heard of 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 Wattanajatra, 4 Aug 2008 at 11:55

It was back at the end of 2006 when IT PRO first looked at the growing threat of the SQL injection attack. The chief executive of data security company Secerno Paul Davie predicted that by 2007, the SQL injection would become the number one attack vector on internet-facing systems.

April 2008: Microsoft denies fault for massive SQL attack

Last April saw one of the most serious SQL injection attacks in history, with half a million web pages affected thanks to an automated attack taking advantage of website vulnerabilities. Microsoft themselves denied responsibility for the problem, but it did show the size of the possible threat as well as the potential for harm.

July 2008: One infected webpage every five seconds during 2008

The latest Sophos report showed very little hope of a solution to the increase in SQL attacks, confirming that SQL injection is one of the most dominant malware trends of 2008. The biggest problem was that many websites were not coded properly, and this was the vulnerability that allowed trusted places to get hit. Sophos claimed that the problem would only get worse in the next six months, and warned businesses to keep a close eye in keeping their online presences clean.

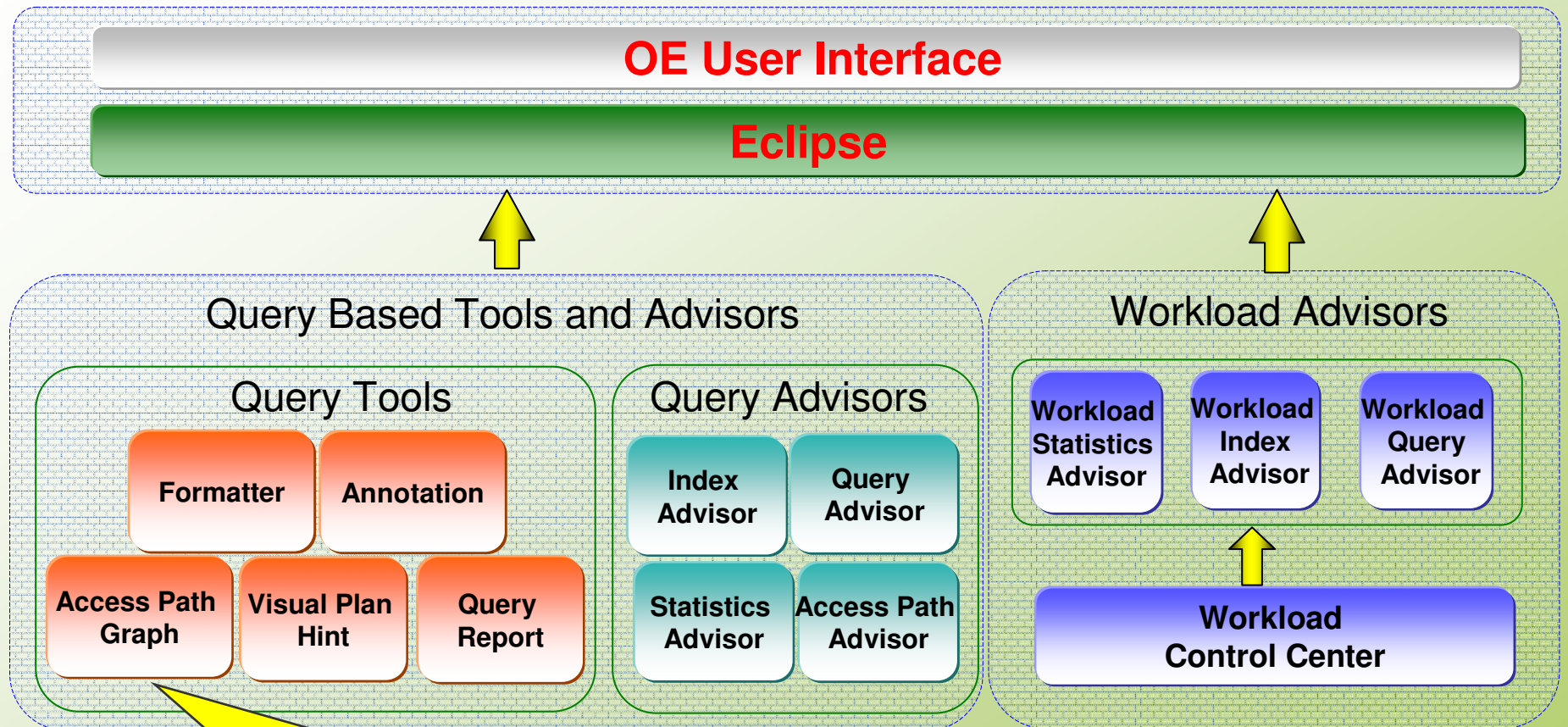


Data Studio Optimization Expert (4Q2008)

Information Management software



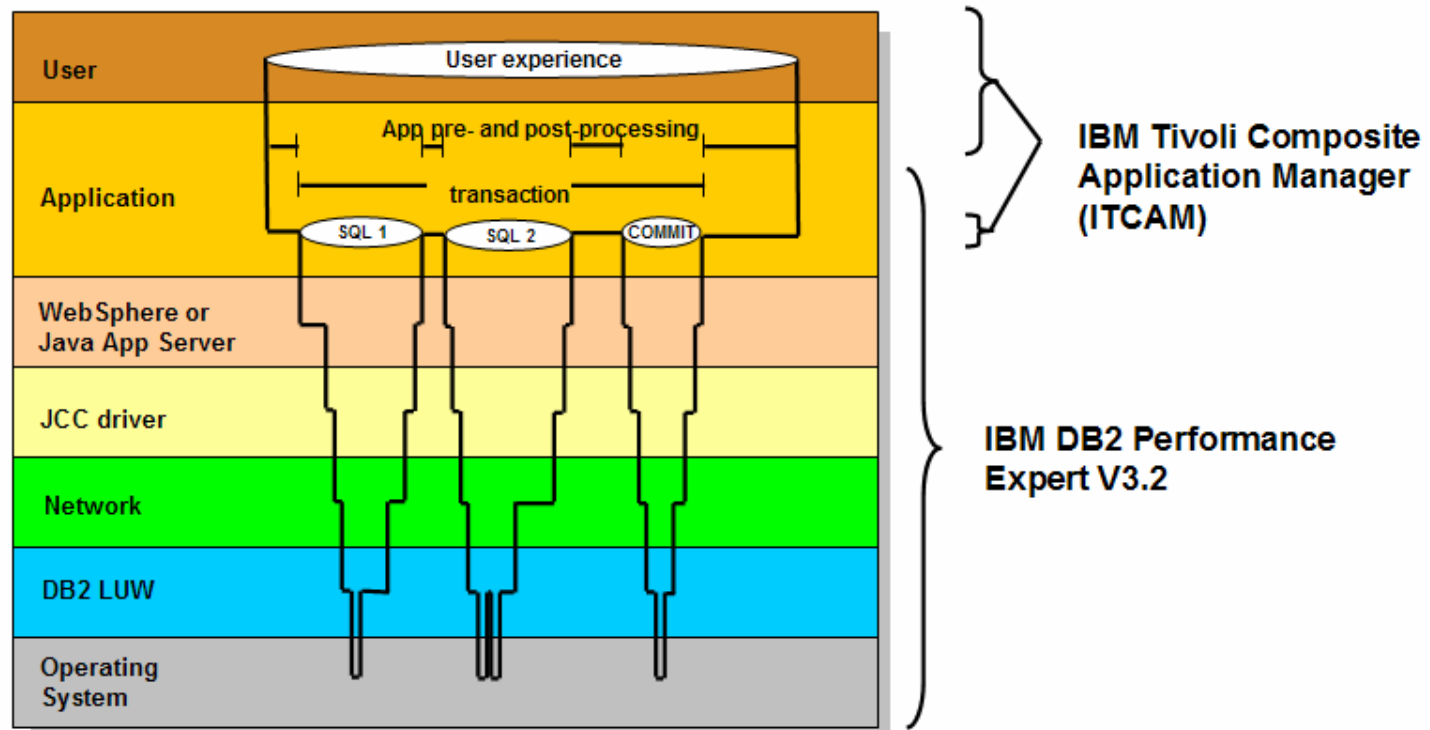
Optimization Expert Features at a Glance



Tools can be used by developers or DBAs. They allow the developer to exchange information with the DBA in a way that minimizes the time needed for the DBA to understand the problem.

How do we plan to help?

- Show me what my application is seeing
- Let me figure out where in the software/hardware stack my problem is
- Is it really my problem, or someone else's ?
- Include database related information from WebSphere



Scenario

DB2 Performance Expert - System Overview

Monitor Selected View Tools Window Help

Data: Recent Refresh: Off

Time Period: Last 30 min. 18:00:36 - 18:30:36

End-to-End KPIs Data Server KPIs Data Views Exceptions

Database: SALES

| Workload Cluster | Transactions | Total End-to-End Time | Avg. End-to-End Time | Avg. Data Server Time | Avg. Network Time | Warnings | Problems |
|----------------------------------|--------------|-----------------------|----------------------|-----------------------|-------------------|----------|----------|
| Database Total (SALES) | 300,000 | 1,068,0... | 3.350 | 0.345 | 0.318 | - | - |
| Sales Portal Applications | 100% | 100% | 3.350 | 0.345 | 0.318 | 3% | 17% |
| Sales Portal Application Servers | 100% | 100% | 3.350 | 0.345 | 0.318 | 3% | 32% |

End-to-end time: SALES Histogram: SALES

End-to-end time: sales_shop... Histogram: sales_shopping_cart

End-to-end time: sales_po... Histogram: sales_portal1.jk_e...

It seems that the first application server has a problem. **Double-click to drill-down.**

In this situation, all applications are equally affected, and the problem seems not to be in the data server.

Scenario - continued

LIMETTE_59930_INSTANCE - End-to-End Details

End-to-End Details Selected View Tools Window Help

Data: History 05/28/2008 18:30:36 Since 05/28/2008 18:00:36

Aggregation: 1 minute Refresh: Manual

Main sales.portal1.jk-enterprise.com

sales.portal1.jk-enterprise.com

Legend

- Data server
- Sorting
- Network
- Driver processing
- Driver agent wait
- WS connection pool wait
- Application

Show data as

- Graphical View
- Text View

Distribution of end-to-end response time (s)

Transactions (x 1,000)

Physical reads (x 1,000,000)

Network bandwidth (Mbps)

Top SQL statements Show top 3 by Avg. end-to-end response

| Statement text | Occurrences | End-to-end time |
|--|-------------|-----------------|
| SELECT * FROM sales.customer AS cust, sales.order AS or... | 51,000 | 2.344 |
| SELECT a.schema, b.name FROM sysi... | 37,000 | 2.308 |
| DELETE FROM account WHERE aid = 3... | 42,000 | 2.227 |

Top clients Show top 3 by Problems

| Client | Problems |
|---------------------------------|----------|
| sales.portal1.jk-enterprise.com | 32% |

Buffer pool and sorting

| | |
|-------------------------------------|-----------|
| Buffer pool hit ratio (%) | 43.400 |
| Buffer pool physical reads per min. | 1,900,000 |
| Rows read per selected row (avg.) | 11.520 |
| Sorts per minute | 8.647 |
| Sort overflows | 0 |

Most of the time is spent for „WAS connection pool wait“ time.

Double-click to drill-down and display detail information.

Scenario – continued

LIMETTE_59930_INSTANCE - End-to-End Details

End-to-End Details Selected View Tools Window Help

Data: **History** 05/28/2008 18:30:36 Since 05/28/2008 18:00:36

Aggregation: 1 minute Refresh: **Manual**

Main sales.portal1.jk-enterprise.com Client Information - sales.portal1.jk-enterprise.com

Client Information

Problems (%) 32
Warnings (%) 3
Transactions per minute 300,000

Statement details

Host name sales.portal1.jk-enterprise.com
IP address 9.152.344.081
Authentication ID YGH6E
Driver level 1.0.3
Connection start time 10/10/2007 06:43:23
JVM version 1.5.1
Operating system Microsoft Windows XP Profes...

System utilization

CPU Usages (%) 56
Memory usage (%) 81
Pages swapped out per second 209
Client up time 10/10/2007 06:40:52

Global transport pool

Max. allowed transport objects 20
Transactions rejected (%) 0
Transactions slowed down (%) 0
Avg. transaction wait time (s) 0
Idle global transport pool hit ratio (%) 84
Idle global transport pool size 15

Distribution of time (s)

| | |
|----------------------|-----|
| Data server | 14% |
| Sorting | 1% |
| Network | 15% |
| Driver processing | 1% |
| Driver agent wait | 0% |
| WAS connect_pool ... | 67% |
| Application | 2% |

Top applications

| Name | CPU Usage (%) | Memory Usage (%) |
|-------------|---------------|------------------|
| db2pb.exe | 16.000 | 14.200 |
| javaw.exe | 15.000 | 8.100 |
| nlnotes.exe | 11.000 | 2.500 |

Statement details

Application server name salesnode1
Connection pool size (max.) 17
Connection pool size high water m... 17
Current free connections 0
Current used connections 17
Used connections (avg.) 15.7
Max. connection pool wait time (s) 4.8

Comparison with other clients

| Name | Avg. Network Time (%) | CPU Usage (%) | Avg. Driver Wait Time | Avg. WAS Connection Pool Wait | Max. Allowed Connections | Max. Allowed Transport | Network Driver Level | Virtual Machine Version |
|---------------------------------|-----------------------|---------------|-----------------------|-------------------------------|--------------------------|------------------------|----------------------|-------------------------|
| sales.portal1.jk-enterprise.com | 0.271 | 56.000 | 0.071 | 4.339 | 17.000 | 20.000 | 9.5.1 | 1.5.1.2 |
| sales.portal2.jk-enterprise.com | 0.365 | 62.000 | 0.082 | 0.723 | 20.000 | 20.000 | 9.5.1 | 1.5.1.2 |

5 second wait time indicates that the maximum number of allowed connections is not sufficient...

... which becomes also evident when comparing the parameters and metrics of this client with other clients.



Data Studio Administrator

- GA July 2008 for DB2 LUW servers
 - ***Compare, Sync and Alter***
 - ***DDL roundtrip support***
 - ***Extended Alter***
 - ***Impact Analysis***
 - ***Change model***
 - ***Physical modeling,***
 - ***Unified Change Project***
 - ***Advanced Data Movement (HPU)***
 - ***Scheduling & Enhanced Advanced Deployment***



Future enhancements to Data Studio Developer (mid 2009)

Information Management software

Oracle PL/SQL Development

- Integrated Query Editor support
 - Content Assist
 - Parser support with Error reporting

```
sql *IOD.sql X
CREATE OR REPLACE PROCEDURE raise_emp_salary (column_value NUMBER,
                                             emp_column VARCHAR2, amount NUMBER) IS
    v_column VARCHAR2(30);
    sql_stmt  VARCHAR2(200);
BEGIN
    -- determine if a valid column name has been given as input
    SELECT COLUMN_NAME INTO v_column FROM USER_TAB_COLS
       WHERE TABLE_NAME = 'EMPLOYEES' AND COLUMN_NAME = emp_column;
    sql_stmt := 'UPDATE employees SET salary = salary + :1 WHERE '
               || v_column || ' = :2';
    EXECUTE IMMEDIATE sql_stmt USING amount, column_value;
    IF SQL%ROWCOUNT > 0 THEN
        DBMS_OUTPUT.PUT_LINE('Salaries have been updated for: ' || emp_column
                              || ' = ' || column_value);
    END IF;
    EXCEPTION
    WHEN NO_DATA_FOUND THEN
        DBMS_OUTPUT.PUT_LINE ('Invalid Column: ' || emp_column);
END raise_emp_salary;
```

Oracle Object Management support in Data Studio

Integrity objects

- Create/Alter/Drop
- Constraints (primary, unique, check, foreign)

Space

- Create/Alter/Drop
- Tablespace, Extents, Free Lists, logging
- LOB Attributes
- Buffer pools

Events

- Triggers
- Before/After/Foreach types
- Trigger events

User Defined Types

- Table Types
- Object Types
- Array Types

Performance objects

- Create/Alter/Drop
- Partitions (Range, Hash, List)
- Indexes

Procedures and Functions

- Create/Alter/Drop

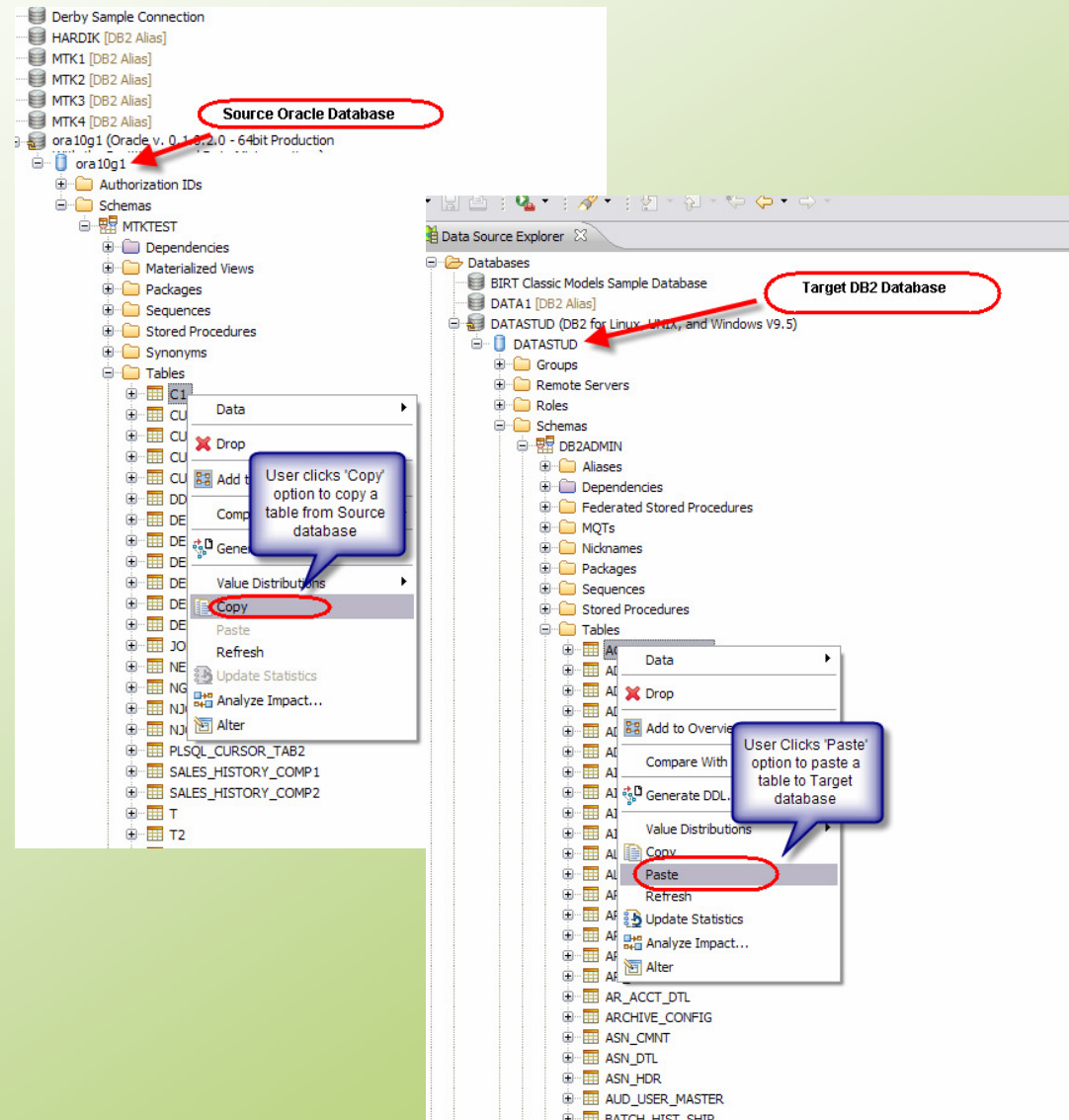
Physical objects

- Create/Alter/Drop for all objects
- Tables, Synonyms, Sequences
- Functions
- Views/materialized views

Strengthening Oracle Support

Data & Object Movement

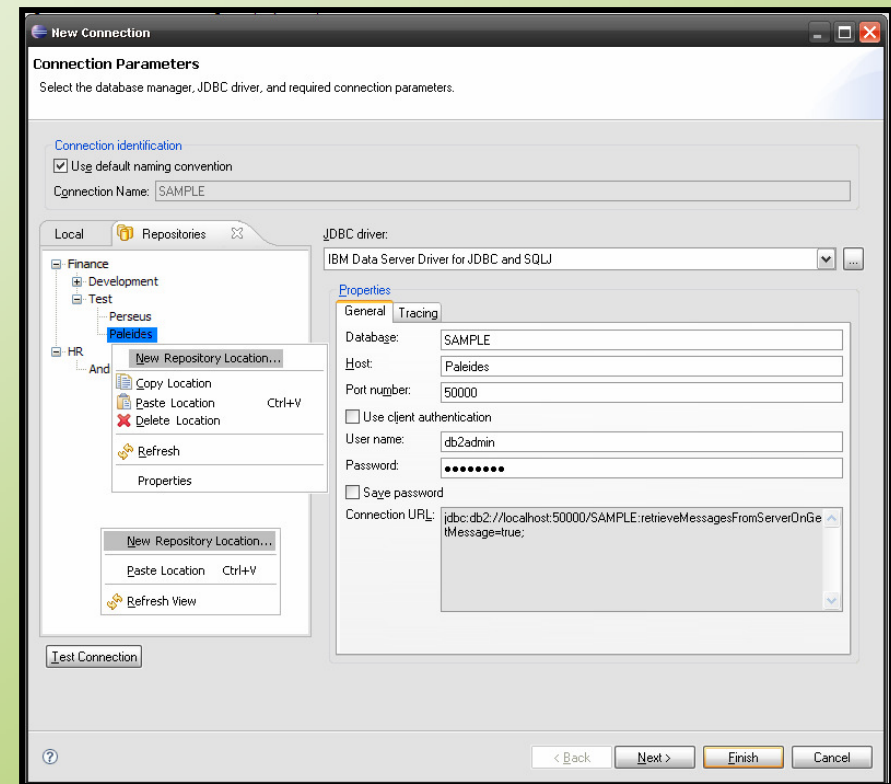
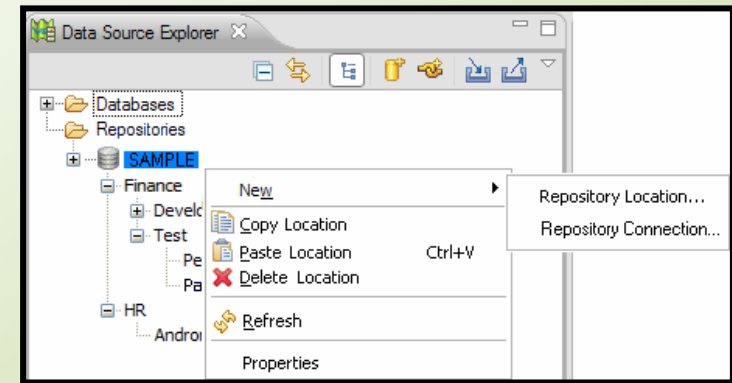
- Value Proposition –
 - Provide for the copying of database objects and data between homogeneous and heterogeneous databases within Data Studio
- Key Features
 - Copy objects at various levels – complete databases to single functions
 - Action performed in Data Source Explorer – Copy/Paste and Drag/Drop
 - Defaults (system and/or user customized) allow for wizard-free copying of data



Common Connection Repository

- Enhancing the value propositions on Team support
 - Centralized connection properties for sharing between DBA and Developers
 - Improve usability and up-and-running scenarios
 - Give controls to DBAs on connection properties settings
 - Eliminates the need to configure each database server on each client desktop
 - “push down” of client properties to allow DBAs to control and override application behaviors

- Key Features
 - Integrated solution to Eclipse Data Source Explorer
 - Integration with upcoming Web DBA tooling
 - Create or connect to Connection Repository
 - Connect to database using existing definitions
 - Create new definition
 - Logical grouping of connection definitions



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