



IBM Software Group

DB2 Access from the Web

March 7, 2006

Shawn Sullivan –DB2 Tools Product Expert, Rocket Software.



ON DEMAND BUSINESS™

Agenda

- Objectives of this call
- Introduction
- Data Editing and Controlled Access
- SQL Web Access
- Resources
- Next steps



Objectives of this Call

- *Would you like to give your employees access to DB2® data from the Web without sacrificing security? And with no client code as a requirement?*
- *Is editing as well as reading the data a requirement for you?*
- *Would you like to be able to insert, update and delete DB2 data without writing SQL? Great for that novice user.*
- *Creating and editing GUI applications without writing application code...would a drag and drop wizard help?*
- *Create SQL queries, share them and deploy them all via a web browser.*





IBM Software Group

DB2 Table Editor

Data Editing and Controlled Access



ON DEMAND BUSINESS™

DB2 Table Editor

- DB2 Table Editor has a name that seems to speak for itself. And in fact it provides an ISPF editor and a Windows GUI editor and a JAVA GUI for non-Windows desktops.

The screenshot displays two overlapping windows from the DB2 Table Editor application. The background window is an ISPF-style editor titled 'Session A - [24 x 80]' and 'DB2 Table Editor'. It shows a command prompt interface with the following content:

```

ETI$EDIT V4R3 ----- Ed
Table ==> PROFITS
-----
Cmd S N STATE          N PRODUCT
---- - - - - -
___  N Utah            N Colas
___  N Utah            N Colas
___  N Utah            N Colas
___  N Utah            N Colas
___  D N California    N Diet Sod
___  D N California    N Diet Sod
___  D N California    N Diet Sod
___  D N California    N Diet Sod
___  D N California    N Diet Sod
___  D N California    N Diet Sod
___  N California     N Fruit So

Valid Line Commands: Delete, In

Option ==>
  
```

The foreground window is a Windows GUI titled 'Table DEMO.PROFITS'. It displays a table with the following data:

STATE	PRODUCT	"MONTH"
Utah	Colas	11
Utah	Colas	10
Utah	Colas	12
Utah	Colas	11
✗ California	Diet Soda	12
✗ California	Diet Soda	11
✗ California	Diet Soda	10
✗ California	Diet Soda	12
✗ California	Diet Soda	11
✗ California	Diet Soda	10
California	Fruit Soda	12
California	Fruit Soda	11
California	Fruit Soda	10
Utah	Colas	10
California	Fruit Soda	12
California	Fruit Soda	11

Below this table, a second table titled 'Table DEMO.PROFITS' provides a more detailed view with columns for SCENARIO and PROFITS:

STATE	PRODUCT	"MONTH"	SCENARIO	PROFITS
Utah	Colas	11	Actual	78.00
Utah	Colas	10	Actual	71.00
Utah	Colas	12	Budget	150.00
Utah	Colas	11	Budget	160.00
California	Diet Soda	12	Actual	101.00
California	Diet Soda	11	Actual	101.00
California	Diet Soda	9	Actual	164.00
California	Diet Soda	10	Actual	164.00
California	Diet Soda	12	Budget	140.00
California	Diet Soda	11	Budget	140.00
California	Diet Soda	10	Budget	260.00
California	Fruit Soda	12	Actual	174.00
California	Fruit Soda	11	Actual	181.00
California	Fruit Soda	10	Actual	219.00

The status bar at the bottom of the application shows: 'Connected to remote server/host RS01.ROCKETSOFTWARE.COM using lu/pool S01TCP03 and port 23'.

No Surprise

- The ISPF Editor is for DB2 on zSeries data, the Windows GUI is for DB2 on DB2 on zSeries, Linux, Unix, or Windows.
- For GUI database access, the same application is in use for all platforms. Access is determined by license keys.

Slight Surprise

- ISPF, Windows, and Java interfaces are all part of the same package



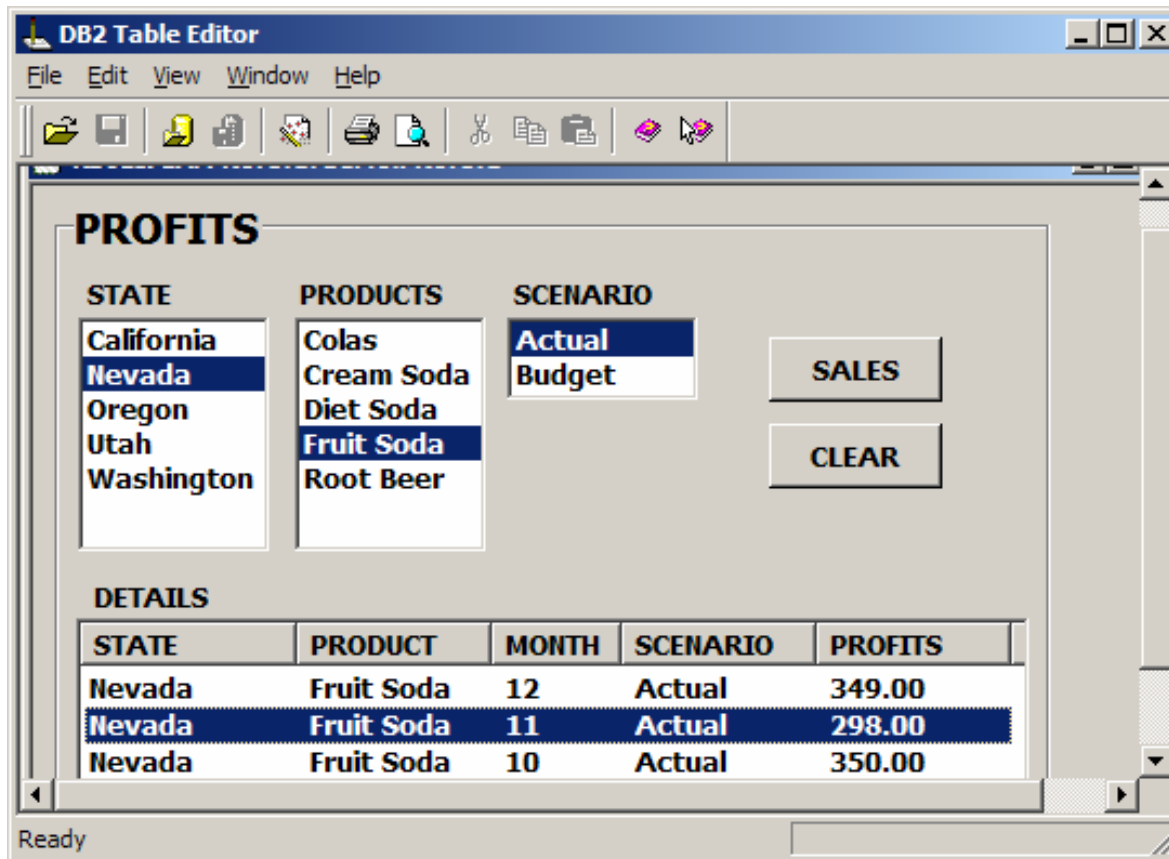
Case 1

- After a three hour training at customer using DB2 Table Editor to replace a competitor's ISPF editor, ten of the twelve students expressed a preference for the GUI, two for the ISPF.
- Guess the distinction between these two groups.



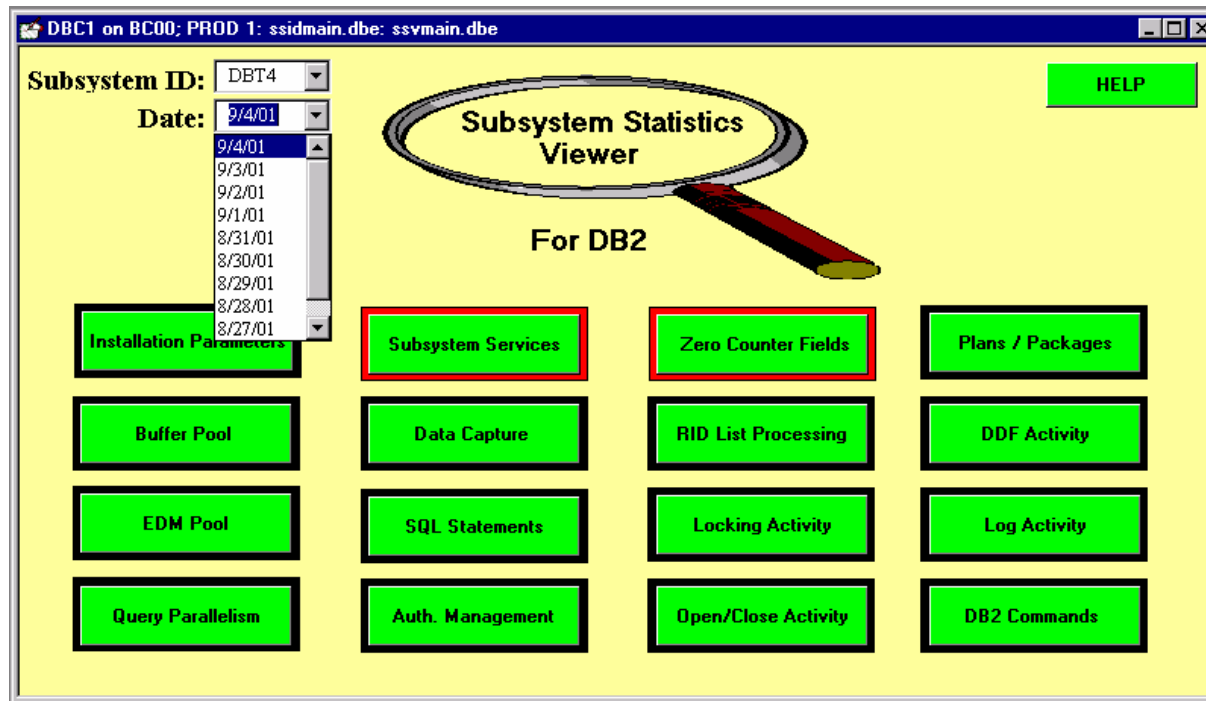
The name does not tell the whole story

- Did you know DB2 Table Editor was originally DB2 Forms?
- It was created to be a fast GUI Form builder for Editing and Lookup and controlled access.



Case 2

- I assisted (I gave minor tips and how-too's) one major customer's DBAs. They created a set of Lookup forms for DB2 metadata



- A SSID and date are picked and then the buttons retrieve the form displaying the corresponding data.

Case 2

- The next form leads via buttons like “By Hour” or “Memory” to more drill down

DBC1 on BC00; PROD 1: ssvserv.dbe

Interval - 24 Hrs **Close**

Subsystem Services

Created Threads.....	2,871,982	Commit Phase 1.....	3,691,539	System Check Points: <input type="text" value="122"/> By Hour
Identify.....	17,288	Commit Phase 2.....	1,625,868	Triggers Executed..... <input type="text" value="0"/>
Signon.....	3,635,251	Read-Only Phase Commit	2,065,702	Triggers with SQL Errors..... <input type="text" value="0"/>
Terminated.....	2,890,358	Opened Data sets (HWM)	2,501	Stored Procedures Executed..... <input type="text" value="0"/>
Rollback.....	4,916	Opened Data sets.....	2,444	Stored Procedures Abended..... <input type="text" value="0"/>
Indoubt Threads.....	<input type="text" value="0"/>	Converted from RW to RO	3,508	User Defined Functions Executed <input type="text" value="0"/>
Queued at Create... Thread	<input type="text" value="0"/>	Data sets Closed / Threshold Reached	1,632	User Defined Functions Abended <input type="text" value="0"/>

	TCB in Min.	SRB in Min.
System Services Address Space (MSTR)	97.9203	3,887.4046
Database Services Address Space (DBM1)	208.3470	9,276.0147
Internal Resource Lock Manager (IRLM)	0.0152	12.2266
Distributed Data Facility (DDF)	14.2147	1,623.6506

SMF Records Written:

SSID:
 Date:

MEMORY

Case 2

- In all this application had several dozen related, highly customized forms. How did they have the time or budget to do all this?

DBC1 on BC00; PROD 1: ssvzparm.dbe

Installation Parameters (ZPARM)

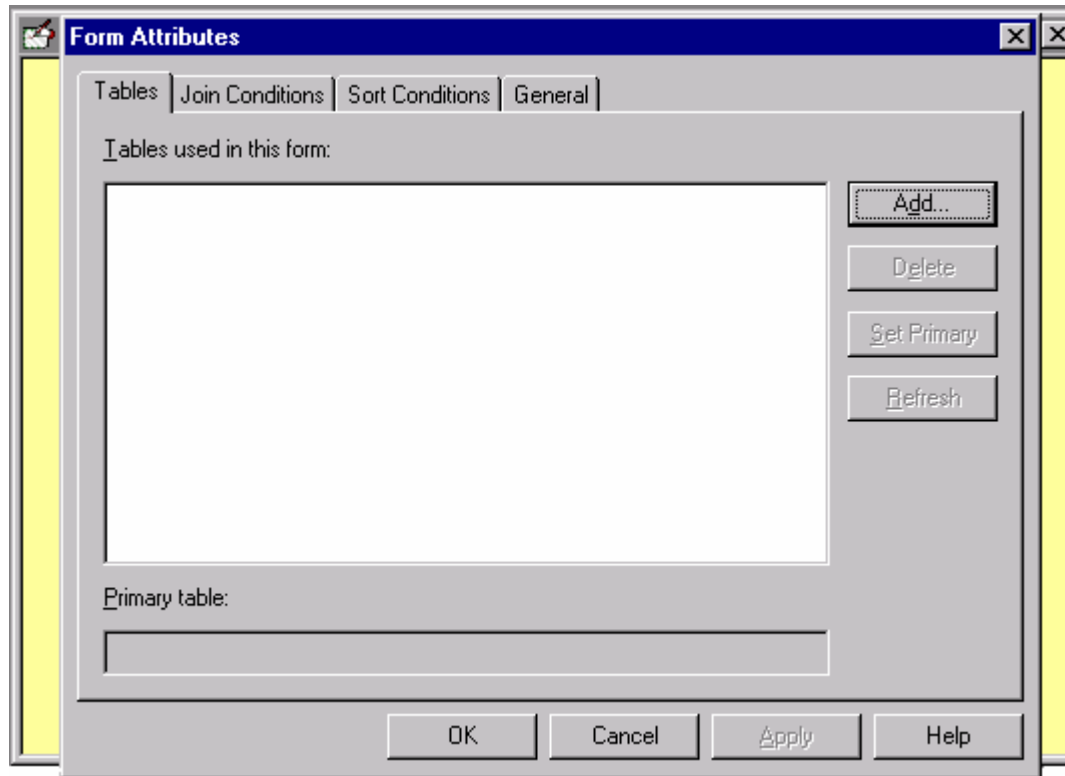
Close

Storage / Threads	Archive Logging	Active Logging	Checkpoint
Tracing	Distributed Data Facility	Data Definition Support	Subsystem Base Params
Operator Functions	Parallelism/Data Sharing	Lock Escalation	Stored Procedures
IRLM	Protection	Appl. Program. Defaults	Misc. Parameters

Refresh Screen SSID: DBT4 Date: 3/4/02 SEARCH / Enter Field Name ==> ABEXP GO

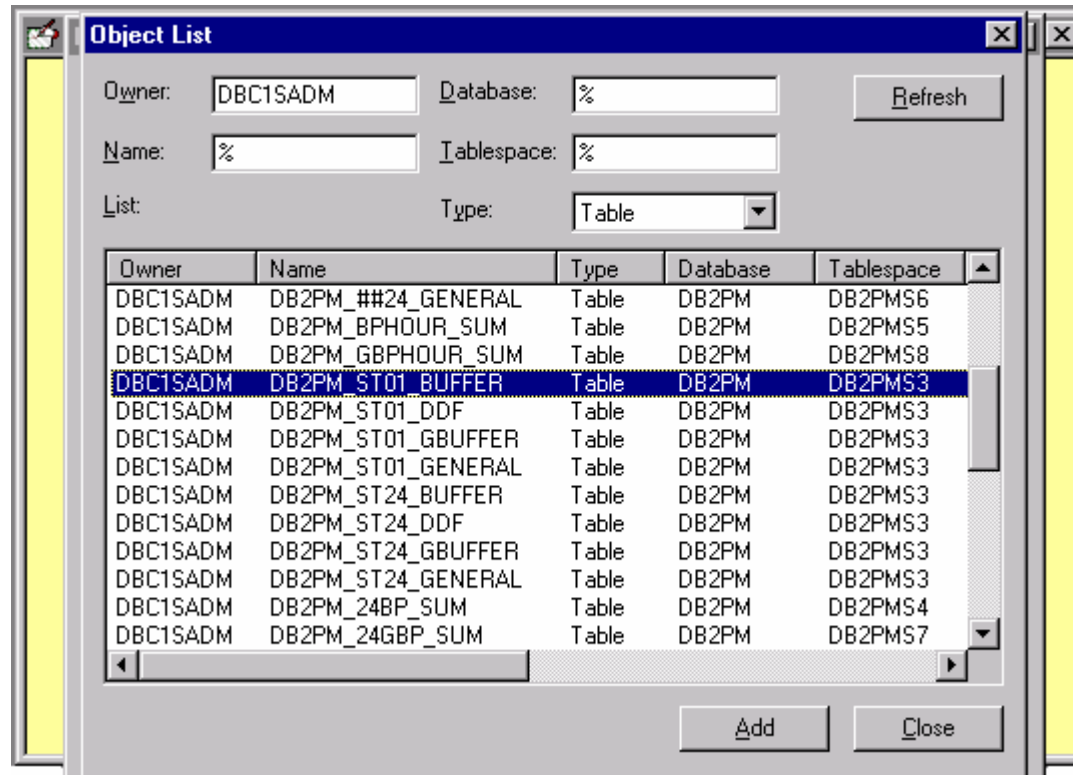
Case 2

- DB2 Table Editor is a fast programming-free form builder.
- They started with a blank palette, and called for a table list



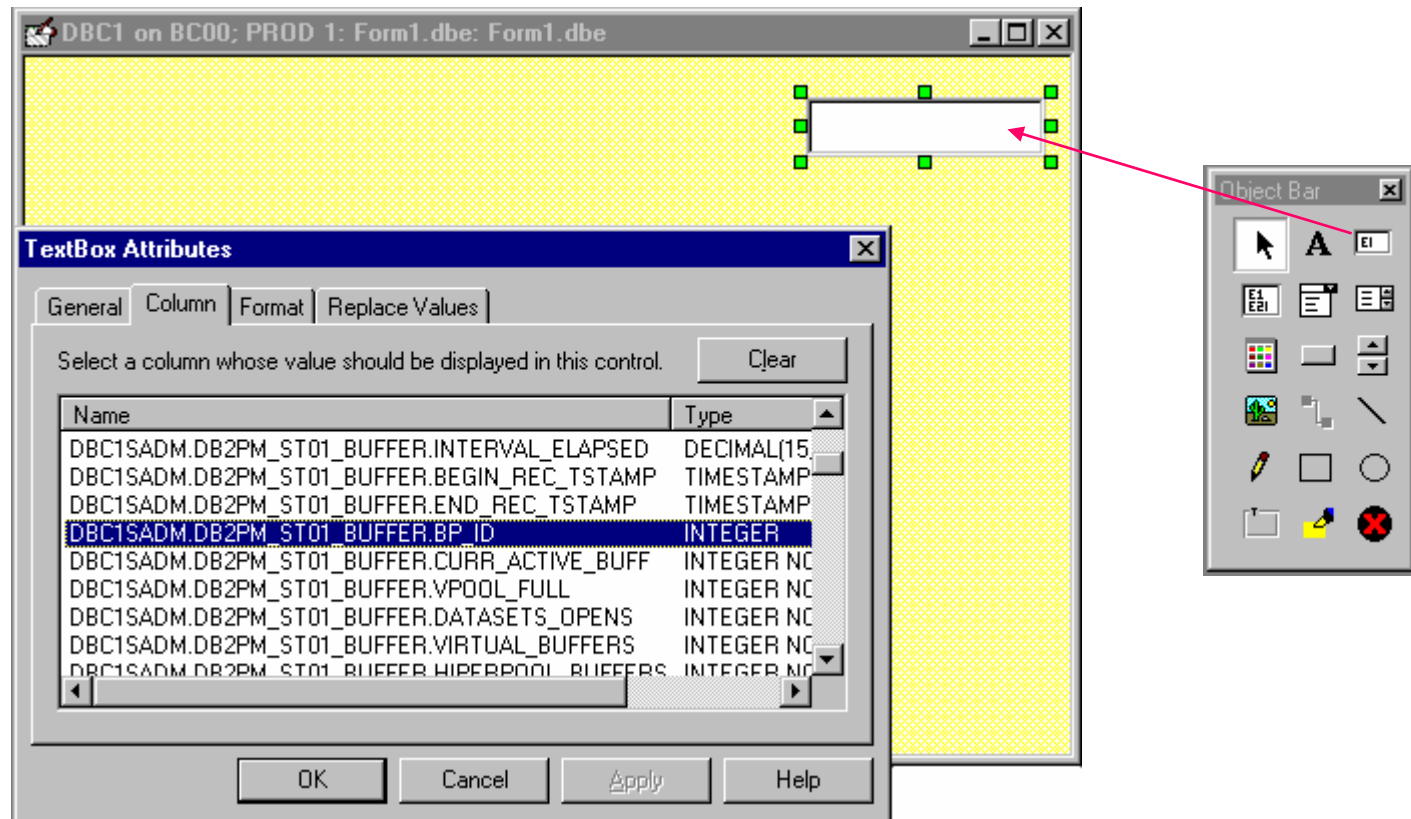
Case 2

They selected one of the IBM DB2 PM Performance Tables:



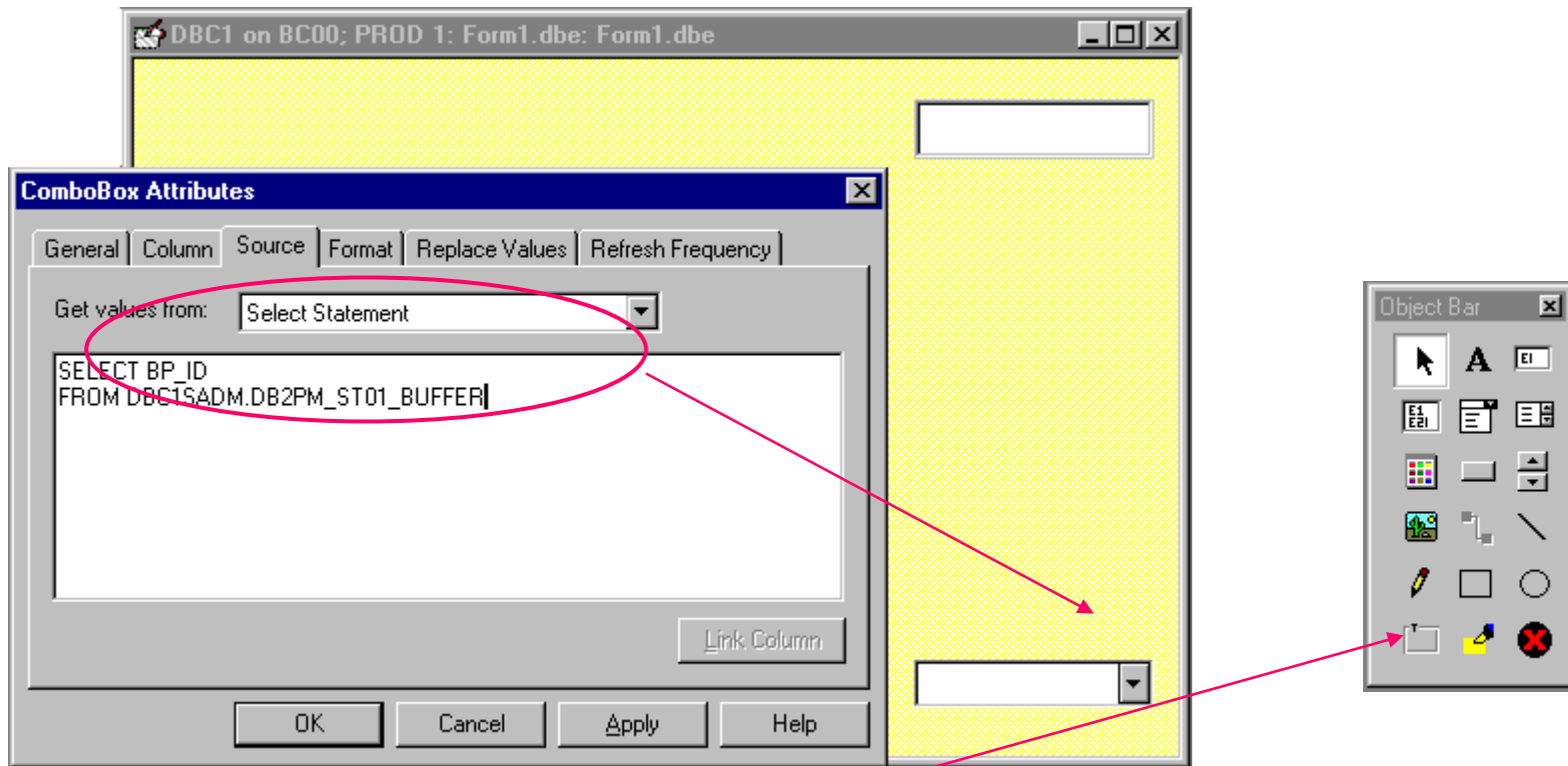
Case 2

Now it was a matter of drag and drop and associating the display boxes with columns from the tables..



Case 2

..or associating SQL with the text display or button.



With a very small bag of tricks, very useful sets of forms can be quickly developed. How quickly?

Case 2

Here is a form that I made for a DB2 LUW customer. It took two hours, and most of that was writing the SQL and deciding on the layout.

DB2 Table Editor
File Edit View Window Help

SAMPLET: CATALOG BROWSER: DEMO.CATALOG

Catalog Viewer Clear

1 Select TYPE

TABLES
VIEWS

2 Select OWNER

- ANNE
- ANNEX
- ANNEXY
- DB2ADMIN
- DBE
- DBE1
- DBE10
- DBE2
- DBE3
- DBE4**
- DBE5
- DBE6
- DBE7
- DBE8
- DBE9
- DBEX
- DEMO
- DEMO2
- FB
- JwT
- KOHL5
- LUBR
- MC
- OSS
- PDEMO
- PETER
- Q
- RDBI
- RSBI
- SHAWN
- SMD0125
- SMD0126
- SULLIVAN
- YSIBM
- TW/SHAWN
- wQ

3 Select TABLE

OWNER	TABLE	"TYPE"
DBE4	APPLICANT	T
DBE4	INTERVIEW	T
DBE4	ORG	T
DBE4	PARTS	T
DBE4	PRODUCTS	T
DBE4	PROJECT	T
DBE4	SALES	T
DBE4	STAFF	T
DBE4	SUPPLIER	T

4 Select COLUMN

NAME	COLTYPE	LENGTH	SCALE	NULLS	DEFAULT
PRODGRP	VARCHAR	10	0	Y	
PRODNAME	VARCHAR	11	0	Y	
PRODNUM	SMALLINT	2	0	N	
PRODPRI	DECIMAL	5	2	Y	

5 TABLES with similar COLUMNS

OWNER	TABLE
DB2ADMIN	SSTEST
DB2ADMIN	TEST
DBE1	PRODUCTS
DBE10	PRODUCTS
DBE2	PRODUCTS
DBE3	PRODUCTS
DBE4	PRODUCTS
DBE5	PRODUCTS
DBE6	PRODUCTS
DBE7	PRODUCTS
DBE8	PRODUCTS
DBE9	PRODUCTS

4 VIEW Alt+Z for Zoom

5 Related Information

ALIAS Base: Click for Column Information

BASE_SCHEMA	BASE_NAME

This space is available. Click here to send ideas to shawn.sullivan@rocketsoftware.com

INDEXES

NAME	COLNAMES	UNIQUERULE
SQL041110165605490	+PRODNUM	P

PRIMARY / FOREIGN KEYS

PKTB_CREATOR	PKTB_NAME	PKCOLNAMES	FKTB_CREATOR	FKTB_NAME	FKCOLNAMES
DBE4	PRODUCTS	PRODNUM	DBE4	PARTS	PRODNO
DBE4	PRODUCTS	PRODNUM	DBE4	PROJECT	PRODNUM

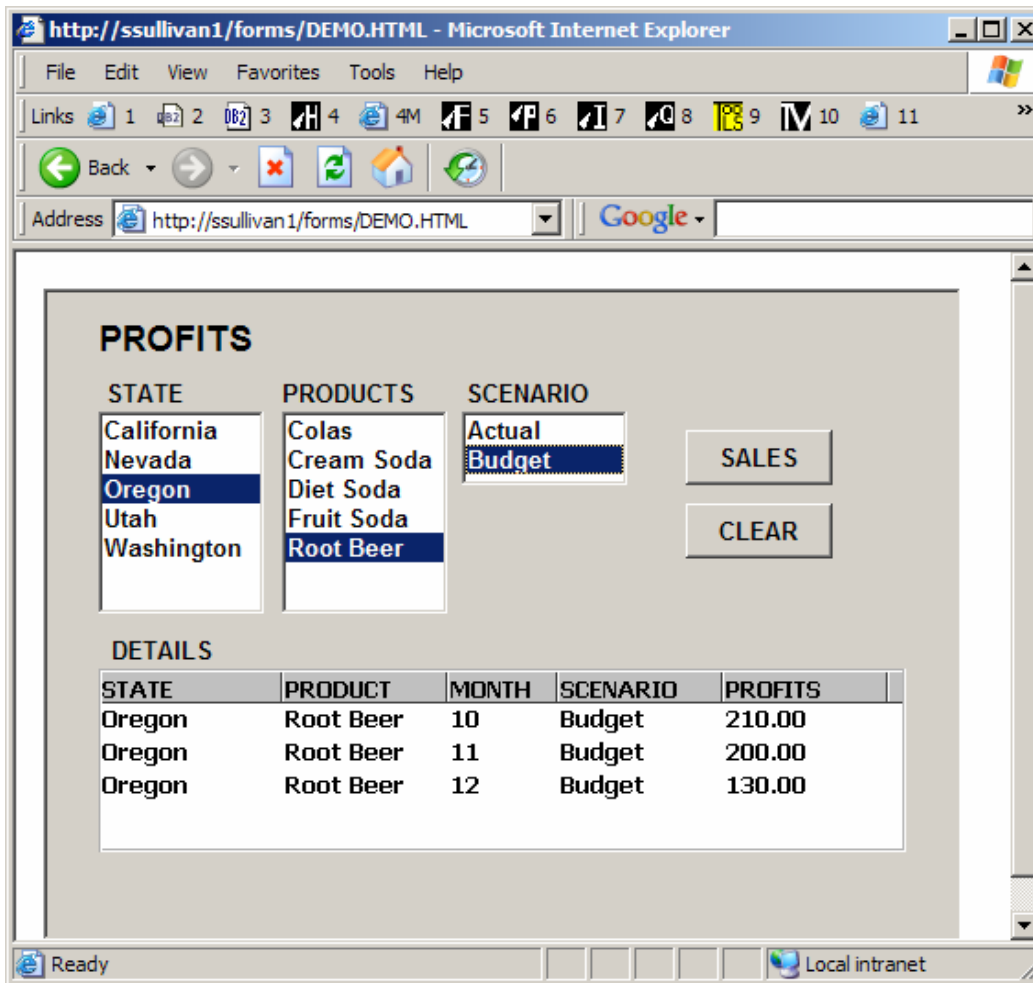
AUTHORITIES

GRANTEE	AUTH
PUBLIC	SELECT
DB2ADMIN	CONTROL

Ready

Web Interface

Where does the Web come in? Recall that there is a Java component to the package. This allows the forms developed and tested in the Windows GUI (including the full screen grid forms) to be deployed as Applets via a web browser.



The screenshot shows a Microsoft Internet Explorer browser window displaying a web interface titled "PROFITS". The browser's address bar shows the URL "http://ssullivan1/forms/DEMO.HTML". The interface includes three dropdown menus for "STATE", "PRODUCTS", and "SCENARIO", along with "SALES" and "CLEAR" buttons. Below these is a "DETAILS" table showing profit data for Oregon, Root Beer, across months 10, 11, and 12, all under the "Budget" scenario.

STATE	PRODUCTS	SCENARIO
California	Colas	Actual
Nevada	Cream Soda	Budget
Oregon	Diet Soda	
Utah	Fruit Soda	
Washington	Root Beer	

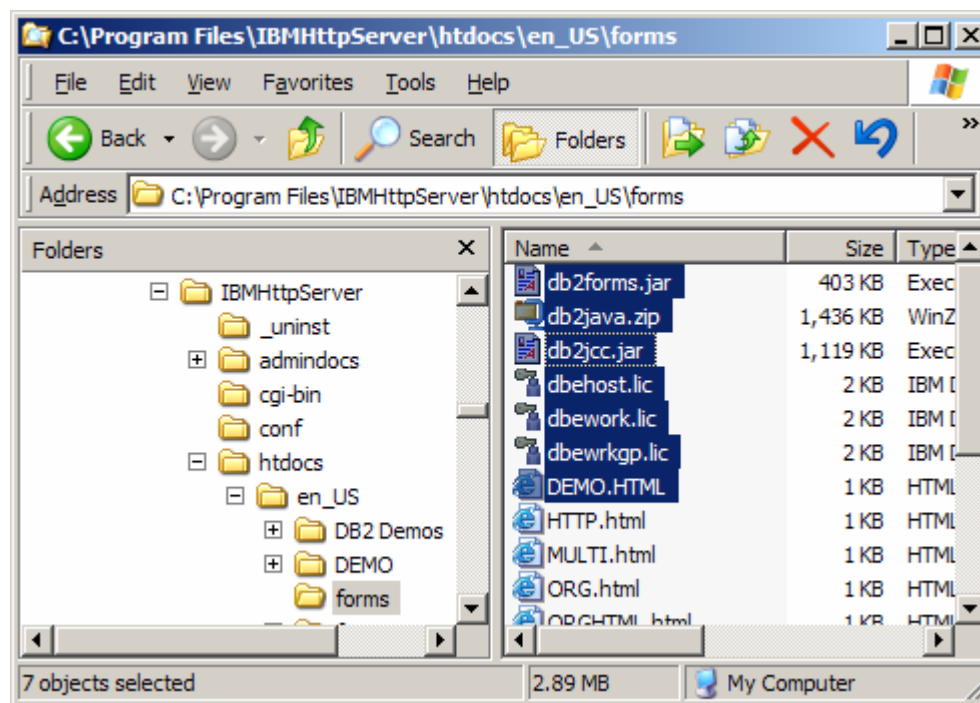
DETAILS

STATE	PRODUCT	MONTH	SCENARIO	PROFITS
Oregon	Root Beer	10	Budget	210.00
Oregon	Root Beer	11	Budget	200.00
Oregon	Root Beer	12	Budget	130.00

Web Interface

Take a Web Server like IBM HttpServer, drop the DB2 Table Editor Java component db2foms.jar into a directory on the Web Server, add the license keys and the DB2 JDBC drivers and add this text to your web page and you are in business:

```
<html>
<applet code = "com.rocketsoftware.juser.DB2FormsApplet.class" width=510 height=365 align="Center" archive="db2foms.jar,db2java.zip,db2jcc.jar">
<param name=HostName value='ssullivan1'>
<param name=Port value='6789'>
<param name=RDBName value='SAMPLE'>
<param name=FormOwner value='DEMO'>
<param name=FormName value='PROFITS'>
<param name="bgColor" VALUE="FFFFFF">
</applet>
</html>
```



Web Interface

Click on the link and after a login, the form is running.

The left screenshot shows the 'Index of /forms' directory listing. A red arrow points from the 'DEMO.HTML' link to the right screenshot.

The right screenshot shows the 'DEMO.HTML' form. The STATE dropdown is set to 'Oregon', the PRODUCTS dropdown is set to 'Root Beer', and the SCENARIO dropdown is set to 'Budget'. There are 'SALES' and 'CLEAR' buttons. Below the form is a table of profit data.

STATE	PRODUCTS	SCENARIO	SALES
California	Colas	Actual	
Nevada	Cream Soda	Budget	
Oregon	Diet Soda		
Utah	Fruit Soda		
Washington	Root Beer		

STATE	PRODUCT	MONTH	SCENARIO	PROFITS
Oregon	Root Beer	10	Budget	210.00
Oregon	Root Beer	11	Budget	200.00
Oregon	Root Beer	12	Budget	130.00



IBM Software Group

DB2 Web Query

Get the Data



ON DEMAND BUSINESS™

Web Query

- DB2 Web Query also has a name that speaks for itself. It's core mission for an end-user is to query the DB2 data, display the data, download the data, which is all typical of a query tool.
- Like DB2 Table Editor, DB2 Web Query is a single application that is available with different license keys. With the proper keys a single Web Query can access DB2 on any platform.



Web Query

Click on table to get a starter Query, proceed to view the data.

The left screenshot shows the 'Edit Query' interface. The tree view on the left contains the following structure:

- Connections
 - db2NT: SAMPLE
 - Table-Data
 - TABLE
 - DBE1
 - DBE2
 - DEMO
 - AIRPLANE_D
 - AIRPLANE_M
 - AIRPLANE_M
 - COGS
 - COGS3
 - CURRQUART
 - EMPLOYEE_
 - EXCEL
 - EXPENSE3
 - EXPENSES
 - INVENTORY
 - INVENTORY3
 - KOHLs
 - OBJDATA
 - PREVQUART
 - PROFITS
 - PROFITS3
 - PROPART

The SQL editor contains the following query:

```

-- Query from TABLE DEMO.PROFIT
-- Created by db2admin SQLID=DB
-- Mon Feb 27 09:43:56 EST 2006
-----
SELECT
    A.STATE, A.PRODUCT, A.MONTH
FROM
    DEMO.PROFITS A;
    
```

The right screenshot shows the 'Query Data' interface. The table of results is as follows:

Row	STATE	PRODUCT	MONTH	SCENARIO	PROFITS
1	Nevada	Diet Soda	11	Budget	60.00
2	Nevada	Diet Soda	12	Budget	80.00
3	Nevada	Diet Soda	10	Actual	20.00
4	Nevada	Diet Soda	11	Actual	14.00
5	Nevada	Diet Soda	12	Actual	23.00
6	Nevada	Root Beer	10	Budget	80.00
7	Nevada	Root Beer	11	Budget	60.00
8	Nevada	Root Beer	12	Budget	60.00
9	Nevada	Root Beer	10	Actual	35.00
10	Nevada	Root Beer	11	Actual	21.00
11	Nevada	Root Beer	12	Actual	27.00
12	Nevada	Colas	10	Budget	80.00

Web Query

Format, process, and go to work on your data. That is the core query process with which Web Query addresses the customer need of Data Access

The screenshot shows the IBM DB2 Web Query interface in Microsoft Internet Explorer. The browser window title is "IBM DB2 Web Query (ssullivan1) - Microsoft Internet Explorer". The address bar shows "http://ssullivan1:9080/DB2Tools/WebQuery". The main content area is titled "Select Output" and contains a "Process" button. Below this, it says "The following result sets were produced. Select a result set and then the output option desired." There are two main sections: "Select Result Set:" and "Transform".

In the "Select Result Set:" section, a list of result sets is shown, with "PROFITS" selected. In the "Transform" section, the "Default" transform is selected. The "Options" section has three radio buttons: "Display", "Download" (which is selected and circled in red), and "Email". Below these are radio buttons for "Excel" and "DB2 Table".

Overlaid on the right is a Microsoft Excel window titled "Microsoft Excel". The active workbook is "PROFITS.csv". The data table is as follows:

	A	B	C	D	E	F	G
1	Row	STATE	PRODUCT	MONTH	SCENARIO	PROFITS	
2	1	Nevada	Diet Soda	11	Budget	60	
3	2	Nevada	Diet Soda	12	Budget	80	
4	3	Nevada	Diet Soda	10	Actual	20	
5	4	Nevada	Diet Soda	11	Actual	14	
6	5	Nevada	Diet Soda	12	Actual	23	
7	6	Nevada	Root Beer	10	Budget	80	
8	7	Nevada	Root Beer	11	Budget	60	
9	8	Nevada	Root Beer	12	Budget	60	
10	9	Nevada	Root Beer	10	Actual	35	
11	10	Nevada	Root Beer	11	Actual	21	
12	11	Nevada	Root Beer	12	Actual	27	
13	12	Nevada	Colas	10	Budget	80	
14	13	Nevada	Colas	11	Budget	30	
15	14	Nevada	Colas	12	Budget	50	
16	15	Nevada	Colas	10	Actual	-16	
17	16	Nevada	Colas	11	Actual	25	

Web Query

Typical customers however are solving the following problem in addition to querying:

“I have hundreds of users with desktop client query tools. Installing and applying maintenance is too time consuming and prone to error. SPUFI is centralized on the mainframe but my user base is increasingly GUI-centric”.

DB2 Web Query installs and runs at the Web Application Server (WebSphere) as a servlet and only requires the end user to have a Web Browser.



BUT There Is No Free Lunch

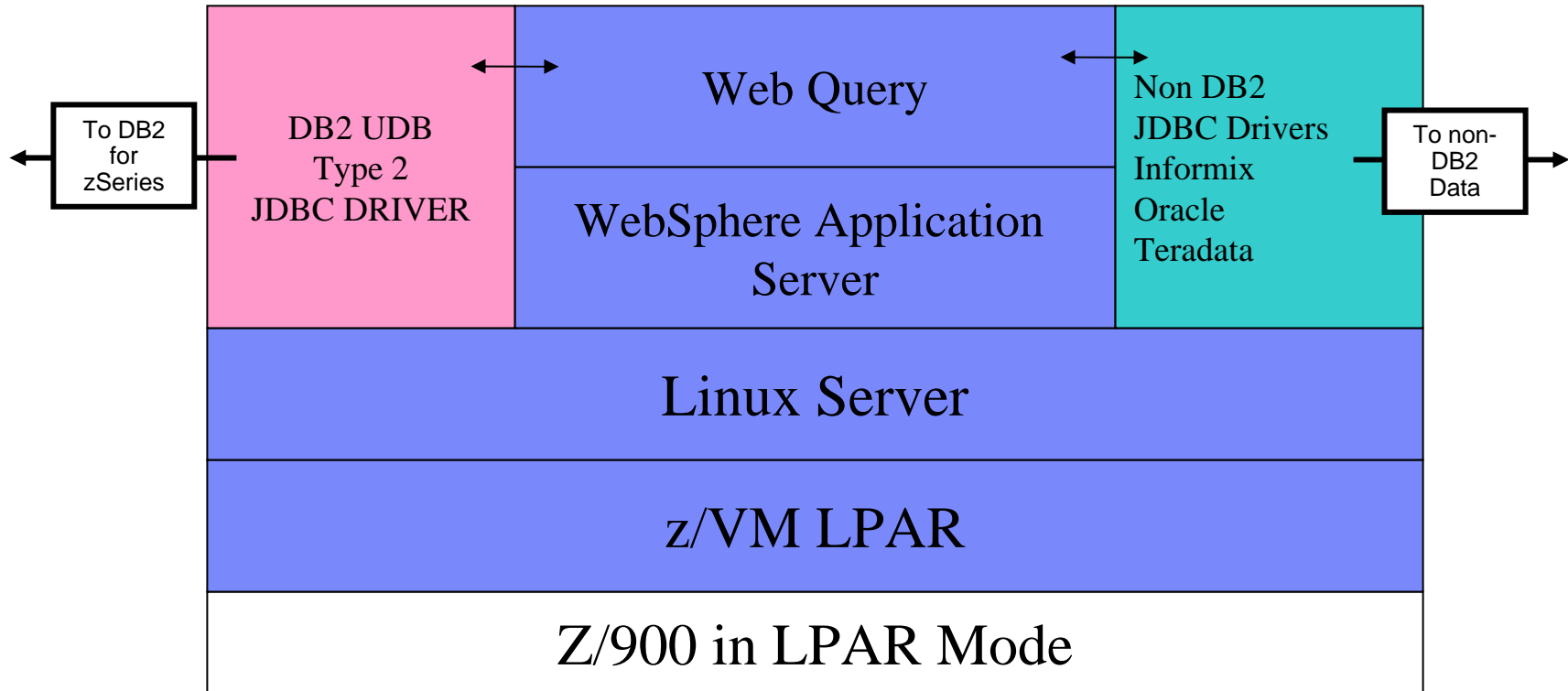
- Any Servlet application avoids the pain of installation and maintenance on a large number of workstations, but there may be a price to pay in the back end setup, if the infrastructure is not already in place.
- What platform should WebSphere (WAS) be on to house Web Query? zOS, Linux on zSeries, AIX, Windows?
- What type DB2 JDBC Driver type 2 or type 4?
- What about connecting to non-DB2 JDBC Drivers?
- What about loss of Windows desktop functionality?
- What about loss of ISPF functionality?

- Let's look at how a couple customers have used implemented Web Query to solve the dual problems of end user deployment and querying.



Case 1

- I assisted a very large customer in addressing the previous decisions as follows: Web Sphere was deployed on Linux for zSeries on a z/VM LPAR. This allowed the customer access to the ease of installing the DB2 EE for Linux and getting the DB2 Connect and JDBC driver infrastructure in one install



Case 1

- Also by using Linux on zSeries they were able to deploy DB2 Table Editor as a Java applet running inside DB2 Web Query

The screenshot shows the IBM DB2 Web Query interface in Microsoft Internet Explorer. The browser address bar displays `http://sullivan/DB2Tools/WebQuery/Configure`. The main content area is titled "DB2 Table Editor" and contains a table for "Table DBE1.CORG". The table has the following data:

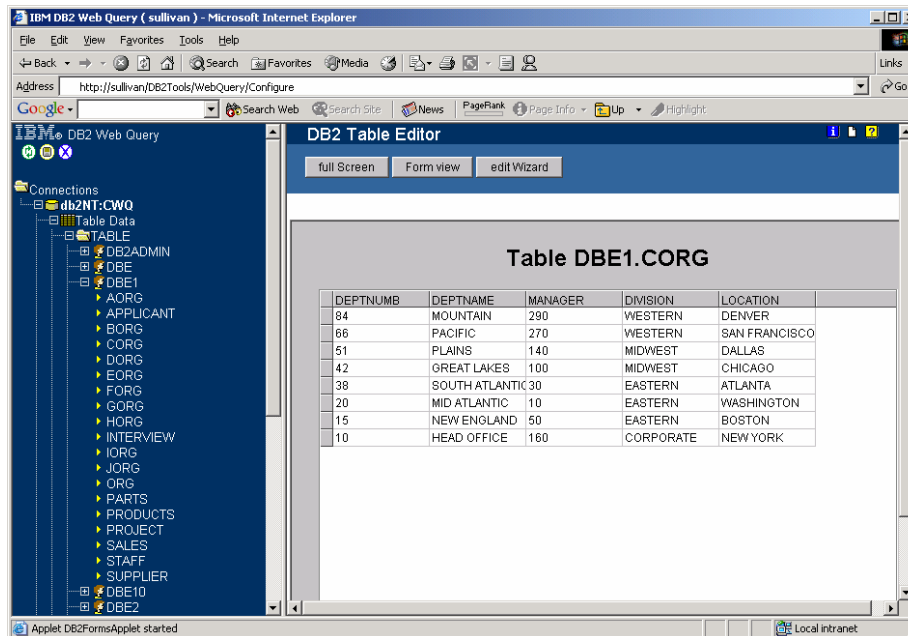
DEPTNUMB	DEPTNAME	MANAGER	DIVISION	LOCATION
84	MOUNTAIN	290	WESTERN	DENVER
66	PACIFIC	270	WESTERN	SAN FRANCISCO
51	PLAINS	140	MIDWEST	DALLAS
42	GREAT LAKES	100	MIDWEST	CHICAGO
38	SOUTH ATLANTIC	30	EASTERN	ATLANTA
20	MID ATLANTIC	10	EASTERN	WASHINGTON
15	NEW ENGLAND	50	EASTERN	BOSTON
10	HEAD OFFICE	160	CORPORATE	NEW YORK

The interface also shows a navigation tree on the left with connections to various tables and databases, including db2NT:CWQ, TABLE, DB2ADMIN, DBE, DBE1, and others. The status bar at the bottom indicates "Applet DB2FormsApplet started" and "Local intranet".

Case 1 No Free lunch (but all you can eat)

- Once the backend is in place installing and maintaining Web Query is quite easy: FTP a single .ear file to Linux image, and use WebSphere Admin Console deploy the .ear file.

In the end this customer has expanded into WAS on zOS and WAS on Linux and has Web Query servicing over 150 LPARs of DB2, hundreds of Informix, Oracle, and Teradata databases



DEPTNUMB	DEPTNAME	MANAGER	DIVISION	LOCATION
84	MOUNTAIN	290	WESTERN	DENVER
66	PACIFIC	270	WESTERN	SAN FRANCISCO
51	PLAINS	140	MIDWEST	DALLAS
42	GREAT LAKES	100	MIDWEST	CHICAGO
38	SOUTH ATLANTIC	30	EASTERN	ATLANTA
20	MID ATLANTIC	10	EASTERN	WASHINGTON
15	NEW ENGLAND	50	EASTERN	BOSTON
10	HEAD OFFICE	180	CORPORATE	NEW YORK

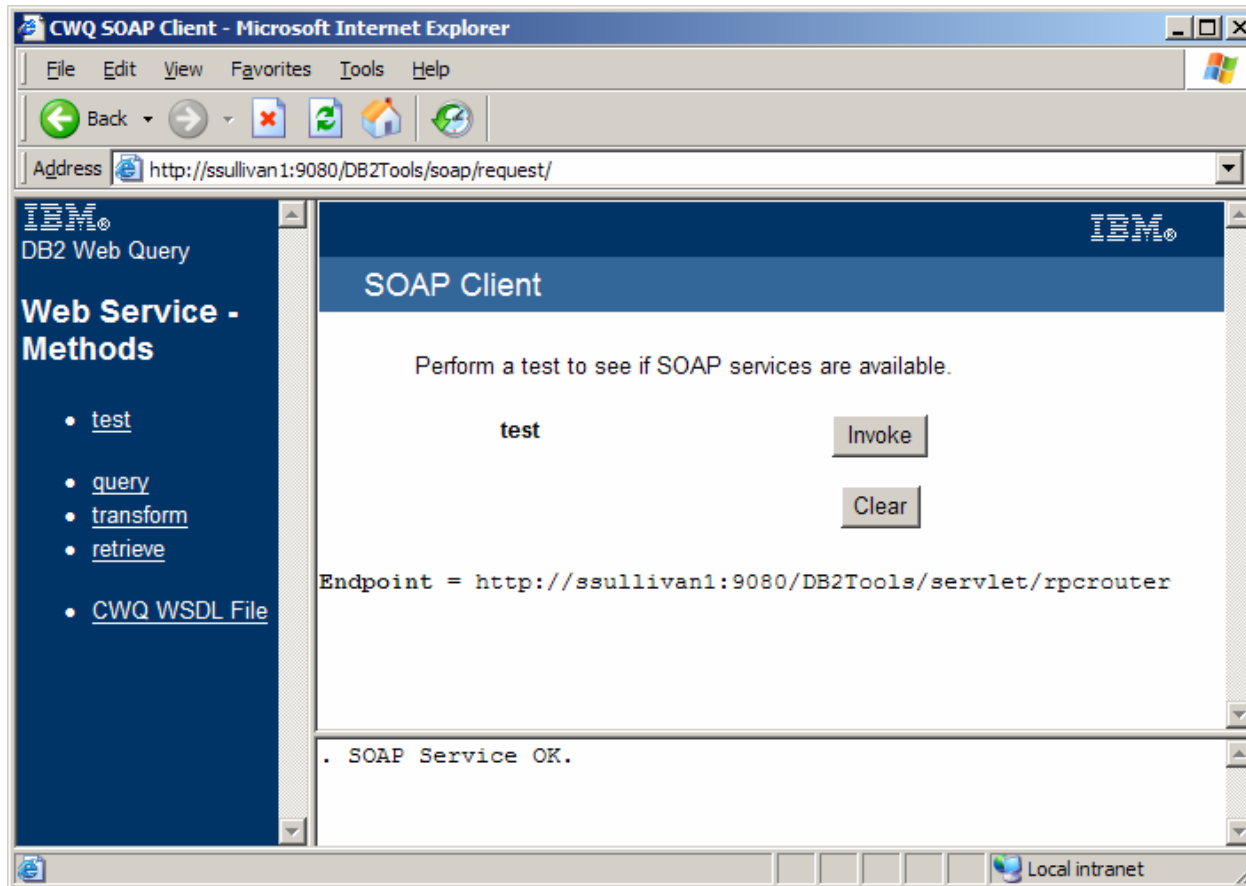
Case 2 Extending the Capabilities

- Another customer was replacing an ISPF based query tool but needed to be able to schedule queries and downloads of the data to run unattended in off hours.
- This is not a *function* of DB2 Web Query, but it was easily achieved using DB2 Web Query's SOAP interface.
- SOAP is Simple Object Access Protocol. You may know of SOAP as Web Services
- Like a simplified JAVA API with a small set of commands.



Case 2 Extending the Capabilities

- Web Query is a SOAP server and supplies a sample SOAP client and a WSDL file to define the requests supported.



Case 2 Extending the Capabilities

- A junior JAVA programmer for this customer took two hours to write a small JAVA application that could be called from a command line and contact the Web Query SOAP service.
- It supplies the name of the query, the location of the server, the location and type of file to be downloaded. These commands could then be scheduled from a Windows or AIX scheduler, embedded in another application or even run via a desktop shortcut.

```
java -classpath ".;/soap.jar;./mail.jar;./activation.jar;./xercesImpl.jar;./xalan.jar;./xml-apis.jar" SoapRetrieval query  
http://nwatest6:80/DB2Tools/servlet/rpcrouter db2NT:SAMPLE DB2ADMIN DEPARTMENT html ./soapdownloads/html.html
```

```
java -classpath ".;/soap.jar;./mail.jar;./activation.jar;./xercesImpl.jar;./xalan.jar;./xml-apis.jar" SoapRetrieval query  
http://nwatest6:80/DB2Tools/servlet/rpcrouter db2NT:SAMPLE DB2ADMIN DEPARTMENT delimited ./soapdownloads/delimited.txt
```

```
java -classpath ".;/soap.jar;./mail.jar;./activation.jar;./xercesImpl.jar;./xalan.jar;./xml-apis.jar" SoapRetrieval query  
http://nwatest6:80/DB2Tools/servlet/rpcrouter db2NT:SAMPLE DB2ADMIN DEPARTMENT fixed ./soapdownloads/fixed.txt
```

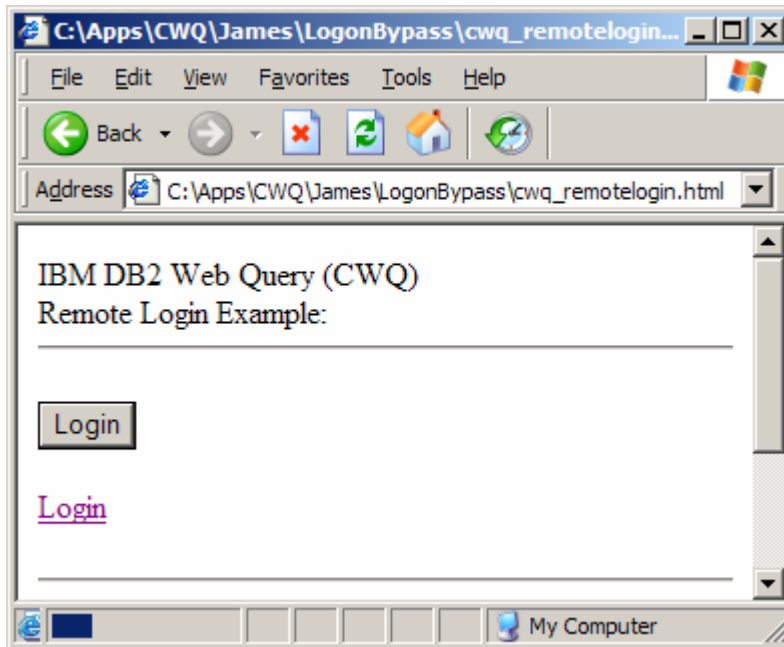
```
java -classpath ".;/soap.jar;./mail.jar;./activation.jar;./xercesImpl.jar;./xalan.jar;./xml-apis.jar" SoapRetrieval query  
http://nwatest6:80/DB2Tools/servlet/rpcrouter db2NT:SAMPLE DB2ADMIN DEPARTMENT formatted ./soapdownloads/formatted.txt
```

```
java -classpath ".;/soap.jar;./mail.jar;./activation.jar;./xercesImpl.jar;./xalan.jar;./xml-apis.jar" SoapRetrieval query  
http://nwatest6:80/DB2Tools/servlet/rpcrouter db2NT:SAMPLE DB2ADMIN DEPARTMENT xml ./soapdownloads/xml.xml
```



Case 3 Extending the Capabilities Continued

- A third customer was moving nearly all applications to a Web Browser based environment and needed to be able to pass the authentication from one Web Application to another.
- Web Query was able to do this using http “post”



```

<html> <body>
IBM DB2 Web Query (CWQ)
<br>
Remote Login Example:
<hr>
<form method="post" action="http://ssullivan1:9080/DB2Tools/Web Query">

<input type=submit value="Login">
<br>

<a href="javascript:window.document.forms[0].submit();">Login</a>

<br>
<input type=hidden name=op value=process>
<input type=hidden name=page value=loginpage>
<input type=hidden name=userid value="userid">
<input type=hidden name=password value="password">
<input type=hidden name=databasetype value="db2NT">
<input type=hidden name=databaselocation value="SAMPLE">

</form>
<hr> </body> </html>

```


Resources

- Tools used in this presentation:
 - ▶ DB2 Table Editor for z/OS
 - IBM DB2 Table Editor for z/OS allows you to edit DB2 data from an ISPF or a GUI Windows, Java, or Web Browser Applet as well as create lookup and editing forms, also for the GUI deployment mentioned above.
 - ▶ DB2 Web Query Tool for z/OS
 - IBM DB2 Web Query Tool for z/OS provides you with a an interface to craft and share SQL Queries, view query result sets, and download and format the result sets all from within a web browser with no client side install.



Resources

- DB2 UDB for z/OS
 - ▶ <http://www.ibm.com/software/data/db2/zos/>
- DB2 UDB for z/OS Tools
 - ▶ <http://www.ibm.com/software/data/db2imstools/>
- Online Library:
 - ▶ <http://www.ibm.com/software/data/db2imstools/library.html>



Next Steps

- Contact your local IBM sales specialist
- Visit us at the IDUG Conferences worldwide and the DB2 Technical Conferences worldwide.
- Email contact: Dianne McCallum – dmccallu@us.ibm.com
- <http://www.ibm.com/software/data/db2imstools/>



Summary & Questions

- Look to the IBM® DB2 for z/OS Tools to ease the pain.
- We will open the line for questions now. Please follow the operator's instructions if you have a question.

