



Using Drumbeat 2000™ to Create a JSP-based DB2 Application for AS/400



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Introduction

The purpose of this paper is to show how Macromedia™ Drumbeat 2000™ can be used to quickly and easily build a dynamic web site that can access AS/400 data. Drumbeat 2000 is a fast, easy way to build web interfaces to databases that take full advantage of Java Server Pages (JSPs). Drumbeat is designed for web-site builders and application developers who need to speed the deployment of departmental-level, database-driven web applications that access and update data in real-time.

For this example, we developed a tool that can be used to track AS/400 hardware and software inventory in a database. This database can then be queried from a browser to find all the systems that have a given set of attributes. Some of the key attributes that can be queried include the operating system version installed, the amount of memory installed, the amount of disk storage installed, and whether certain e-Business software products are installed.

Scenario summary

For our sample application, data was collected for each of the key hardware and software attributes for the AS/400 systems used by our development and test organization. This data was entered into a DB2 database.

Next, Drumbeat 2000 was used to develop a web application that would allow a user to search the database for systems that match a key set of attributes and display the resulting list in an HTML (HyperText Markup Language) table.

Finally, some administration functions were added to the application for updating and deleting information from the database.

Scenario Architecture

Server Physical Environment

An AS/400 9406 model 720 running OS/400® Version 4 Release 4 Modification Level 0 was used in our implementation. The system contained 70 gigabytes of system Auxiliary Storage Pool (ASP), and 896 megabytes of main storage.

Server Software Inventory

OS/400 Version 4 Release 4 Modification Level 0 was the operating system version of the AS/400 system.

This scenario required the following licensed programs and PTFs to be installed:

Licensed Program	Description
5769SS1 Option 12	OS/400 - Host Servers
5769AS1	WebSphere Application Server for AS/400
5769DG1	IBM HTTP Server for AS/400
5769JV1	AS/400 Developer Kit for Java
5769TC1	TCP/IP Connectivity Utilities for AS/400
5769XE1	Client Access/400 Express for Windows

PTFs	Description
C0049440	V4R4 Cumulative PTF Package

Client Software Inventory

Any machine with a TCP/IP stack, a web browser, and connection to an AS/400 web server (via dial-up connection, wireless connection, local-area network, or wide-area network) can participate in this scenario.

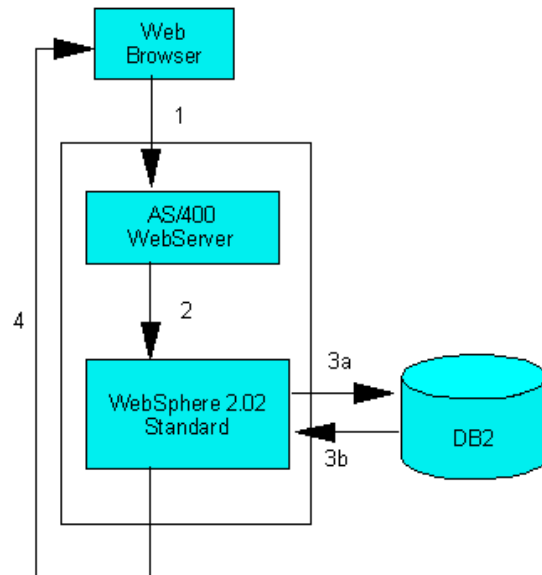
Browsers tested and found to work in this scenario include:

1. Netscape Communicator 4.51 and 4.72
2. Microsoft Internet Explorer 4.0 and 5.0

In addition, the following software was used for creating the inventory database and the web application.

1. Microsoft Windows NT™ 4.00
2. IBM AS/400 Client Access Express for Windows 4.5.0, Service level SF11116
3. Macromedia Drumbeat 2000

Application Walkthrough



1. A request is issued from a client.
2. The request is received by the AS/400 web server, recognized to be a JSP, and passed to the WebSphere Application server.
3. WebSphere executes the JSP.
 - a. WebSphere queries the DB/2 database or updates the database.
 - b. The Hyper-Text Markup Language (HTML) results are formatted and passed back to the web server.
4. The generated HTML is returned to the client.

Implementing the Application

The following sections describe the major steps performed to implement the sample application.

The major steps are:

1. Designing, creating, and populating the underlying system database
2. Creating the Drumbeat 2000 application
3. Publishing the site
4. Configuring the AS/400 HTTP Server

Designing, creating, and populating the underlying system database

The database used for this solution is a single table. The database table name is DLJXCE.SYSTEMS.

Each column represents a key AS/400 system attribute as identified by the development and test organizations that will use this application. The table was created and data inserted using Operations Navigator as described in the help panels for Operations Navigator.

Queries can be generated against this database to locate AS/400 systems that satisfy a given set of criteria. Detailed information about the database table is located in Appendix A of this document.

Creating the Drumbeat 2000 application

Creating a Drumbeat 2000 database driven application is a very simple operation. Drumbeat 2000 makes it easy to formulate and display the results of database queries. Without manual coding, you can build powerful intranet and Internet applications that serve customers, streamline business transactions, and help employees work more efficiently.

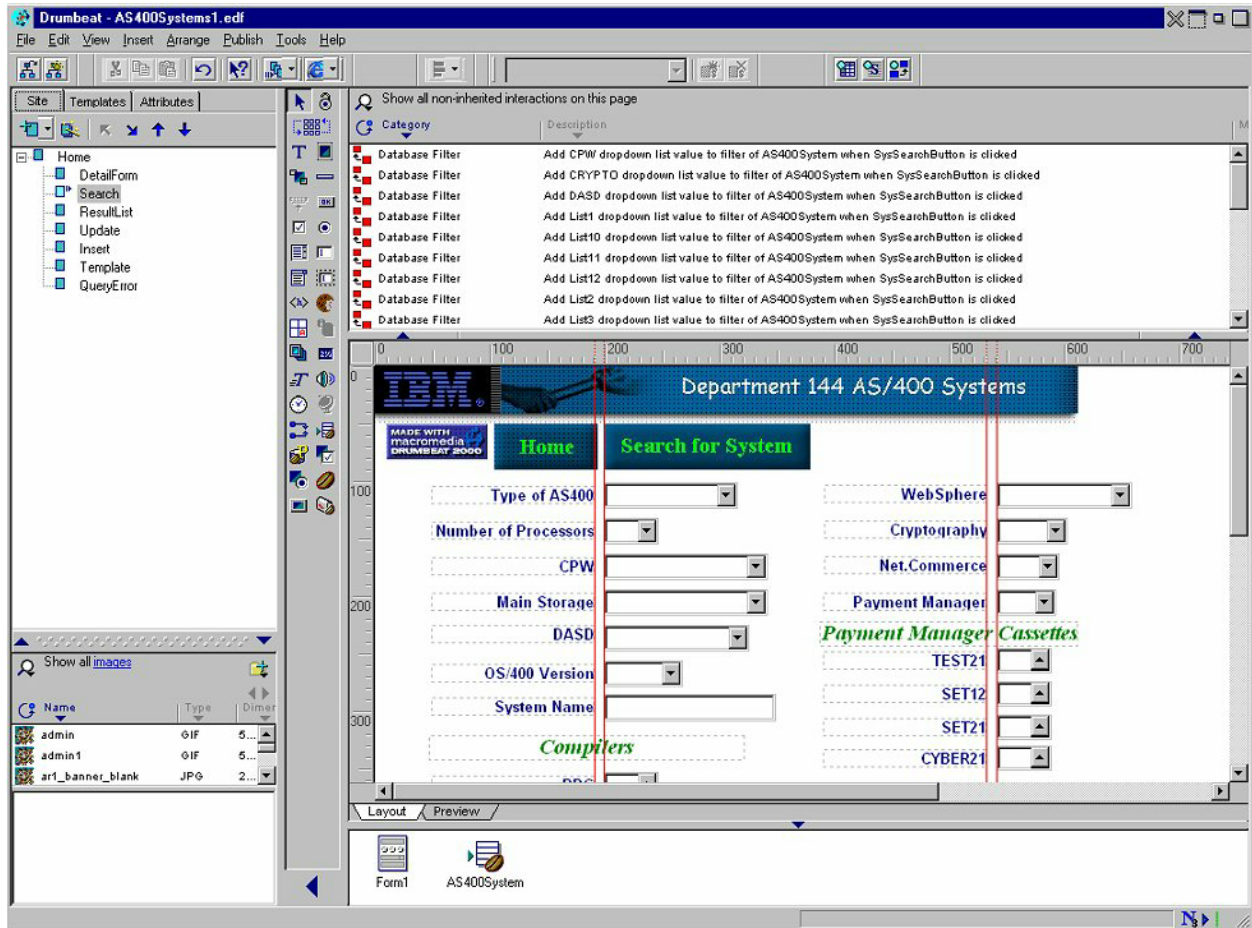
With Drumbeat 2000, you can convert existing applications and enterprise databases into Web applications, assemble JSP applications with reusable Web components, create engaging Web applications quickly, build sites that automatically work in different browsers, and manage all your content from one convenient location.

Create an ODBC connection to the DB2 database

First, create an Open DataBase Connectivity (ODBC) connection to the AS/400 DB2 database. ODBC is an open, vendor-neutral and powerful interface that allows applications to seamlessly access over 50 different database systems through a common set of functions. With this powerful technology, developers need not learn multiple programming interfaces since they can use the universal set of interfaces provided by ODBC.

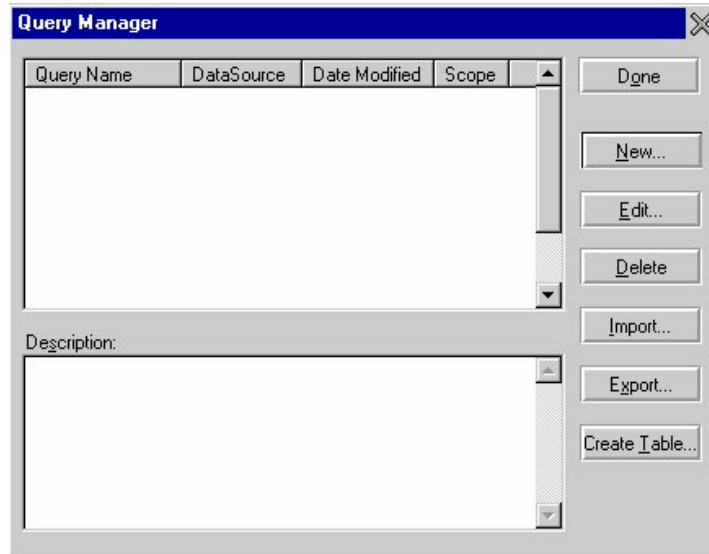
The Operations Navigator online help describes how to use the ODBC Data Source Administrator that comes with Client Access Express to setup an ODBC connection.
Create an SQL Query

Start the Drumbeat 2000 program. This will bring up the following panel. Note that all of the frames will be empty prior to creating your application.



Select **File...Create a New Site** or **New Site Wizard**. Select **Use Wizard** at the first dialog box. Selecting **Use Wizard** will invoke the New Site Wizard when creating your application. Click the **OK** button. Give your site a name and use the defaults for the rest of the options in the subsequent dialog boxes. Some of the information requested in these dialog boxes include site type, browsers that will be supported, scripting language, and CGI program support.

In **Asset Center**, clicking the **Add Assets** (folder) button, and choosing **Queries...** from its pop-up menu invokes the Query Manager. The following panel is displayed:



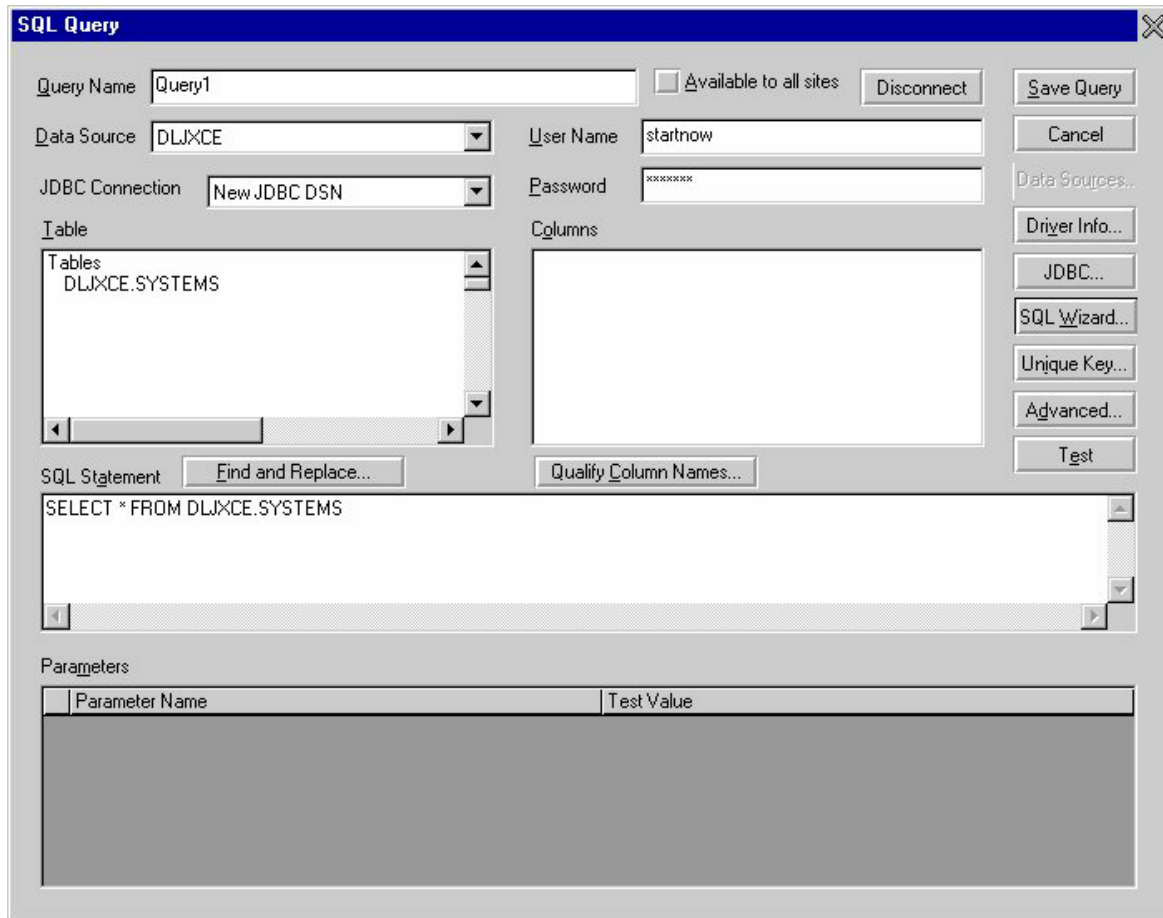
The Query Manager allows you to create, edit, delete, export, and import queries. The Query Manager manages all the queries in Drumbeat. This invokes the SQL Query Builder. The SQL Query Builder allows you to specify the data source and associated data that you want to include in a query.

There are several ways you can define a query:

- Manually type an SQL statement into the SQL Statement window,
- Copy an SQL statement from another source into the SQL Statement window,
- Use a pre-built query or View from the database, or
- Make a call to a stored procedure.

To create a new query, press the **New** button from the Query Manager panel.

The query that we will use returns all of the information from the database table, DLJXCE.SYSTEMS. This allows our application access to all of the system information for all of the AS/400s in the table. We will use Drumbeat 2000 to filter this information based upon user searches.



Create an ODBC Content Table

Once you have created a query, you must create an ODBC Content Table based on the query to use the database information in your site. The Content Table is the visual representation of your data. The ODBC Content Table may contain references to images, other media, and hyperlinks, as well as text elements. Any changes made to the database, either from an external application or from the DataForm pages you create in Drumbeat (Insert or Update pages) will automatically be reflected in the Content Table and all pages that reference it.

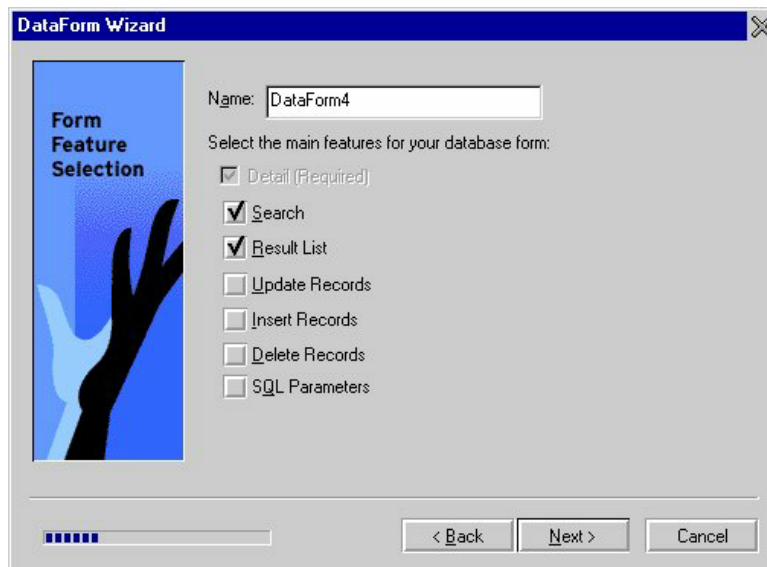
ODBC Content Tables are used when building JavaServer Pages applications. ODBC Content Tables are generated from queries. Once you have built an ODBC Content Table, you can use the DataForm Wizard to automatically create Java Server Pages. You can also build pages and database interactions manually.

To create an ODBC Content Table, press the **Create Table** button from the Query Manager panel.

ODBC tables are automatically updated to reflect changes in the source query when changes are made to the database file. Selecting the **Edit Table** button updates the table data.

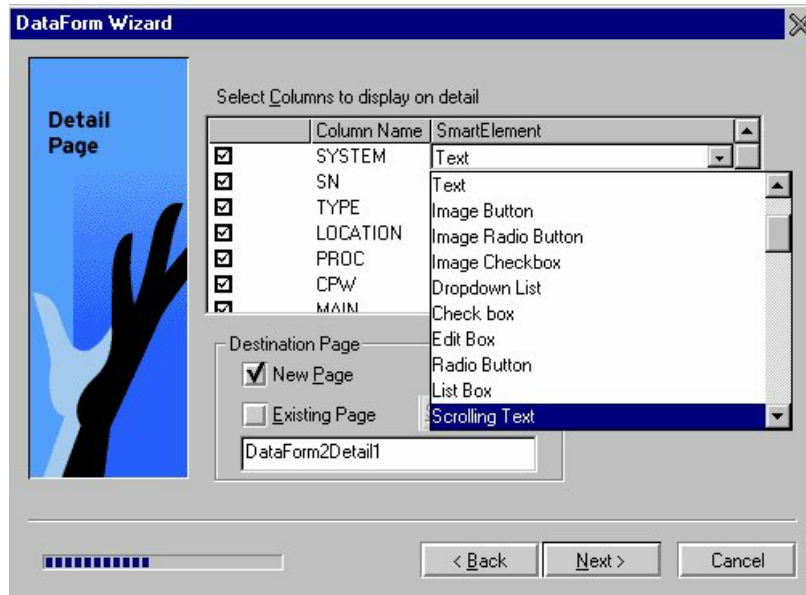
Use Drumbeat 2000 to define the presentation to the users

After the SQL Query and Content tables are created, invoke the Drumbeat 2000 DataForm wizard by selecting **Insert...DataForm** from the main Drumbeat panel. The DataForm wizard will be used to create pages that allow users to search the database. The first panel describes the functions that users are allowed to perform. We will allow users to generate searches of the database, and also will provide them with the results of their searches. We will not allow users to update the database.



You will then be presented with a panel that describes the information that can be used to search the database table. Select the items in the database on which you want to allow searching, and press the next button. The next panel is used to describe how the search results are presented to the user.

The DataForm Wizard allows us to describe the way in which the database information is presented to the end user. This is accomplished by making a selection from the drop down list next to each column, and defining the attributes of each column in the database. This panel also indicates that we want the results placed on a new page.



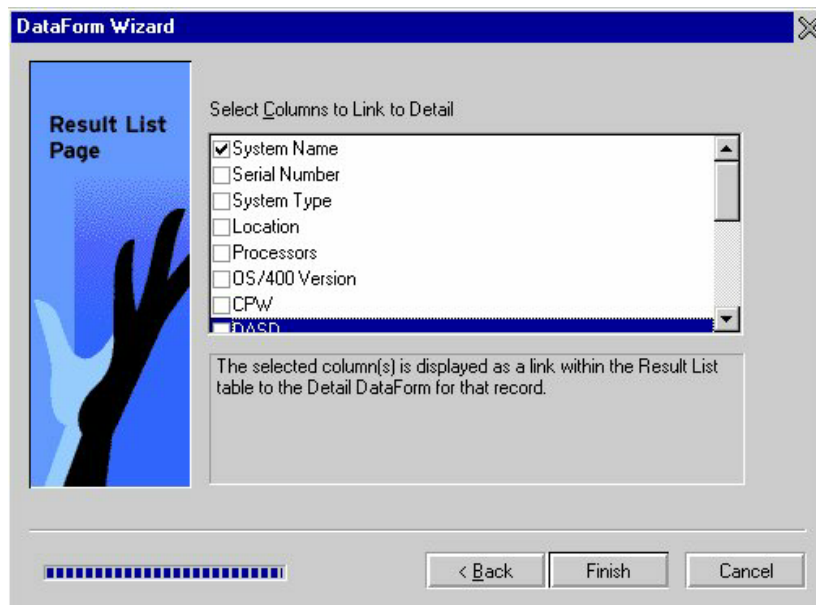
The next panel allows us to describe more detail information. We specify that we wish to have First, Previous, Next and Last Buttons enabled on our page. We also indicate that we want to display one record per page.



This panel allows us to give users the ability to sort the results of a query.



In our application, the results page shows some of the system's key attributes. Defining a Columns to Link to detail allows us to build a hyperlink for the System Name column in order to show the entire record for a selected system.

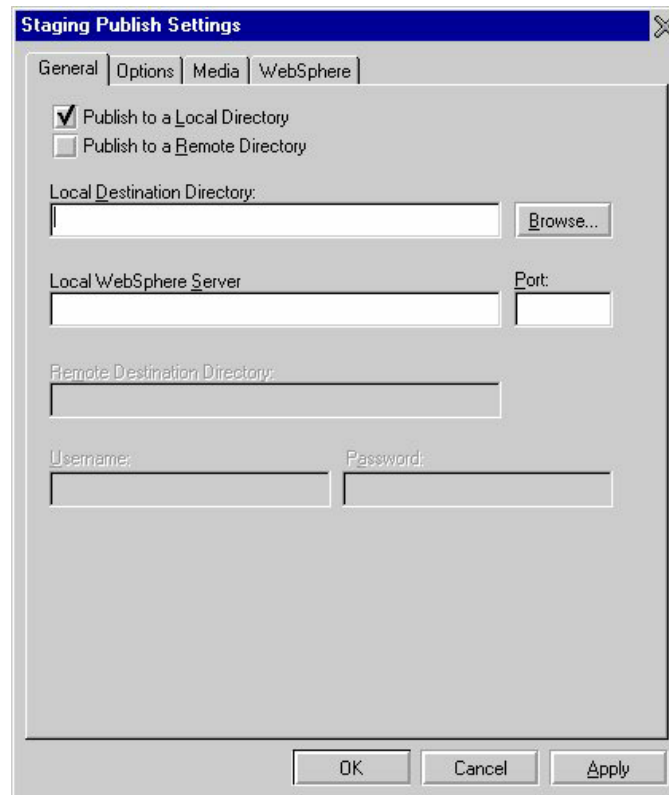


On the last page of the DataForm Wizard, click the **Finish** button and Drumbeat 2000 will automatically generate your pages. From there it is a matter for the developer to add the appropriate items to customize the pages such as the graphics, sounds, or animations.

Publishing the site

After the design of the site has been completed, it is time to publish the pages. For this it will be necessary to have a drive mapped to the AS/400 that will be serving the pages. In the Drumbeat 2000™ application, select **Publish** from the menu and then **Publish settings**.

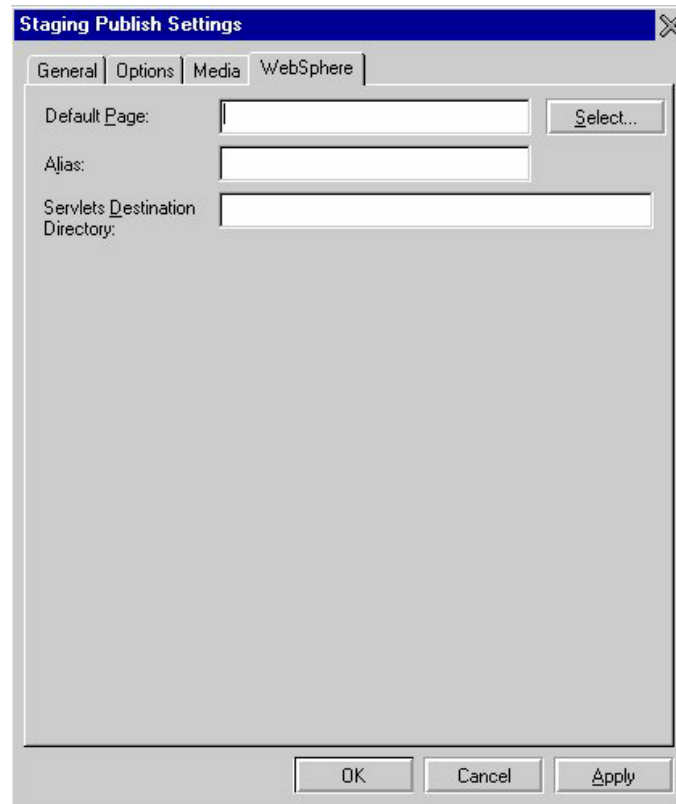
For the **Local Destination Directory** select the location on the AS/400 which will contain the files. For **Local WebSphere Server** and **Port** enter the name or IP address and port of the HTTP server running on the AS/400.



The image shows a screenshot of the "Staging Publish Settings" dialog box. The dialog has a title bar with the text "Staging Publish Settings" and a close button. Below the title bar are four tabs: "General", "Options", "Media", and "WebSphere". The "General" tab is selected. In the "General" tab, there are two radio buttons: "Publish to a Local Directory" (which is checked) and "Publish to a Remote Directory". Below these are three input fields: "Local Destination Directory:" with a "Browse..." button, "Local WebSphere Server", and "Port:". Below these are two more input fields: "Remote Destination Directory:" and "Username:". At the bottom of the dialog are three buttons: "OK", "Cancel", and "Apply".

On the WebSphere tab it is necessary to set the default page. In most cases this defaults to Home.jsp but can be any page that you wish to have as your home page. You will also need to configure the alias for forming the URL to access the web site from within Drumbeat 2000. Finally the **Servlets Destination Directory** path needs to be defined.

After all this information is entered the pages are ready to be published. This is accomplished by selecting **Publish** from the menu and then **All Pages** as the publishing option.



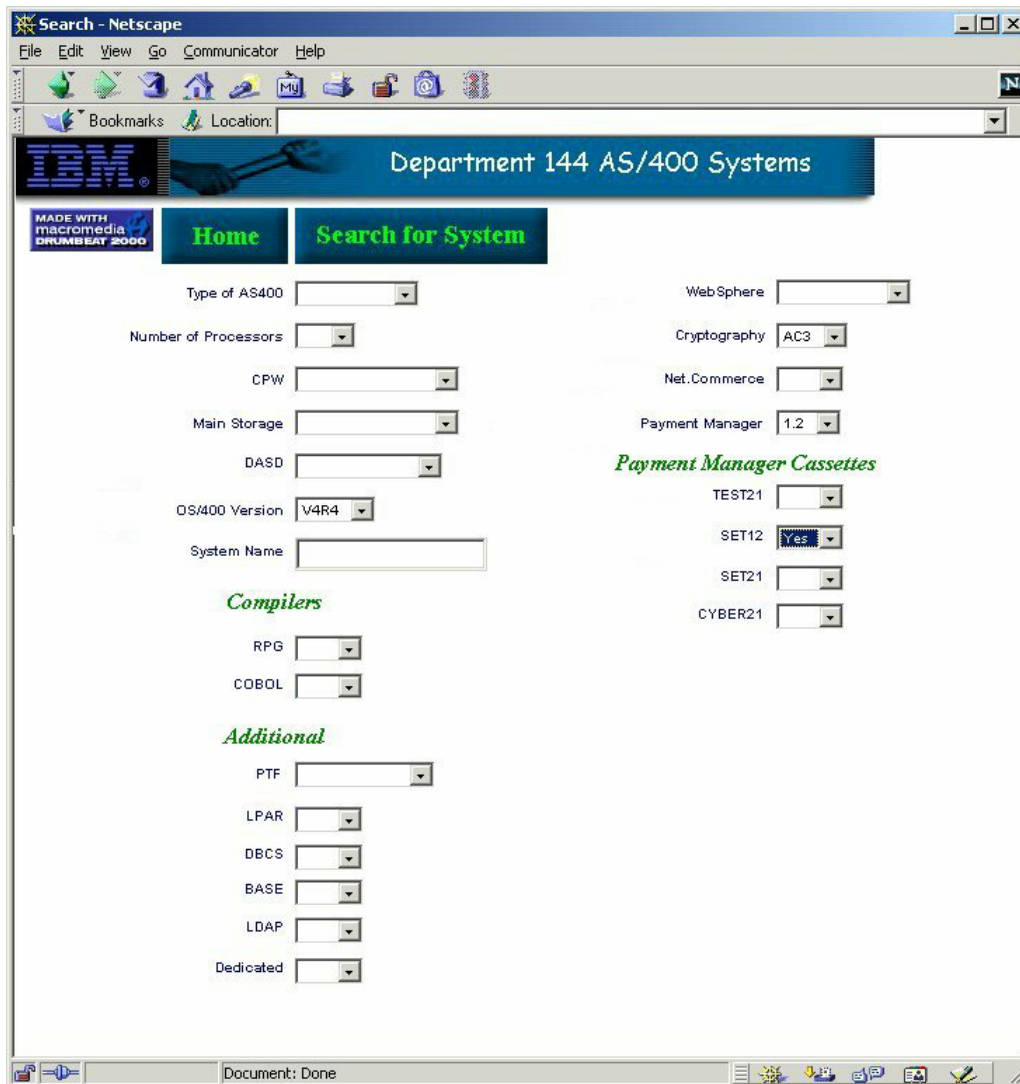
Configuring an HTTP server instance

Once the Java Server Pages have been published to the AS/400, an HTTP (HyperText Transport Protocol) server instance must be configured for serving the pages. This is done by following the instructions found for web serving on the AS/400 Information Center available on the Web at <http://www.as400.ibm.com/infocenter>, making sure Java Server Pages are enabled for this instance.

Using the Completed application

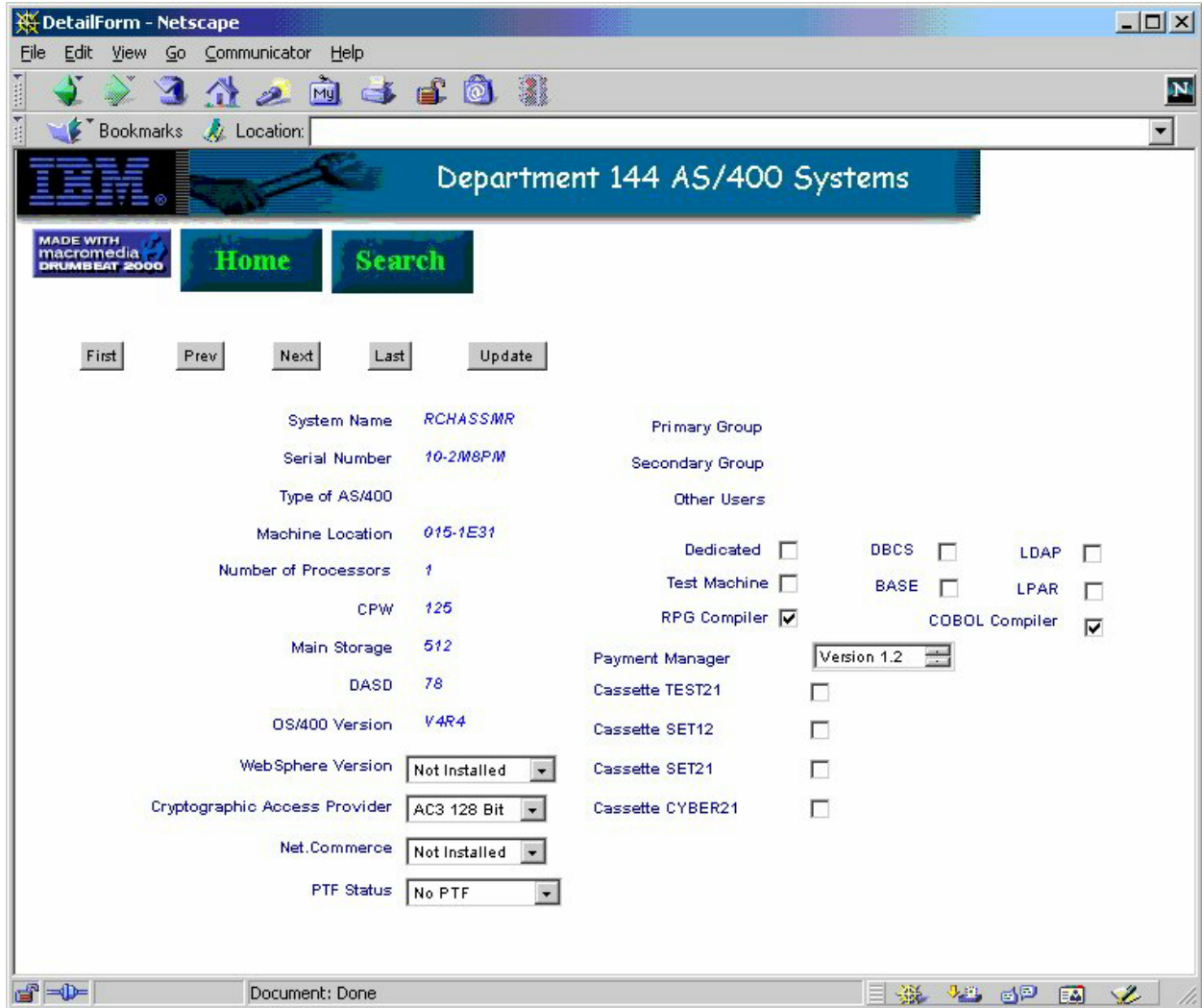
Performing Queries

With the generated web application, searching the database to find a list of systems that match a given set of key attributes is easy. Simply bring up the Search web page and specify any specific matches desired. If all fields on the Search page are left blank, a list of all the systems in the database will be returned. In the following example, the user is looking for systems that are installed with OS/400 version V4R4, 128 bit cryptography, Payment Manager version 1.2, and the SET (Secure Electronic Transaction) cassette version 1.2 for the Payment Manager.



The result of the search will show which AS/400 systems match the users search criteria. There is an option for sorting the result table based on one of a small set of attributes, such as the CPW rating of the system.

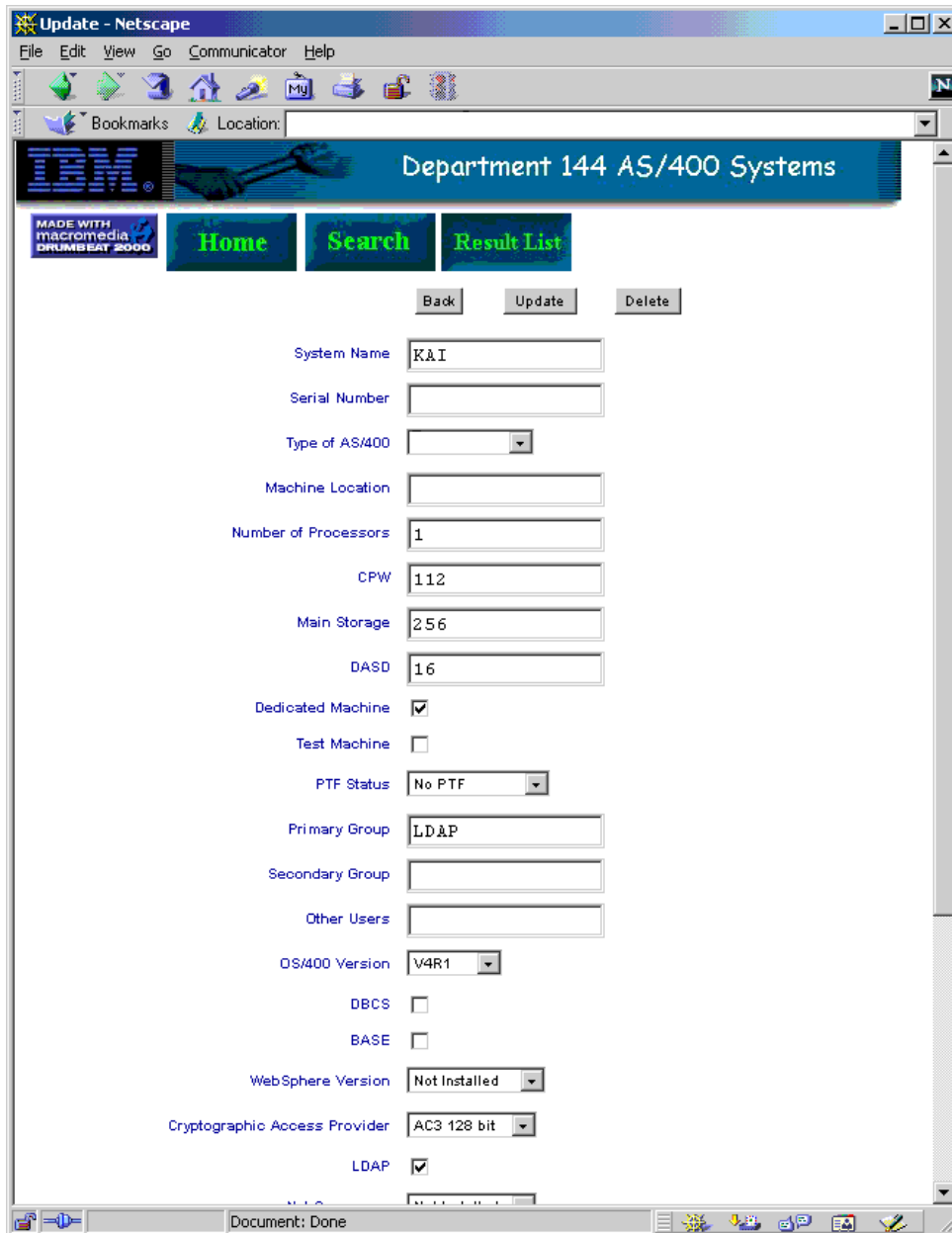
The system name is a hyperlink to a page which will show additional details about the selected system as can be seen in the next screen shot.



Performing Updates

An additional web page was developed for administering the contents of the database.

A web site administrator can add systems to the database, update information for an existing database, and delete systems from the database from this web page.



The screenshot shows a Netscape browser window titled "Update - Netscape". The address bar is empty. The page content includes a blue header with the text "Department 144 AS/400 Systems" and three buttons: "Home", "Search", and "Result List". Below the header are three buttons: "Back", "Update", and "Delete". The main form contains the following fields and controls:

- System Name: Text input field containing "K&I"
- Serial Number: Text input field
- Type of AS/400: Dropdown menu
- Machine Location: Text input field
- Number of Processors: Text input field containing "1"
- CPW: Text input field containing "112"
- Main Storage: Text input field containing "2.56"
- DASD: Text input field containing "16"
- Dedicated Machine: Check box (checked)
- Test Machine: Check box (unchecked)
- PTF Status: Dropdown menu containing "No PTF"
- Primary Group: Text input field containing "LDAP"
- Secondary Group: Text input field
- Other Users: Text input field
- OS/400 Version: Dropdown menu containing "V4R1"
- DBCS: Check box (unchecked)
- BASE: Check box (unchecked)
- WebSphere Version: Dropdown menu containing "Not Installed"
- Cryptographic Access Provider: Dropdown menu containing "AC3 128 bit"
- LDAP: Check box (checked)

Appendix A

Design of the underlying system database

The database table name is DLJXCE.SYSTEMS.

Column Heading	Type	Len	Description
SYS_ID	Integer		System Identifier
NC	Integer		Net.Commerce version
OS	Character	10	Operating System version
PM	Integer		Payment Manager version
SN	Character	10	Serial number
CPW	Integer		CPW of system processor
PRI	Character	25	Primary user
PTF	Integer		PTF (Program Temporary Fix) level
RPG	Integer		RPG (Report Program Generator) compiler installed
SEC	Character	25	Secondary user
BASE	Integer		A base set of features is installed
DASD	Integer		Amount of DASD (Direct Access Storage Device) on the system
DBCS	Integer		System is a DBCS (Double Byte Character Set) system
LDAP	Integer		LDAP (Lightweight Directory Access Protocol) base operating system option installed
LPAR	Integer		System is partitioned
MAIN	Integer		Main memory
PROC	Integer		Number of processors
TEST	Integer		Test machine or development
TYPE	Character	10	Type of system
WEBS	Integer		WebSphere version
COBOL	Integer		Cobol compiler installed
OTHER	Character	25	Additional users of the system
SET12	Integer		Payment Manager cassette installed
SET21	Integer		Payment Manager cassette installed
CRYPTO	Integer		Cryptographic level installed
SYSTEM	Character	10	System name
TEST21	Integer		Payment Manager cassette installed
CYBER21	Integer		Payment Manager cassette installed
LOCATION	Character	10	System location in the lab
DEDICATED	Integer		Dedicated use

Appendix B

Resources on the Web

IBM AS/400 site

<http://www.as400.ibm.com>

AS/400 WebSphere site

<http://www.as400.ibm.com/websphere>

HTTP Server for AS/400

<http://www.as400.ibm.com/products/http/httpindex.htm>

DB2 Universal Database for AS/400

<http://www.as400.ibm.com/db2/db2main.htm>

AS/400 Operations Navigator

http://www.as400.ibm.com/oper_nav/

Drumbeat 2000 site

<http://www.macromedia.com/support/drumbeat>

Note: The Drumbeat 2000 product has been replaced by a newer product called Dreamweaver™ UltraDev™. Please see the Macromedia web site <http://www.macromedia.com> for details of this change.

Trademarks

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