

VSE/ESA

Development with Websphere Studio Application developer

z/VM, VSE, and Linux on zSeries Tech Conference
Miami Beach - Oct 7 - 10th



Wilhelm Mild

VSE/ESA Design and Development

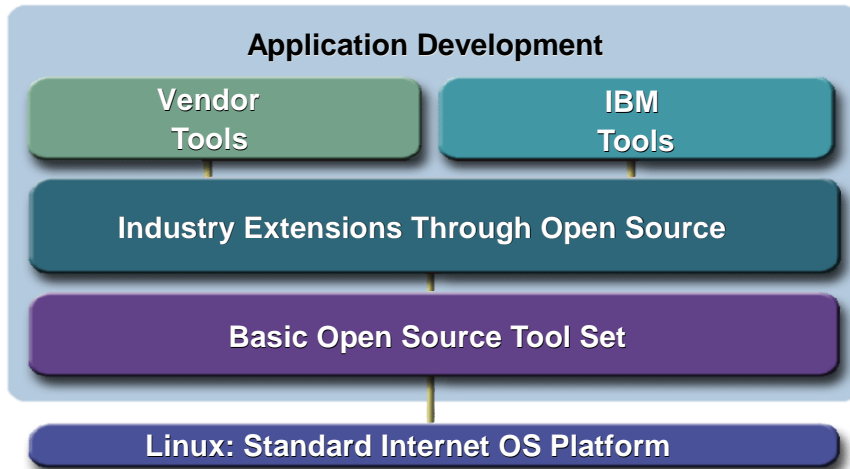
@-business ambassador

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Open/Standards-based Application Deployment



- **Common Application Development**



```
assigned int num, const char  
if (iotable[i].num == 0)  
break;  
if (< IOTABLE_SIZE; i++)  
Printk("warning: ioport table is full\n");  
return;  
iotable[i].name = name;  
iotable[i].from = from;  
iotable[i].num = num;  
iotable[i].next = p->next;
```



- **zSeries**



- **iSeries**



- **pSeries**



- **xSeries**



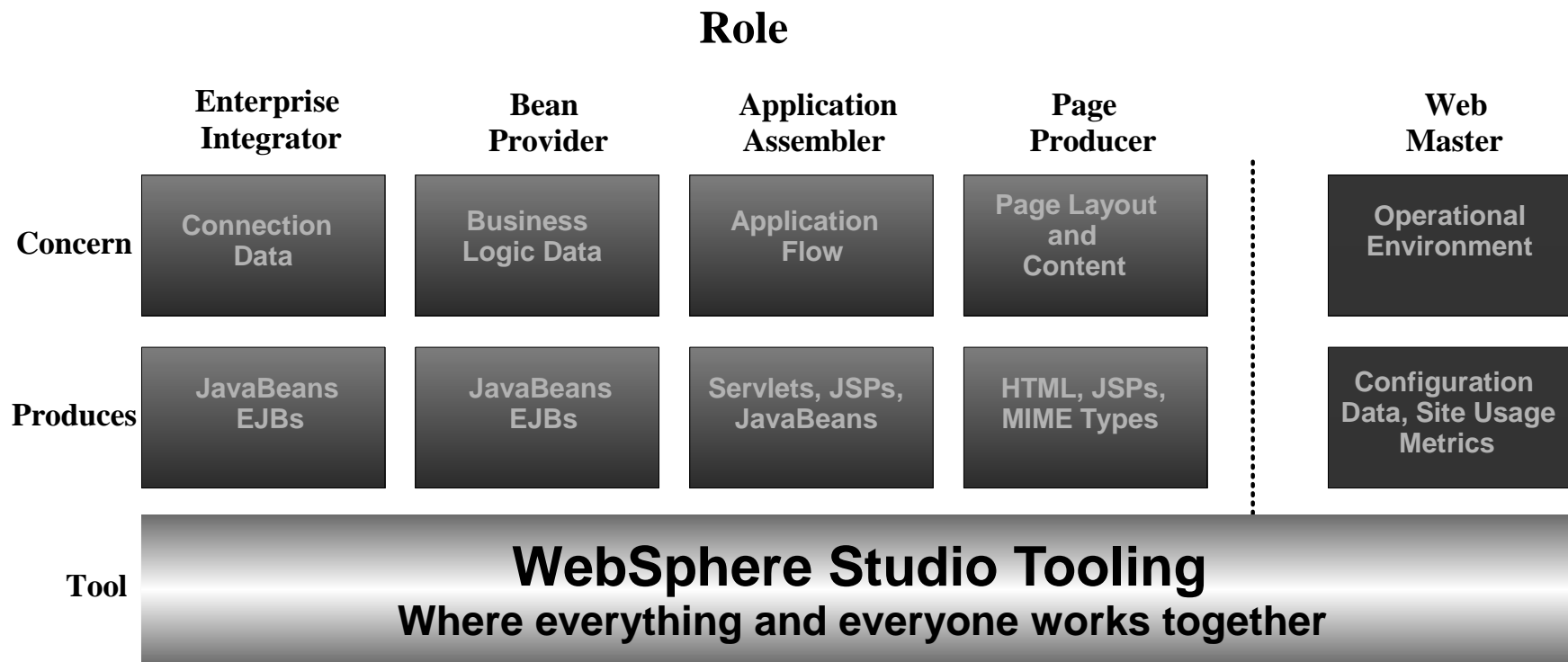
- **Embedded Appliances**

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Roles-based Development

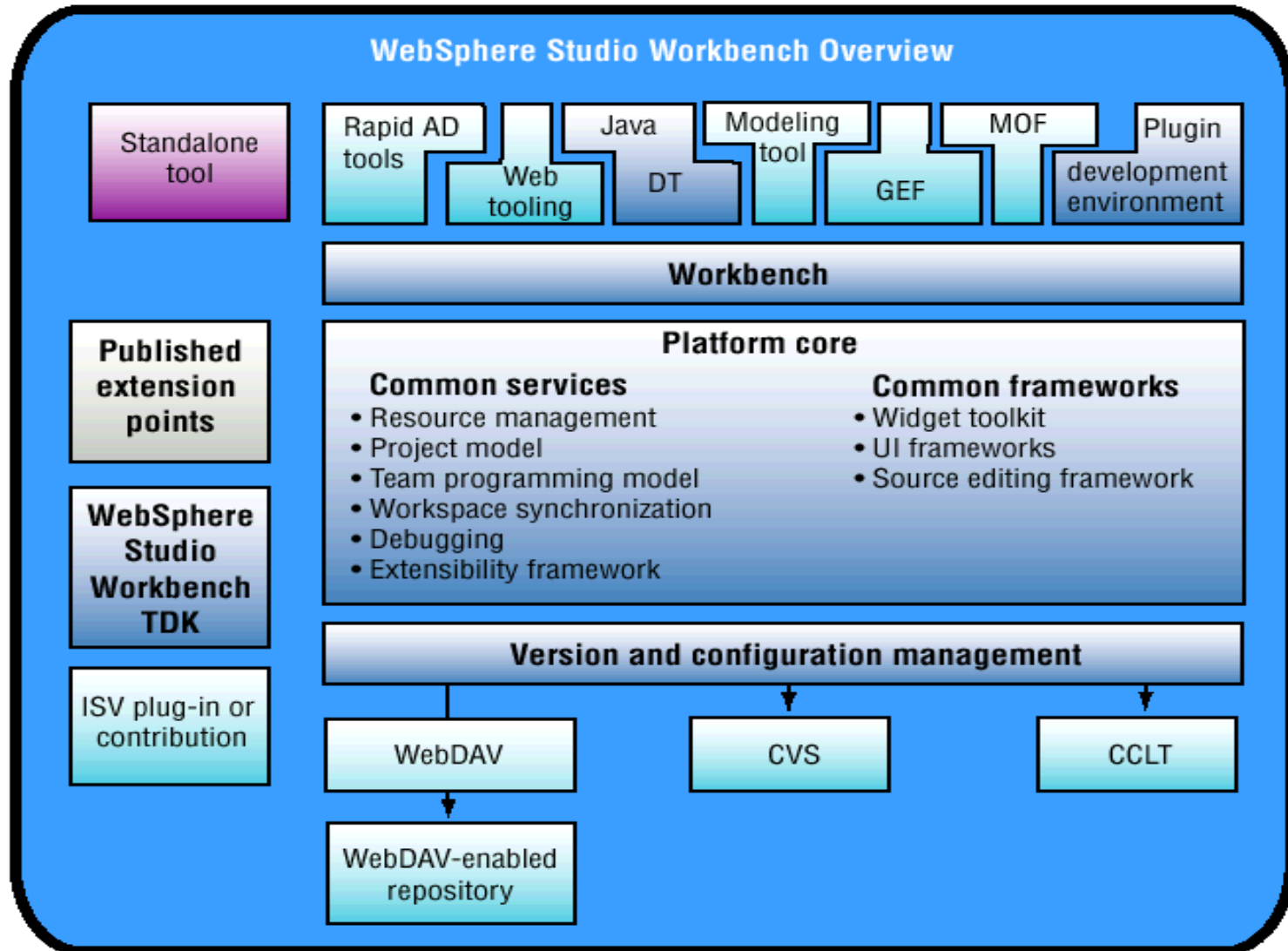
- Developing Web Applications requires more than just writing Java code



One tool, many user perspectives

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Workbench - Architecture



www.eclipse.org



Offering/Branding

- **WebSphere Studio** is the brand name for the next generation of tooling:
- **Products:**
 - ▶ **WebSphere Studio Site Developer**
 - Focused on development of Web Services, JSPs, Servlets, XML, WAS and Basic Team support.

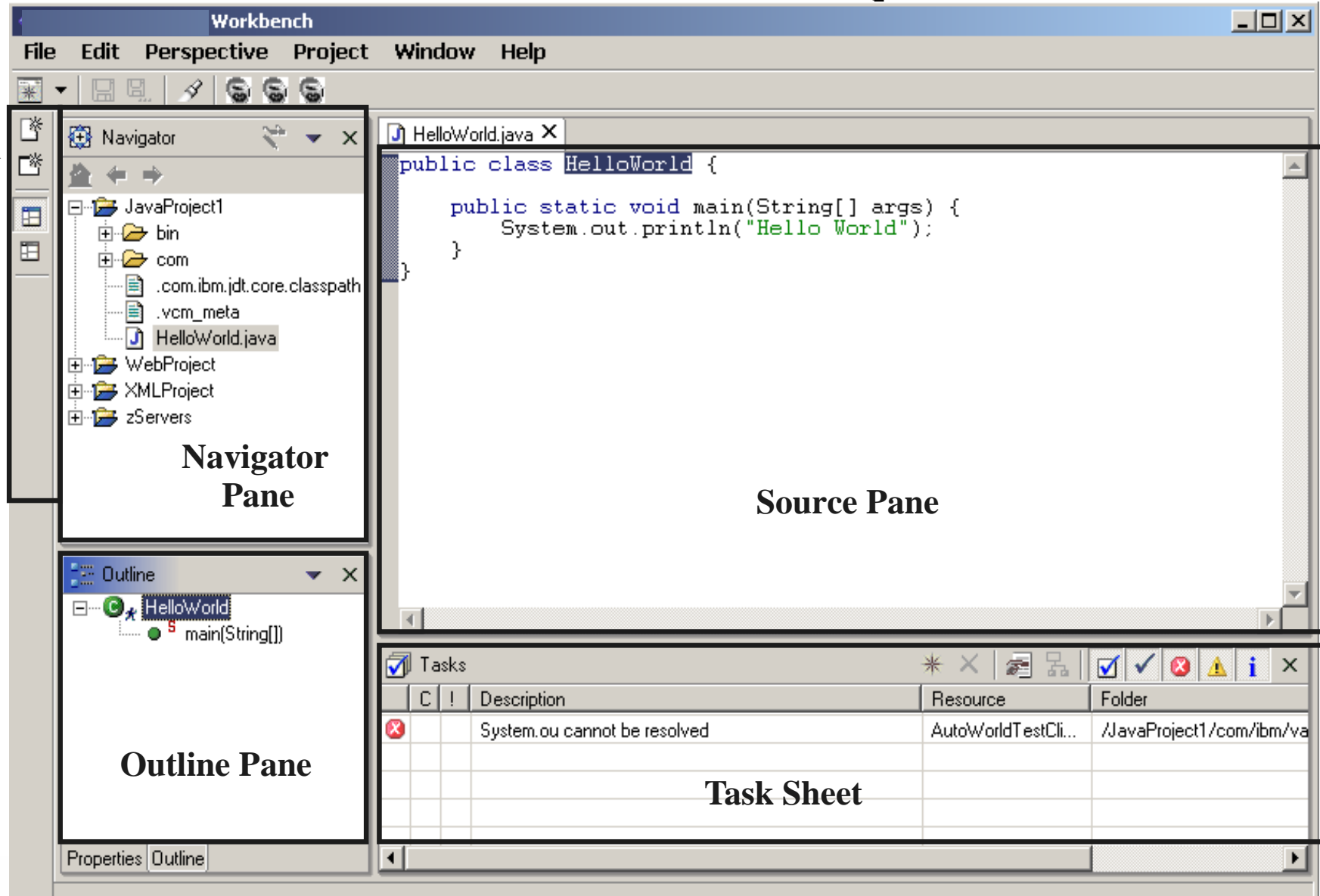
 - ▶ **WebSphere Studio Application Developer**
 - Includes all WebSphere Studio Site Developer functionality
 - Focused on development of J2EE and database applications in a team environment
 - VisualAge for Java EE 4.0 will contain the Beta



Workbench – Organization

Default Resource Perspective

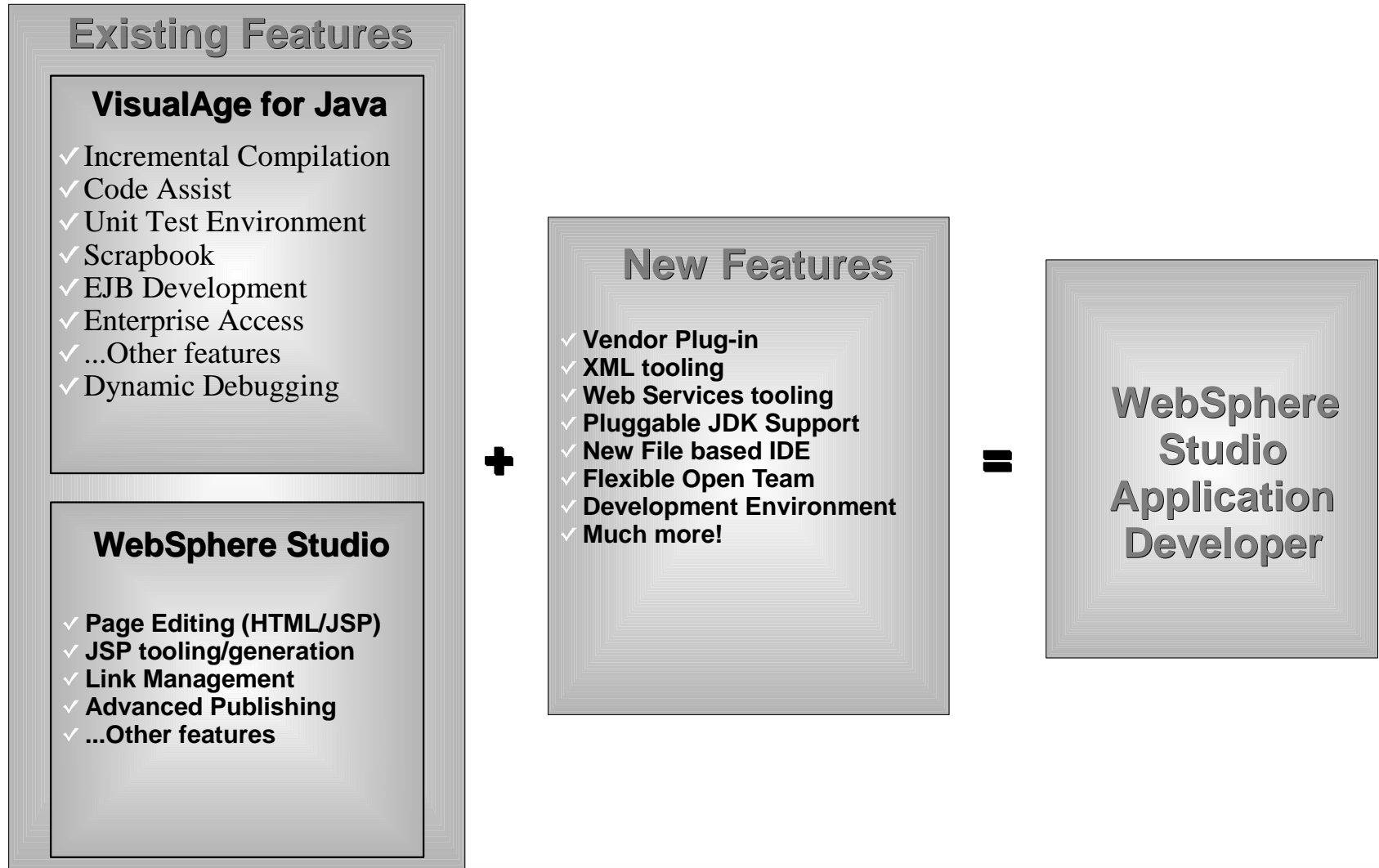
Perspective Bar



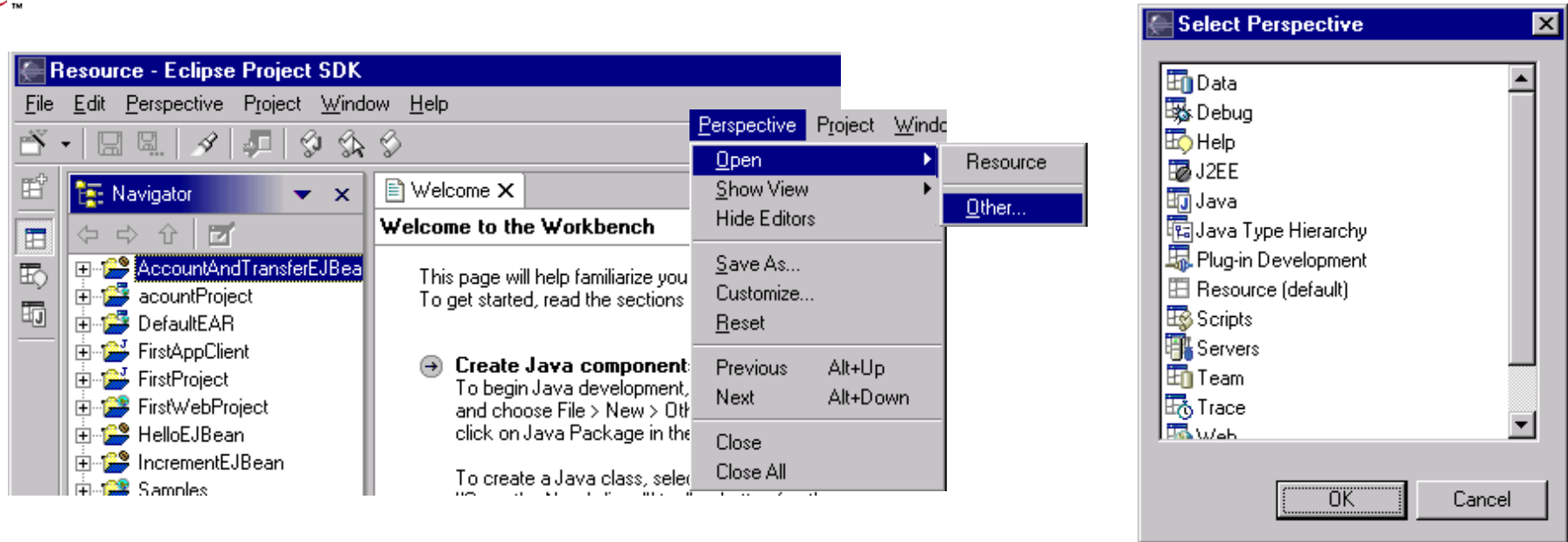
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WebSphere Studio Application Developer



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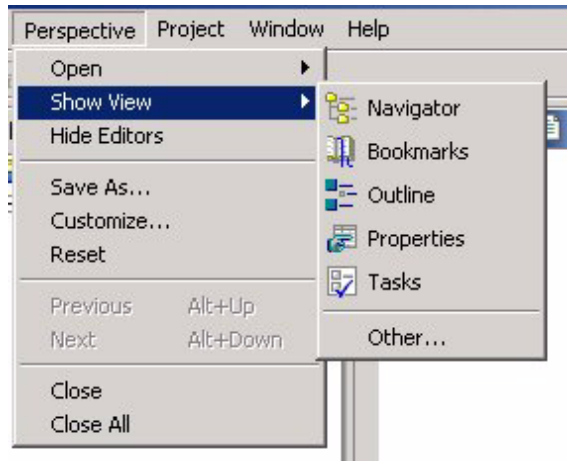
- A group of related views and editors is called a perspective
- You can open different perspective by
 - Perspective -> Open -> Other
- WebSphere Application Developer contains several Perspective
 - ▶ Resource perspective: default perspective when you open the workbench
 - ▶ Java perspective: number of views that provide the information that you need to work on a Java project
 - ▶ Managing perspective: which allows you to work with a team
 - ▶ Debug perspective: which allows you to run and debug your project.



Perspectives

- **Perspectives allow team members to focus on the task they just work on**
 - ▶ **Provides "Views" into the e-business application**
- **Perspectives can be opened from same Workbench or anchored to a different Workbench**
 - ▶ **Allows developers to maximize "real-estate" usage**
- **Desktop Perspectives can be customized**
 - ▶ **The design intentions allow to configure the workbench in a manner, that developers can have similar look and feel to other Java tools they are familiar with**
- **This allows customers to consolidate all Java tools to one development platform**
 - ▶ **Unique Perspectives should satisfy everyone**
 - **VAJ developer, JBuilder developer, Visual Cafe developer can all have their own perspectives**

Views



- Display a view by selecting **Perspective > Show View**
- Views support:
 - ▶ Editors
 - ▶ Provide alternative presentations or navigation of the information
- A view might appear by itself, or stacked with other views in a tabbed notebook
- Views can be floated by Selecting the blue bar at the top of the Tasks view and drag it on to the desktop.



Standards Support

- **Advanced-function HTML and JSP editor**
- **Built-in WebSphere Application Server and Tomcat Jakarta test environment with JSP Debugger**
- **Database support to define databases and create applications using wizards**
- **Advanced rich media image editing and animation tools**
- **An integrated version control system including adapters for Rational ClearCase LT OEM and Concurrent Versions system (CVS)**
- **Integrated Java development environment**
- **Comprehensive Visual XML development environment**
- **Complete Web services development environment**

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Standards Support

- **EJB 1.1**
- **Servlet 2.2**
- **JSP 1.1**
- **JRE 1.3**
- **Web Services Definition Language (WSDL) 1.1**
- **Apache SOAP 2.1**
- **XML DTD**
- **XML Namespaces**
- **XML Schema**
- **HTML 4.01**
- **CSS2 (PageDesigner displays a subset)**



WebSphere Studio Application Developer – Key Features

- **Java IDE**
- **Web Services development environment**
- **XML Tooling**
- **RDB Tooling**
- **Web Tooling**
- **Java Performance Analysis/Trace Framework**
- **J2EE Tooling**



Java IDE - Key Features

- **Is shipped with JDK 1.3**
- **Pluggable JDK support**
 - ▶ **Defined at project level**
- **Hot Method Replace**
- **Java Snippet support (Scrapbook)**
- **Task Sheet (All Problems Page)**
- **Code Assist**
- **Class Outliner**
- **One debugger for local/remote debugging**
- **Run code with errors**
- **Refactoring Support**
 - ▶ **Rename/move support for method/class/packages**
 - ▶ **Fixes all dependencies for renamed element**

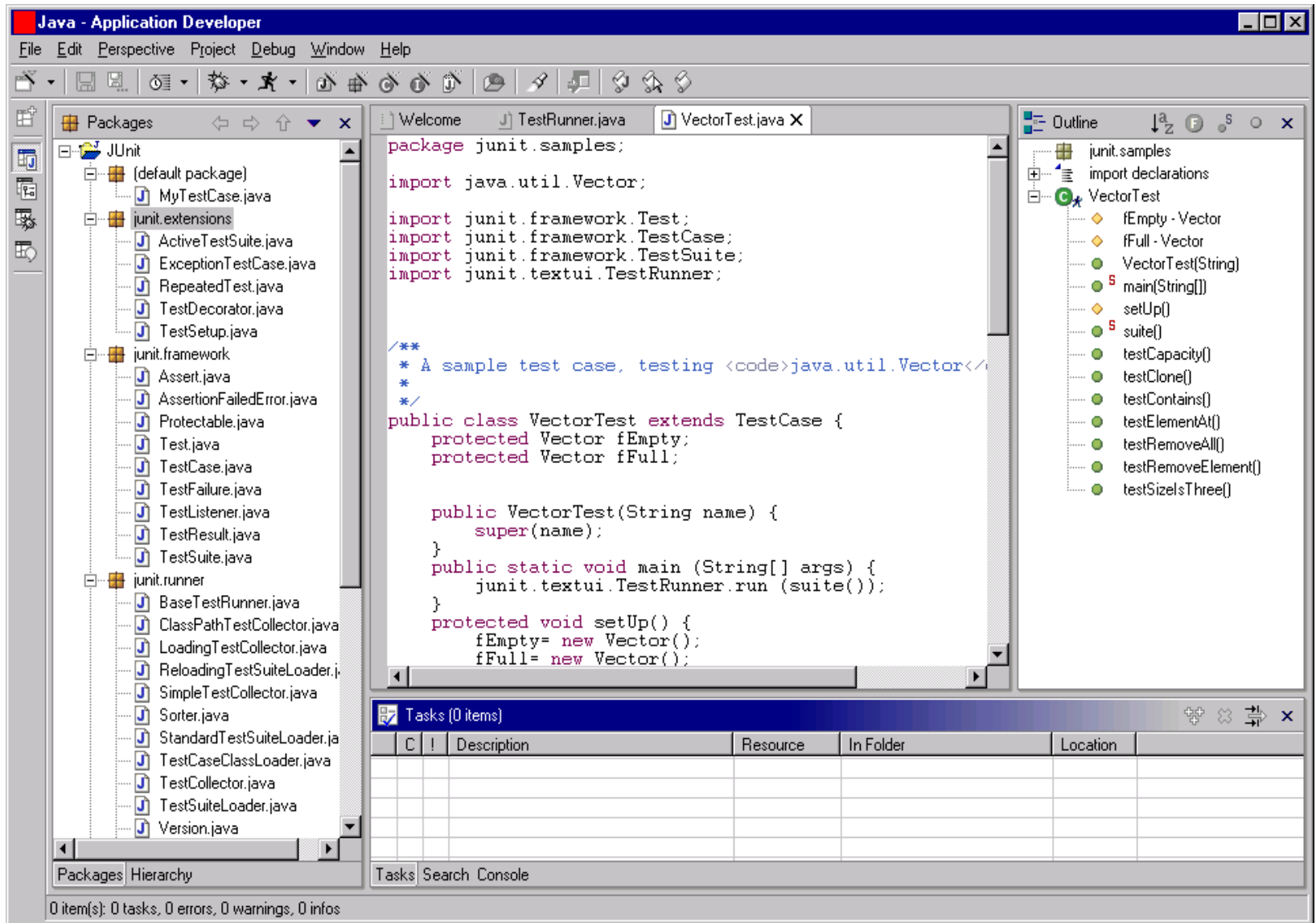


Java IDE - Incremental Compilation/Hot Method Replace

- **Incremental compilation/hot method replace will be supported with these caveats:**
 - ▶ **The JVM must support hot method replace**
 - **J9 JVM supports this today**
 - **IBM JVM plans to support this with JDK 1.4**
 - **SUN JVM may support this with JDK 1.4**
- **IBM has worked with JavaSoft to add hot method replace into JVM technology**
 - ▶ **This was the best way to support pluggable JDKs and hot method replace in our Java IDE**
 - ▶ **Must wait for JVMs to be released which support this technology**



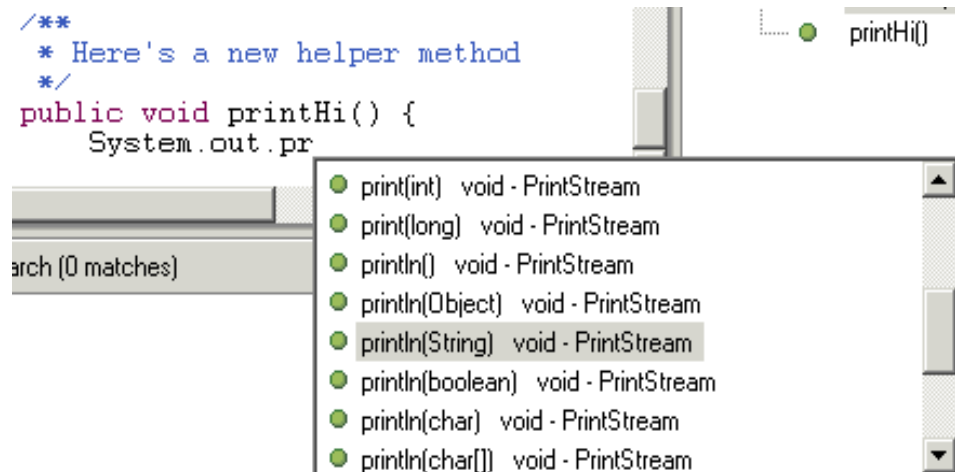
Java Perspective



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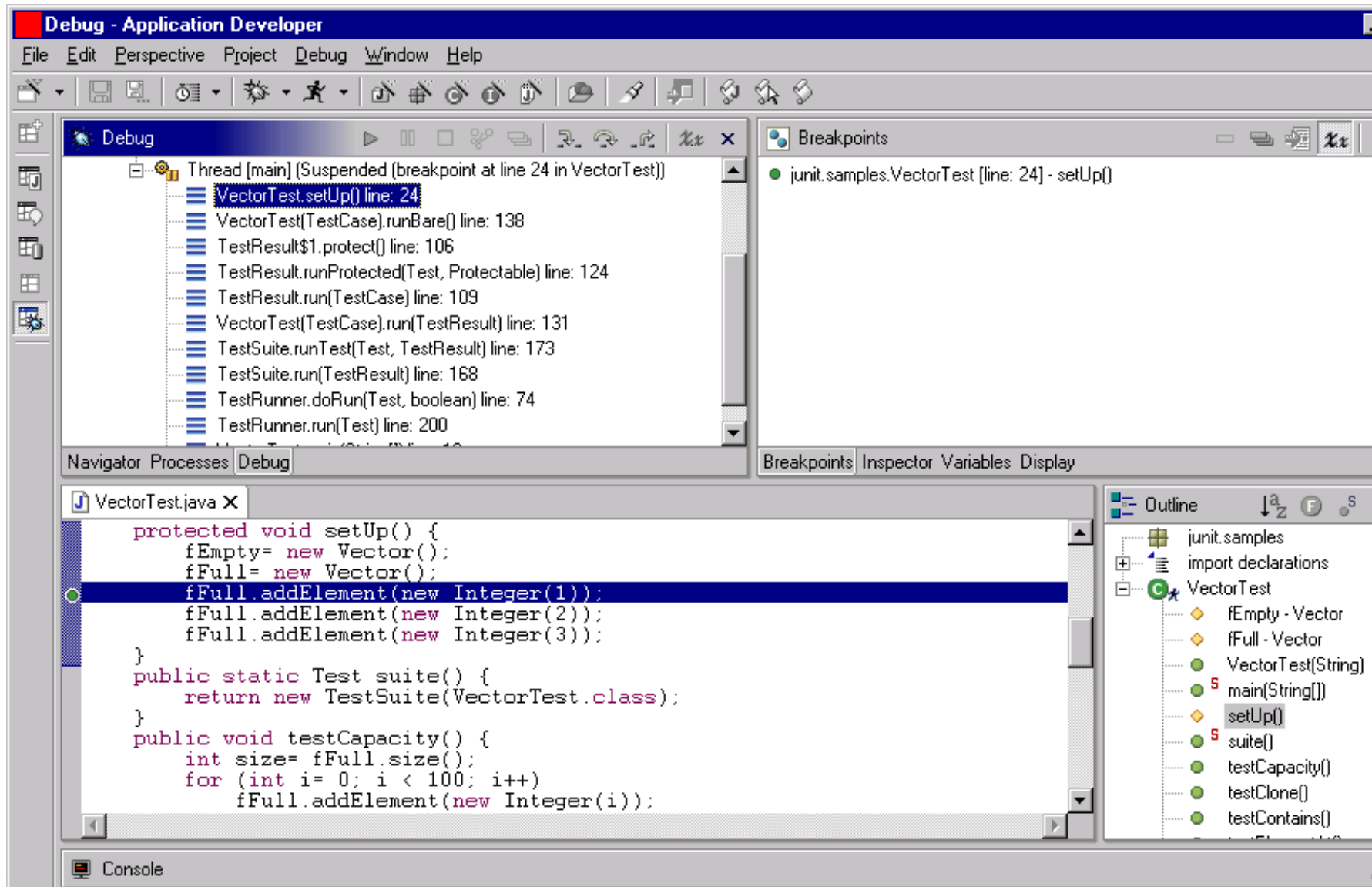
Java Editor

- Coding Assistance
 - ▶ Enter assist mode with CTRL-space
 - ▶ Select from scrolling list of possible completion's





Debug Perspective



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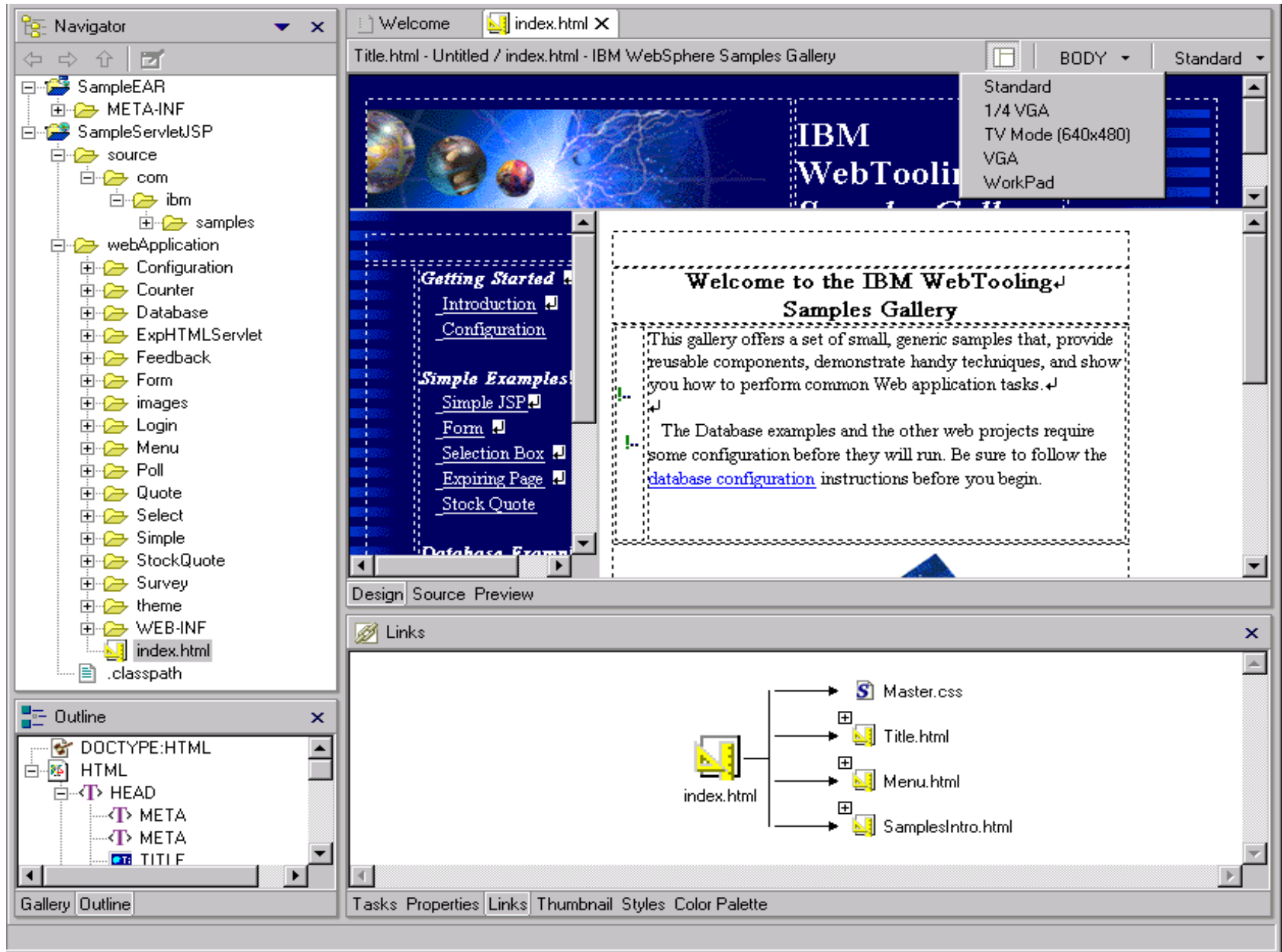


Web Tooling

- **HTML/JSP Editing**
 - ▶ WYSIWYG page design, source editing, page preview
- **HTTP/FTP Import**
- **WAR Import/Export**
- **Links View (Relations)**
 - ▶ View HTML/JSP and all links referenced in HTML/JSP
- **Parsing/link management**
 - ▶ Automatically fix links when resources are moved/renamed
- **Built-in Servlet, Database, JavaBean Wizards**
 - ▶ Quick generation of HTML/Servlet/JSP
- **Built-in JSP Debugging**
- **Site-Style and Template Support**
- **Built-in Web Perspective provides the useful views for HTML/JSP developer**



Web Perspective



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J2EE Tooling Features

- **Full EJB 1.1 Support**
- **WAR/EAR deployment support**
- **All metadata exposed as XMI**
 - ▶ **No hidden metadata**
- **Enhanced Unit Test Environment for J2EE**
 - ▶ **IBM WebSphere Application Server or Apache TomCat**
 - ▶ **Create multiple projects with different Unit Test configurations/instances**
 - **Allows for versioning of unit test environment**
 - **Share Unit Test Environment Configuration across developers**
- **O/R Mapping for EJBs**
 - ▶ **Top-Down/Bottom-up/Meet-in-the-middle**



J2EE Tooling Features

(continued)

- **Updated EJB Test Client**
 - ▶ **HTML Based**
 - ▶ **J2EE Programming model**
 - ▶ **Built-in JNDI Registry Browser**
- **Enterprise Connectors (separate plug-in offering)**
 - ▶ **JCA Connector based**
- **Built-in J2EE Perspective provides the useful views for the EJB/J2EE developer**

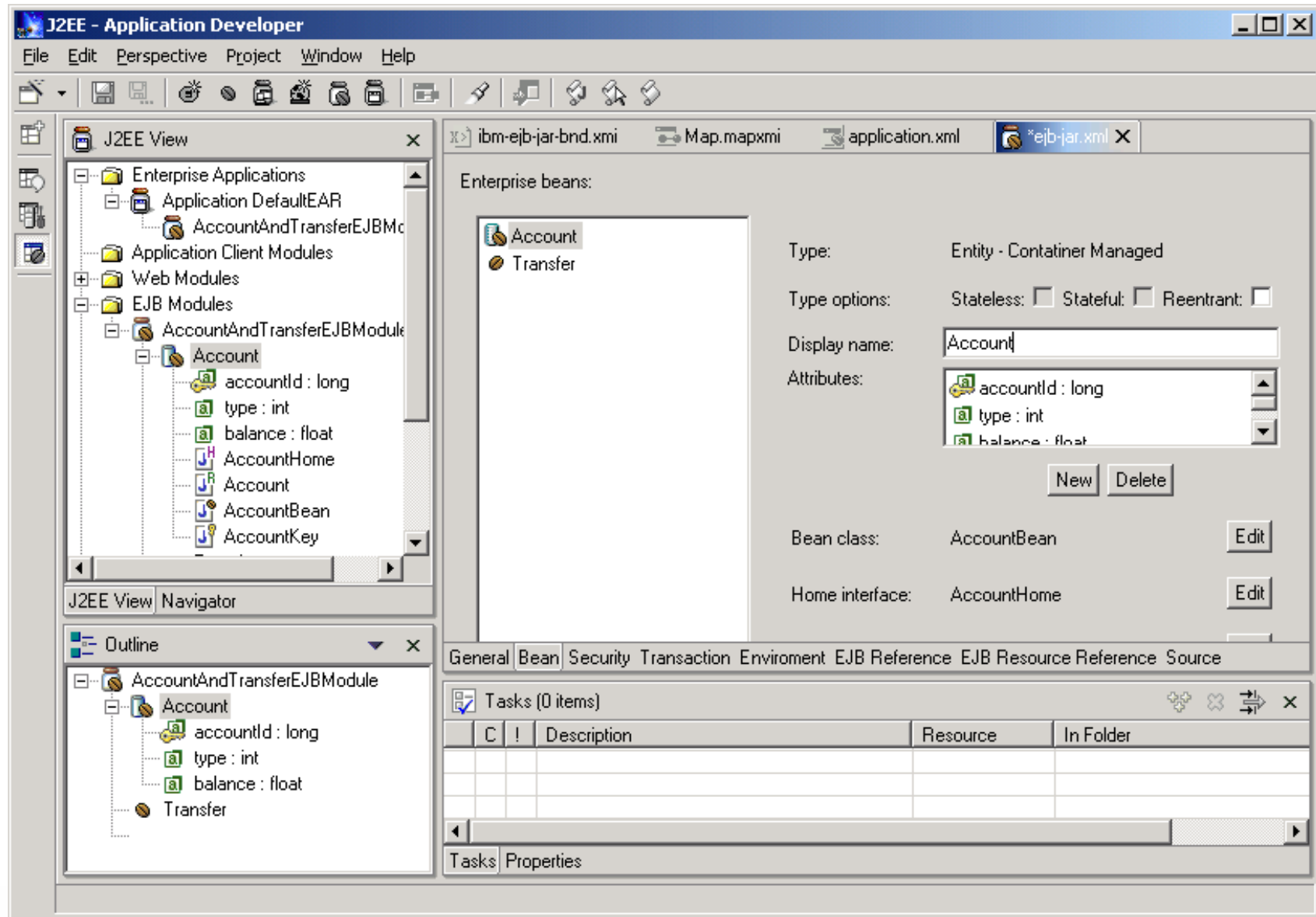


J2EE Perspective

- J2EE Projects
 - ▶ Enterprise application, EJB, Web, application client modules
 - ▶ Provided in the J2EE View
- EJB Editor
 - ▶ deployment descriptor (ejb-jar.xml)
- EJB Extension Editor
 - ▶ extensions (ibm-ejb-jar-ext.xmi)
 - ▶ bindings (ibm-ejb-bnd-ext.xmi)
- Enterprise Application Editor
 - ▶ EAR deployment descriptor (application.xml)
- EJB RDB Mapping Editor



The J2EE View



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Data Tooling

- **Relational Schema Center**
 - ▶ Provides views geared for DBAs to
 - Create Databases
 - Create Tables/Views/Indexes/Keys
 - Generate DDL
 - ▶ Online and off-line support for working with databases
 - Metadata generated as XMI
- **SQL Query Builder**
 - ▶ Visually construct SQL statements
 - Insert, update, delete, select supported
 - ▶ Metadata generated as XMI
 - ▶ SQL/XML mapping
- **Built-in Data Perspective provides the useful views for the DBA**



Data Perspective

- Data Perspective contains
 - ▶ DB Explorer
 - View existing database entities on database server
 - Read only view
 - ▶ Data view
 - writable local view of database entities
 - Copy of description of existing entities
 - Description of new entities

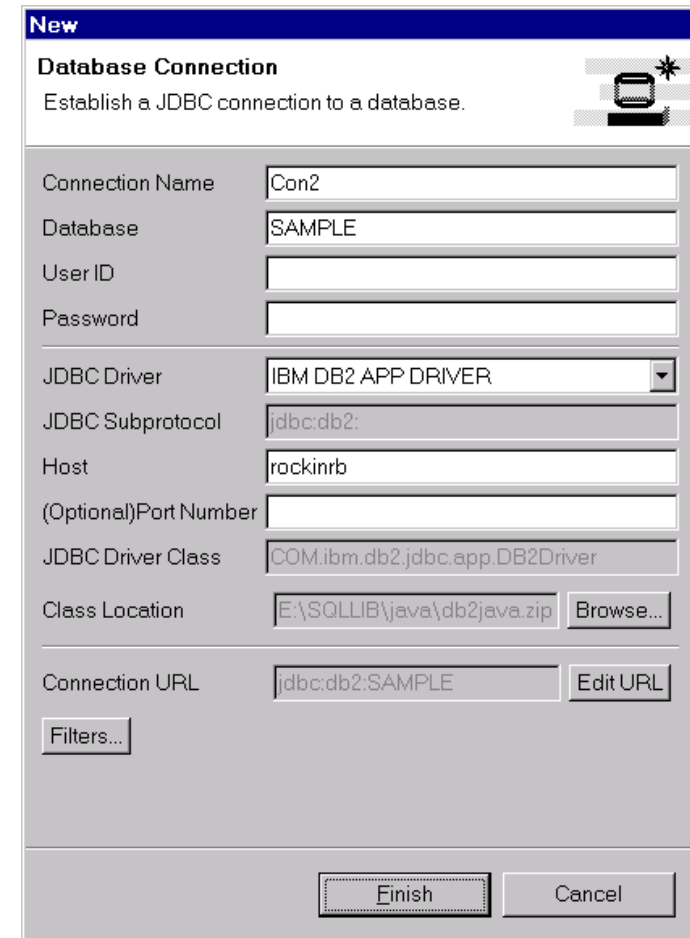
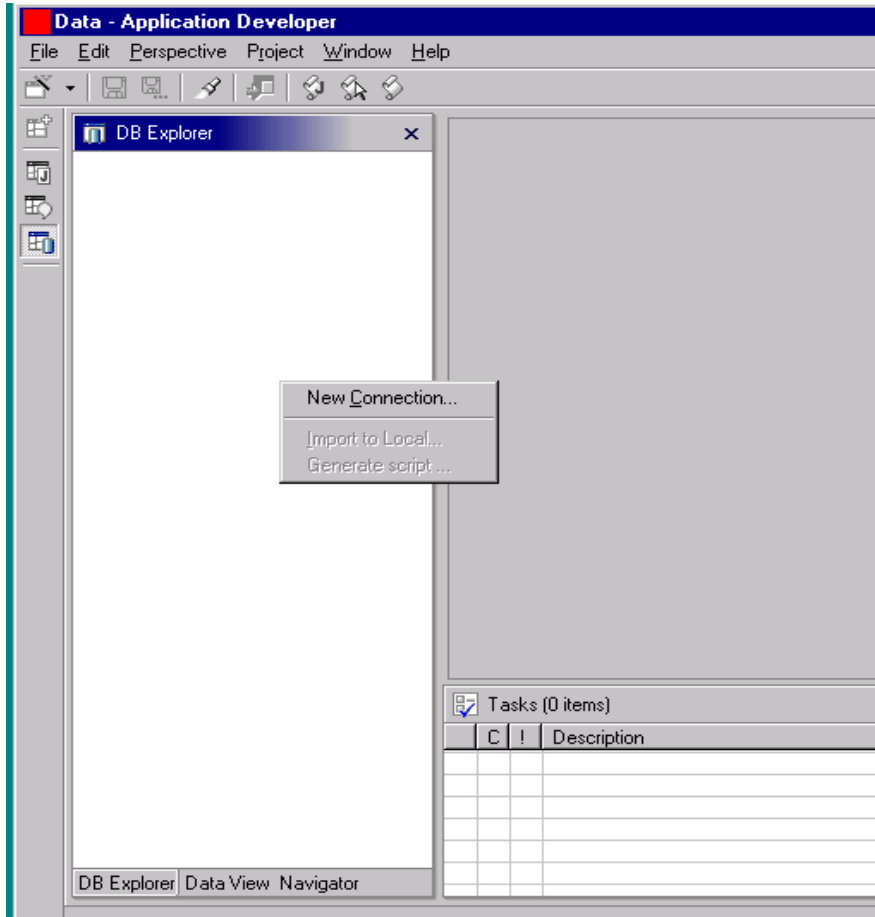


Data Perspective

- Data Perspective contains
 - ▶ DB Explorer
 - View existing database entities on database server
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 - Description of new entities



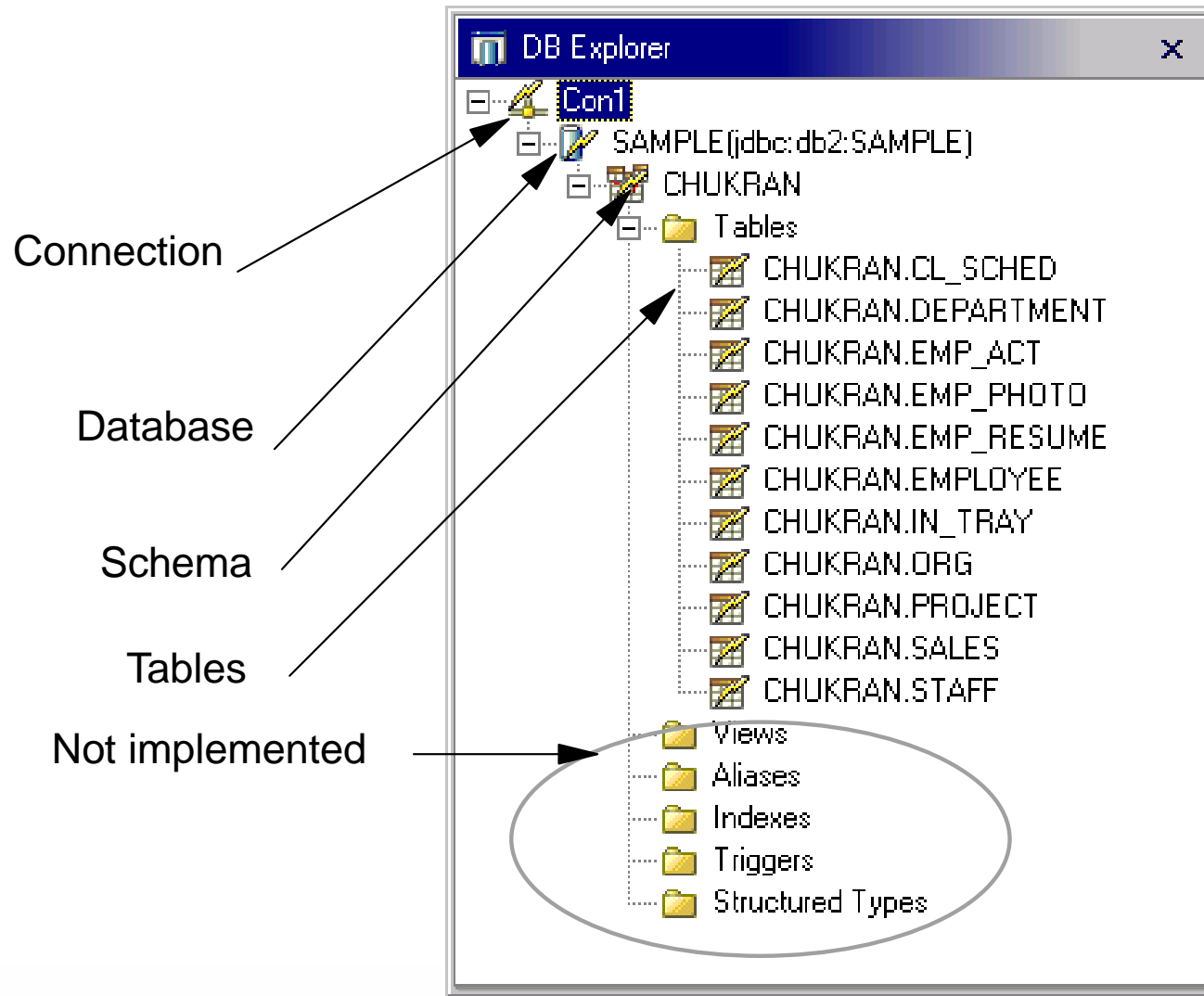
New Database Connection



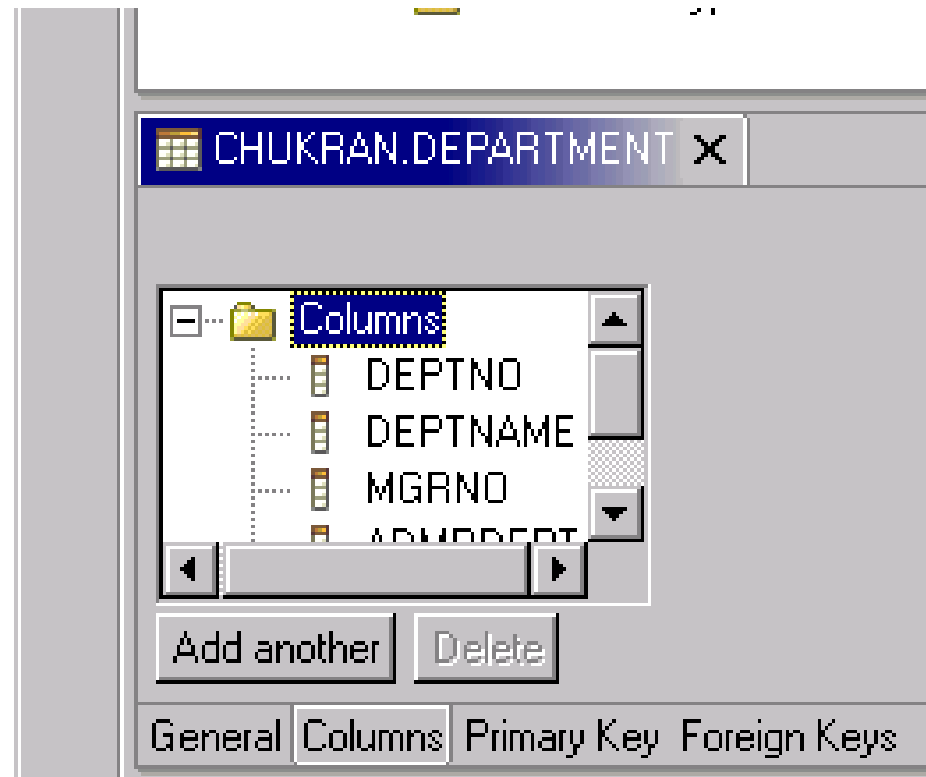
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DB Explorer

- DB Explorer after opening new connection



- Double-click in navigator edits table
 - ▶ Add columns
 - ▶ Specify keys





XML Tooling

- **XML Tooling provides integrated tools/perspectives to create XML based components:**
 - ▶ **DTD Editor**
 - Visual tooling (Design/Source) for working with DTDs
 - Create DTDs from existing documents
 - Generate an XML Schema from a DTD
 - Generate JavaBean(s) for creating/manipulating XML documents
 - Generate an HTML form from a DTD
 - ▶ **XML Schema Editor**
 - Visual tooling (Design/Source) for working with an XML Schema
 - Generate DTDs from an XML Schema
 - Generate JavaBean(s) for creating/manipulating XML documents
 - ▶ **XML Source Editor**
 - DTD/Schema validation
 - Code Assist for building XML documents



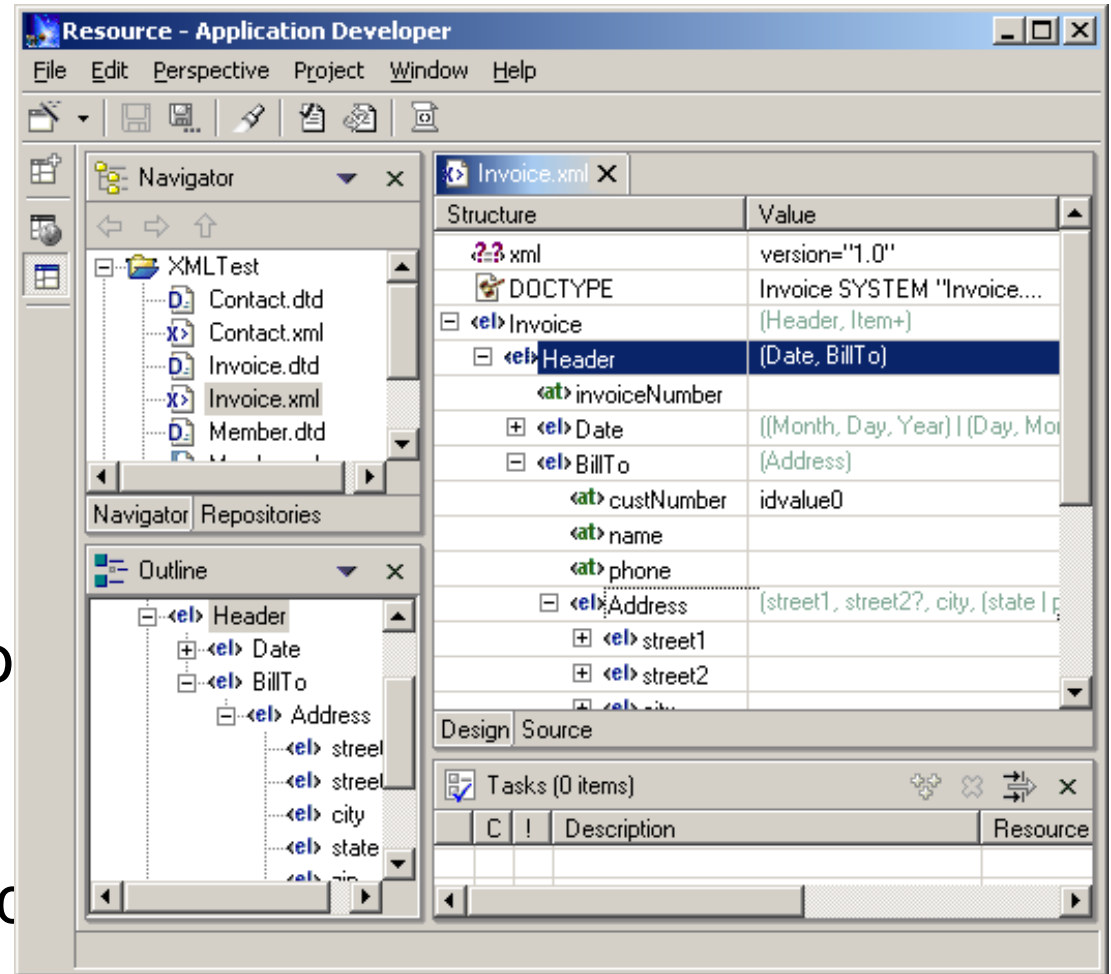
XML Tooling (continued)

- **Additional XML Tools:**
 - ▶ **XML Mapping Editor**
 - Generate XSL to map XML between DTDs/Schemas
 - ▶ **XSL Trace Editor**
 - Trace XSL transformation
 - Examine relationships between the result node, the template rule, and the source node
 - ▶ **XML to/from Relational Databases**
 - Generate XML, XSL, XSD from an SQL Query
 - ▶ **RDB/XML Mapping Editor**
 - Map columns in a table to elements and attributes in an XML document
 - Generate a Database Access Definition (DAD) script to compose/decompose XML documents to/from a database
 - DAD is used with DB2 XML Extender
- **Built in XML Perspective provides the useful views for the XML developer**

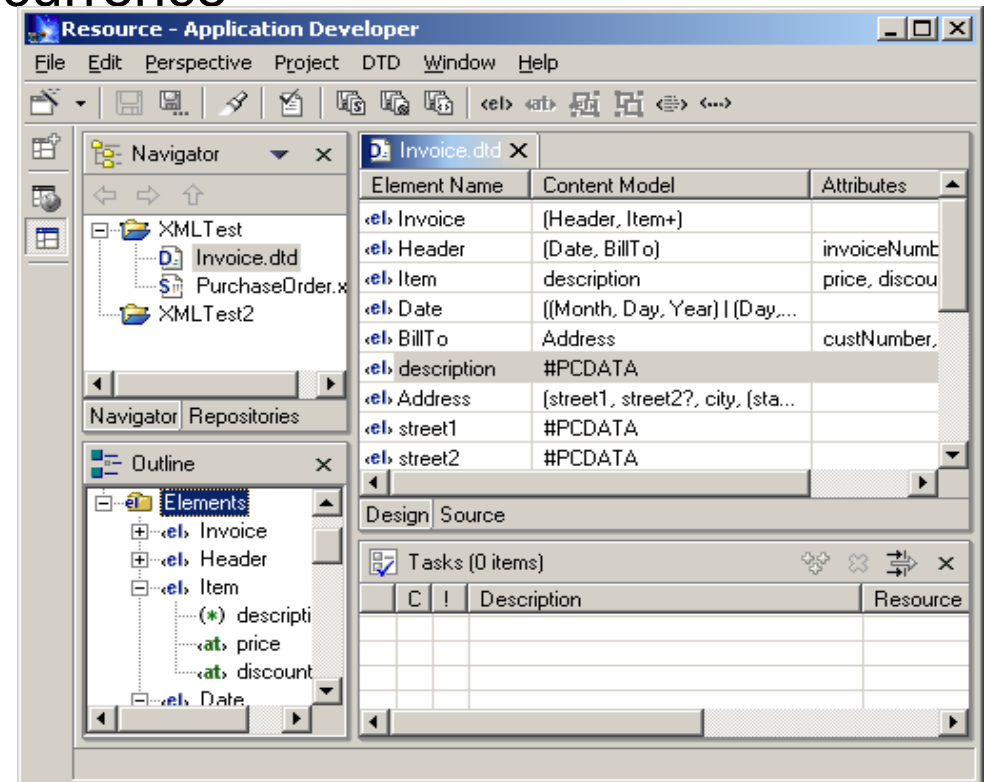


XML Editor

- Create XML
 - ▶ New file
 - ▶ From DTD file
 - ▶ From XSD file
- Validation Option
- Smart double-click
- Content Assist
 - ▶ Combo-box choices for enumerator attribute type
 - ▶ Element content based on sequence/choice relationships

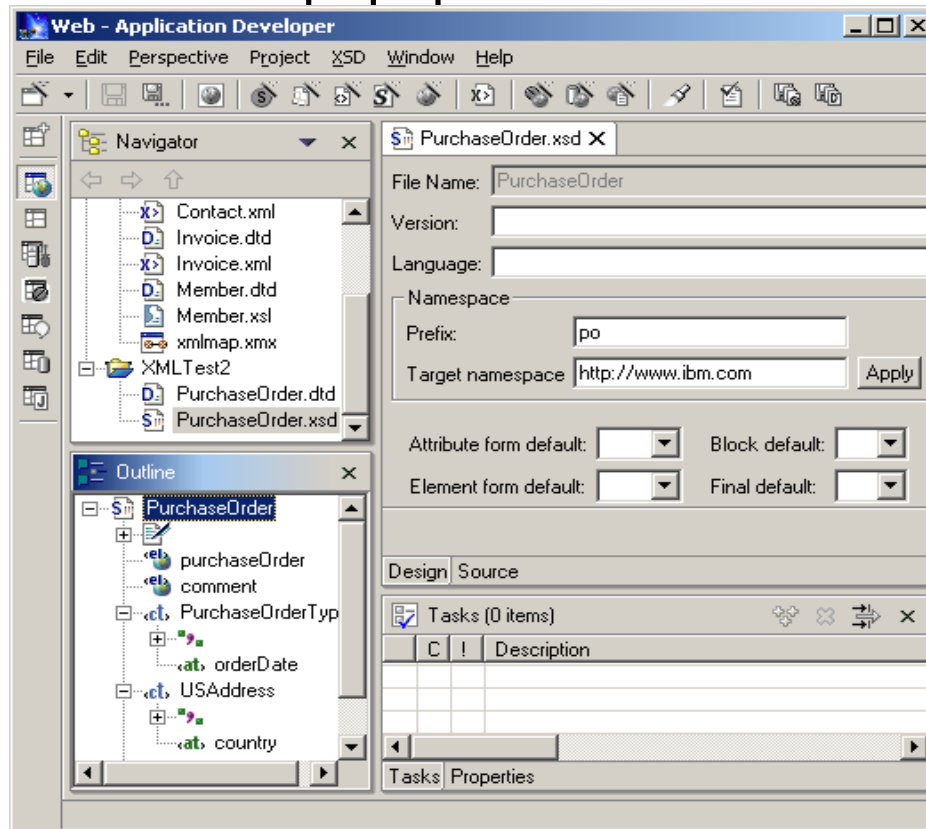


- Create DTD
 - ▶ Create New DTD
 - ▶ Create from Multiple XML files
- Validation
- Define elements, attributes, entities, notations
- Define content model, occurrence
- Reusable Entities
 - ▶ External files
 - ▶ Internal model
 - ▶ Within another entity



XSD Editor

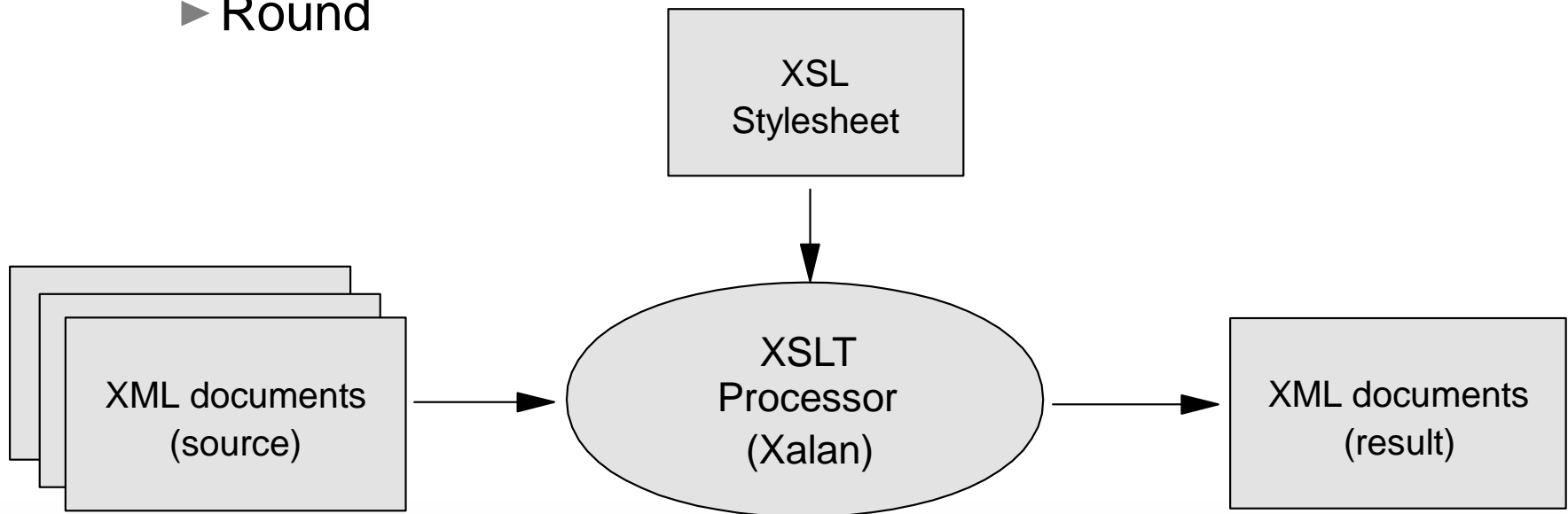
- Create, Import XSD
- Validation
- Generate DTD, DDL file from XSD
- Define complex type, simple type, element, attribute, attribute group, group etc.
- Context sensitive popup actions





XML to XML Mapping Editor

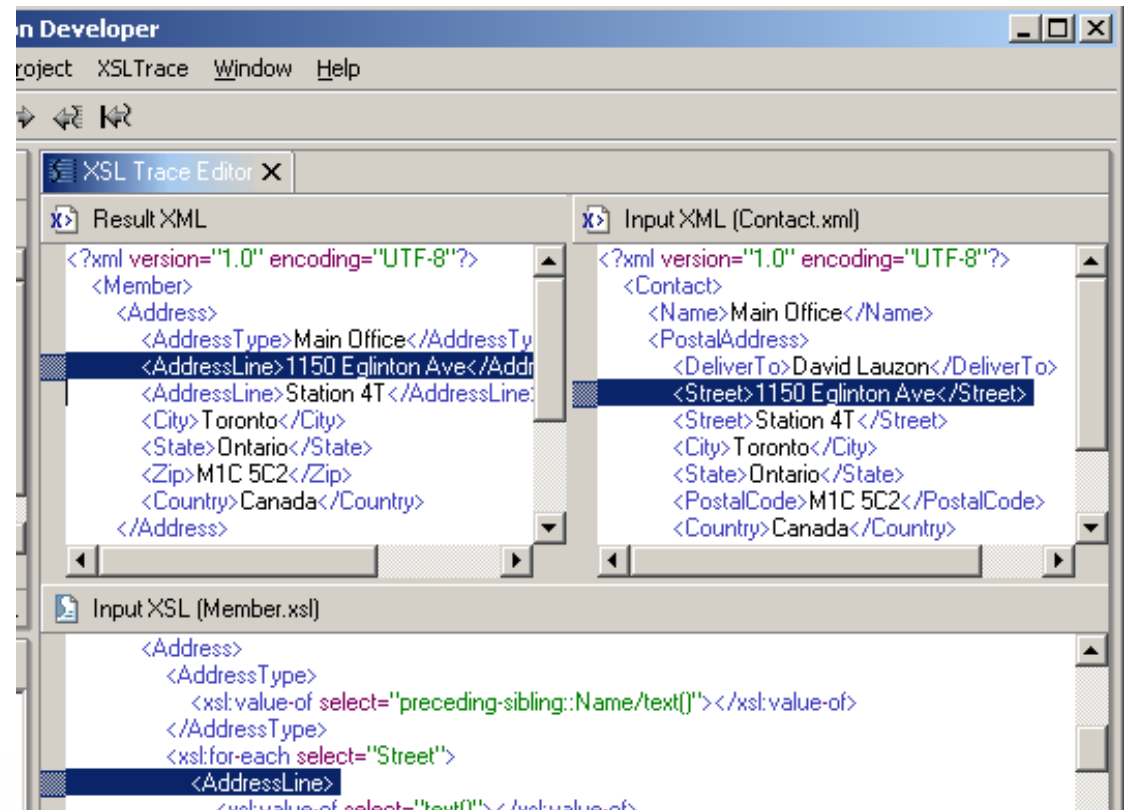
- Convert XML data from one definition type to another
- Visually defines the mapping between source and target
- Generates XSL that represents the transformation
- Hides the complexity of creating XSL
- Allows user to define functions for converting between source and target
 - ▶ Substring
 - ▶ String-length
 - ▶ Round





XSL Trace

- Apply XSL to XML document
 - ▶ Step Forward
 - ▶ Step Back
 - ▶ Watch flow of XSL
- Type of Output
 - ▶ XML document result
 - ▶ HTML output result





Team Development

- **Workbench integration occurs through a pluggable adapter based configuration:**
 - ▶ **Open framework allows any SCM provider to add adapter to integrate their SCM into the Workbench**
 - ▶ **CVS Plugin**
 - ▶ **WebDAV enabled adapter planned over time**
- **Built-in Team Perspective**



Web Services Tooling

- **Easily Construct Web Services:**
 - ▶ **Discover**
 - Browse UDDI registry to locate existing web services
 - Generate JavaBean Proxy for existing web services
 - ▶ **Create/Transform**
 - Create new Web Services from JavaBeans, databases, etc.
 - ▶ **Deploy**
 - Web Service to WebSphere or TomCat for testing
 - ▶ **Test**
 - Built-in test client allows for immediate testing of local/remote Web Services
 - ▶ **Publish**
 - Web Services to UDDI registry

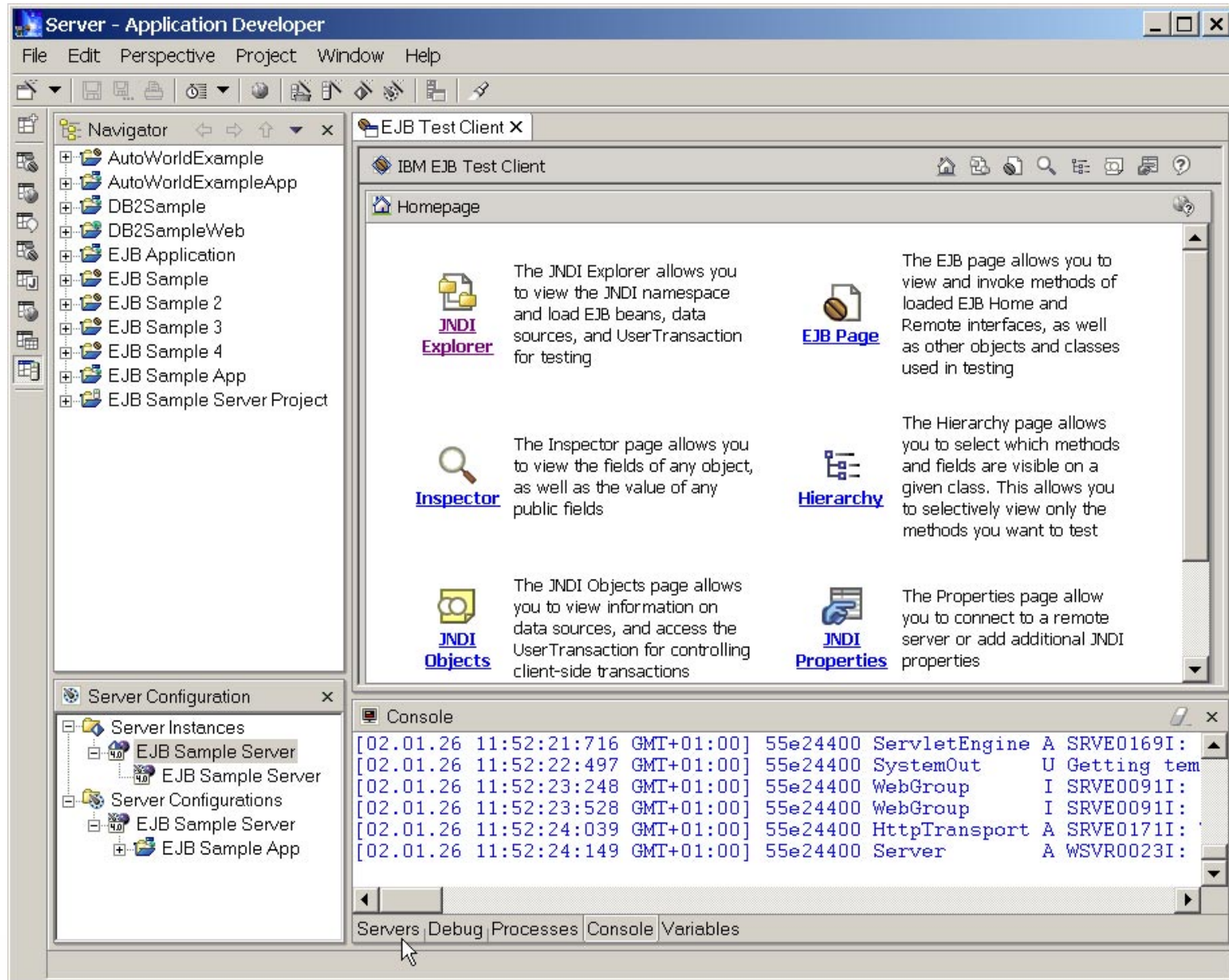


Testing: Server Perspective

- Repackaged WAS AE Single Server included (Runs EJBs, JSPs, Servlets, and HTML files)
- Supports Web projects, EJB projects, EAR project
- Can be Unit Test, Local Unit Test, Remote Unit Test
- If Remote Unit Test, must install:
 - ▶ WebSphere Application Server
 - ▶ IBM Remote Agent Controller
- Is the default server type for all projects
- When Unit Test, changes made to files are saved to disk, detected, and reread by WAS (except EJB Interface changes)

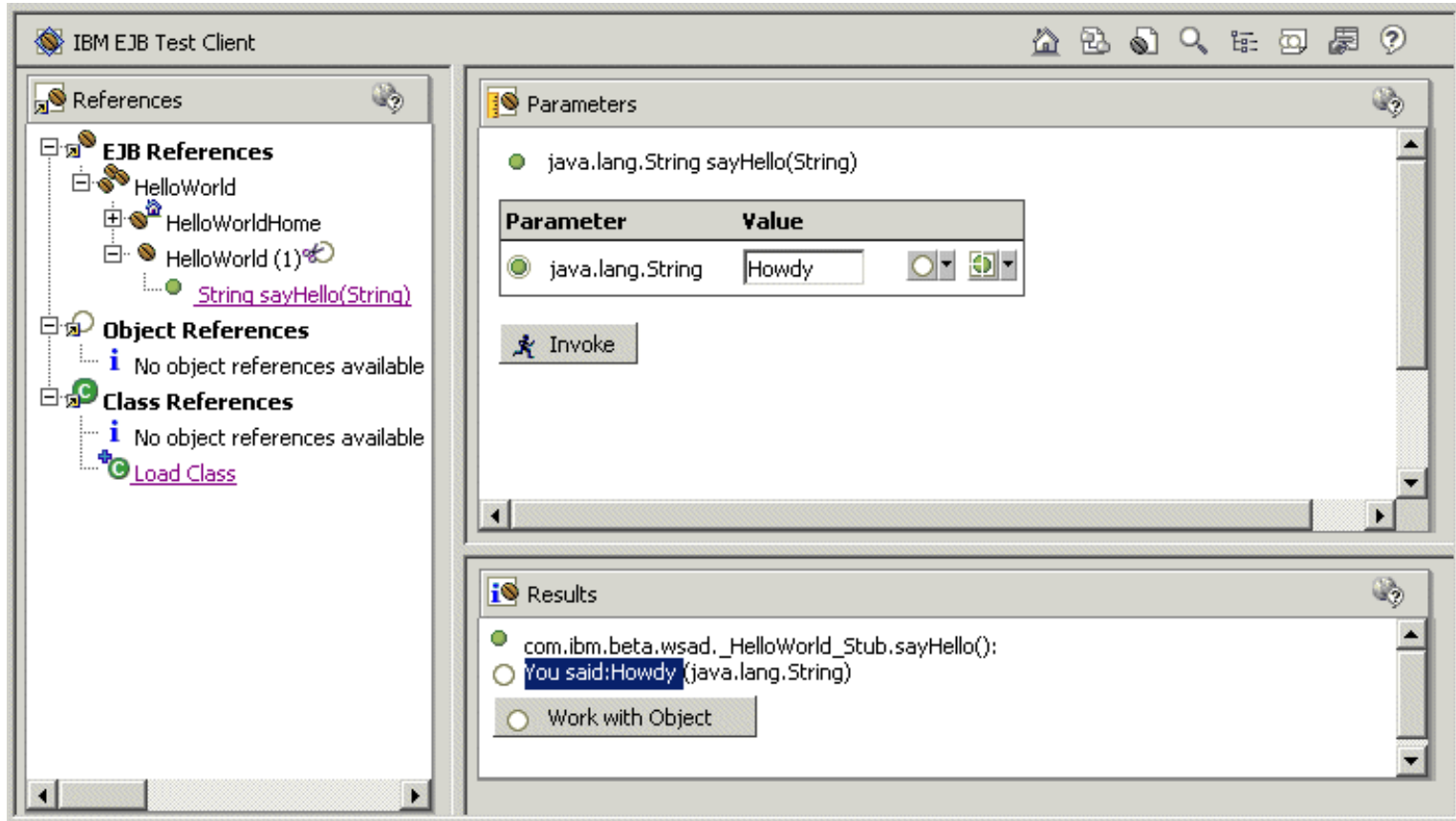


Server Perspective



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EJB Test Client

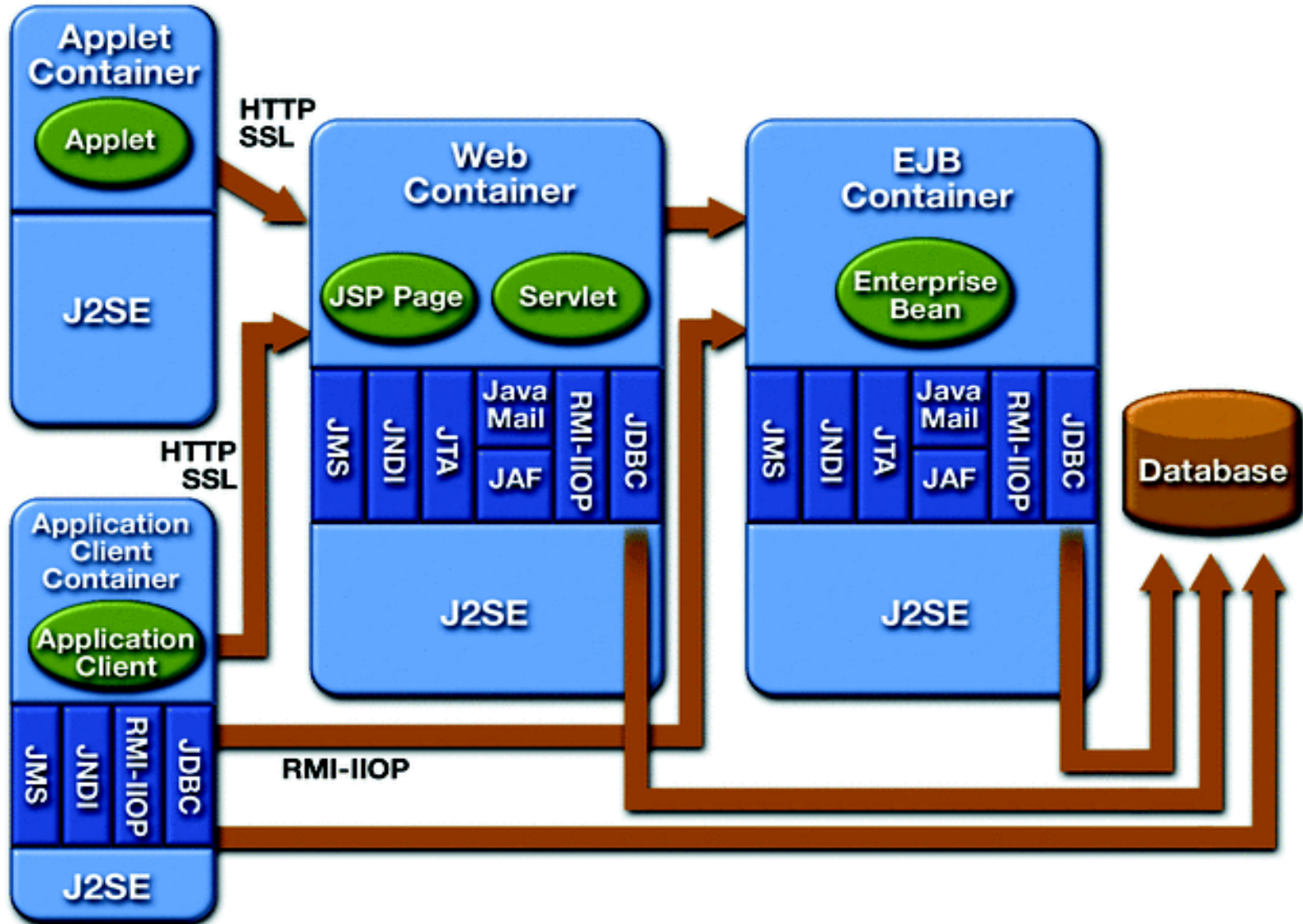




VA Java Project Migration

- **Import Wizard will be added to the New Tooling**
 - ▶ **Wizard will import the VAJ Project(s) into the new tooling**
- **Work is being done for additional migration support**
- **Coexistence support for current/new tooling**
 - ▶ **Usage scenario documents**

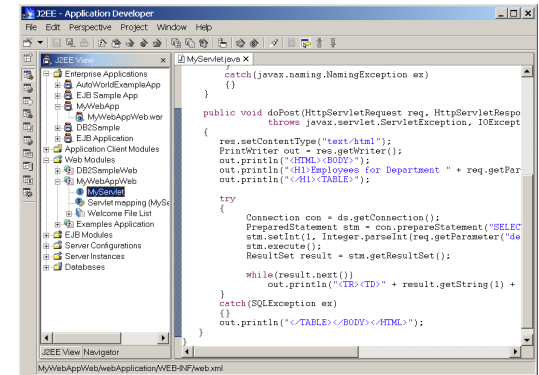
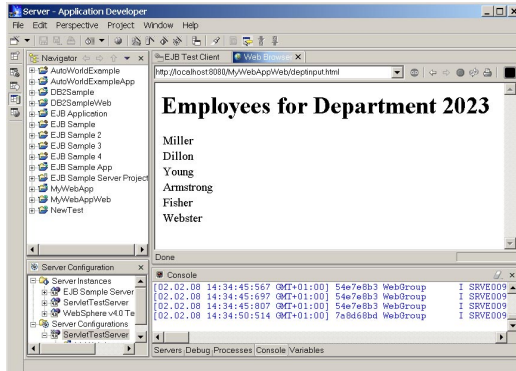
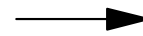
Development - J2EE Containers





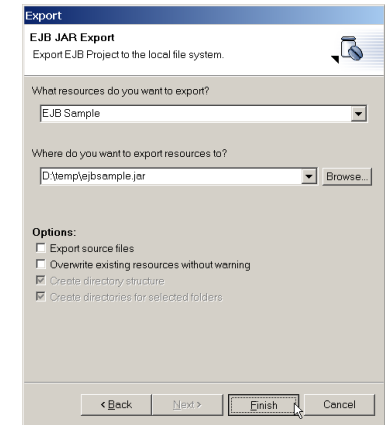
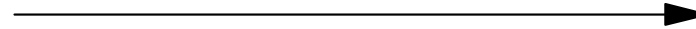
Servlet Development Process

1. Create Web Application in WSAD

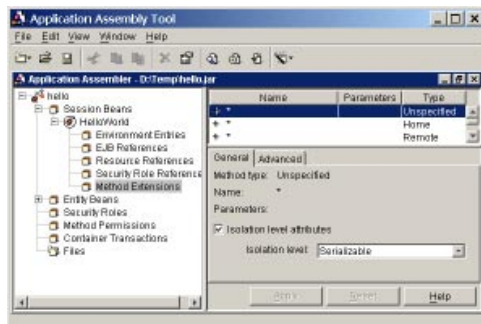


2. Test Web Application in WSAD Test Server

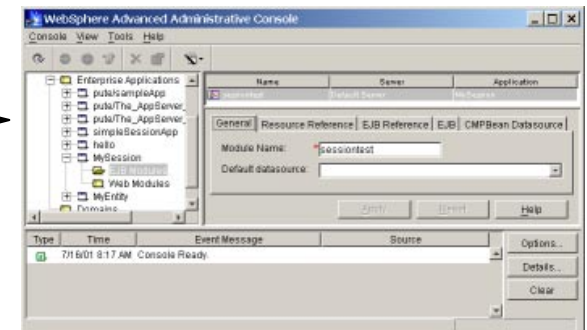
3. Export WAR File



4. Deploy using Application Assembly Tool



5. Install using WebSphere Admin Console





In Web Perspective: Create Web Project

The screenshot shows the 'Web - Application Developer' IDE. The 'New' menu is open, and 'Web Project' is selected. The 'Create a Web Project' dialog box is displayed, with the following fields and options:

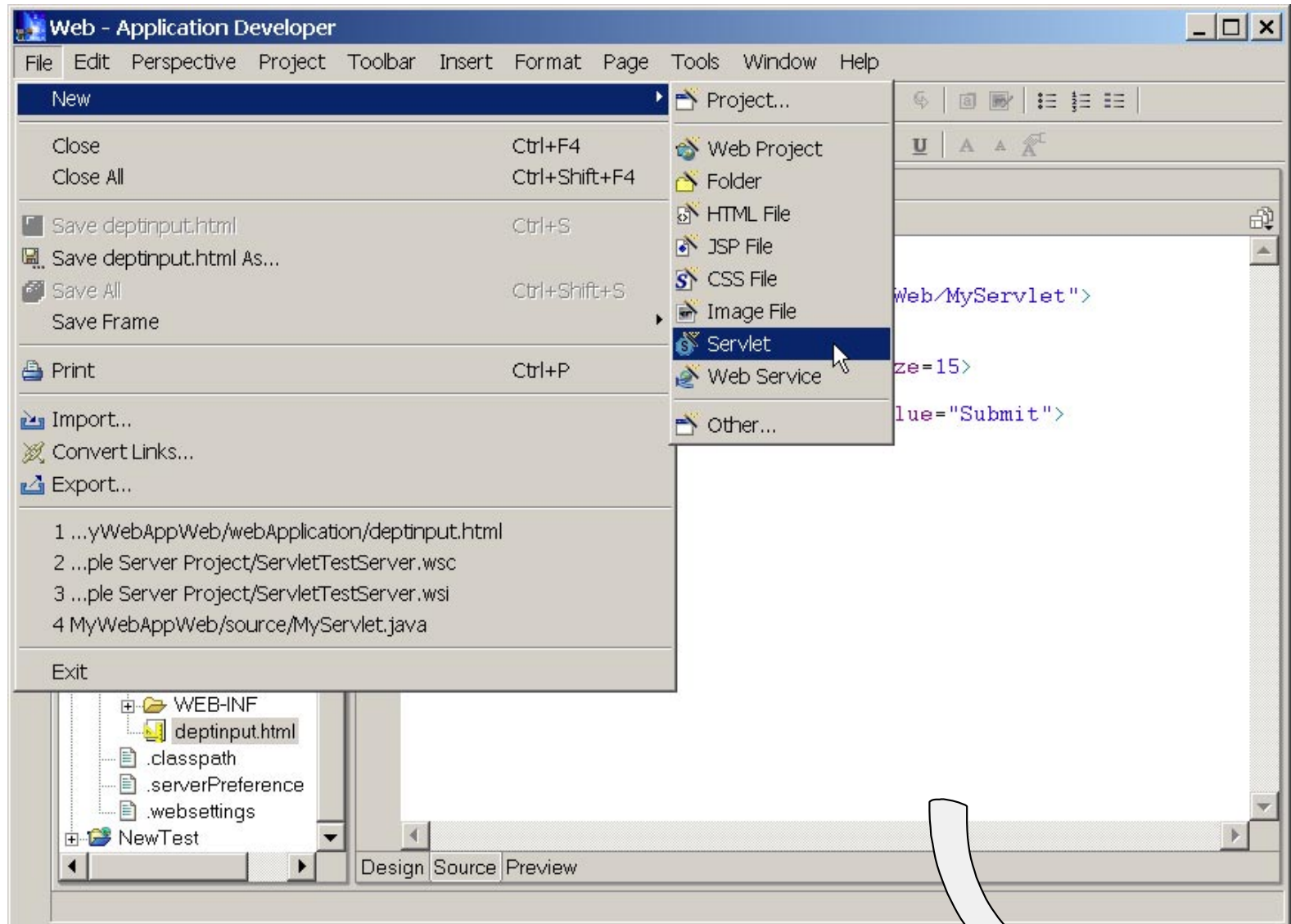
- Project name:** MyWebApplication
- Use default location
- Location:** C:\Program Files\WSAD\workspace\MyWebAppli
- Enterprise Application project name:** MyWebApp
- Context root:** MyWebApplication

At the bottom of the dialog box, there are buttons for '< Back', 'Next >', 'Finish', and 'Cancel'. A large white arrow points from the 'Web Project' menu item to the 'Finish' button.

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Create Servlet 1/2



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Create Servlet 2/2

Create the Servlet Class

Specify a name and package location for the new Servlet class.
Also, indicate any modifiers, interfaces, or methods to be generated.

Folder: Browse...

Package: Browse...

Servlet Name:

Superclass: Browse...

Modifiers: public abstract final

Options: Use Single Thread Mode

Interfaces: Add...
 Remove

Which method stubs would you like to create?

init() toString() getServletInfo()
 doPost() doPut() doDelete()
 destroy() doGet()

Inherited abstract methods
 Constructors from superclass

< Back **Next >** Finish Cancel

Create the Servlet Class

Define the Servlet in the Deployment Descriptor (web.xml)

Identify any information that should be inserted into the Deployment Descriptor (web.xml) file for the servlet.

Add to web.xml?

Display name:

Mappings:

URL	
MyServlet	

Add Delete

Init Parameters:

Initialization param...	Value
myParm1	hallo

Add Delete

< Back Next > **Finish** Cancel





Implement Servlet Code

```
catch(javax.naming.NamingException ex)
{
}
}

public void doPost(HttpServletRequest req, HttpServletResponse res)
throws javax.servlet.ServletException, IOException
{
    res.setContentType("text/html");
    PrintWriter out = res.getWriter();
    out.println("<HTML><BODY>");
    out.println("<H1>Employees for Department " + req.getParameter("dept"));
    out.println("</H1><TABLE>");

    try
    {
        Connection con = ds.getConnection();
        PreparedStatement stm = con.prepareStatement("SELECT * FROM EMPLOYEE WHERE DEPT = ?");
        stm.setInt(1, Integer.parseInt(req.getParameter("dept")));
        stm.execute();
        ResultSet result = stm.getResultSet();

        while(result.next())
            out.println("<TR><TD>" + result.getString(1) + " ");
    }
    catch(SQLException ex)
    {
    }
    out.println("</TABLE></BODY></HTML>");
}
}
```



Create HTML File

The screenshot shows the IBM WebSphere Application Developer IDE. The 'New' menu is open, and the 'HTML File' option is selected. A dialog box titled 'Create an HTML File (Static Web Page)' is displayed in the foreground. The dialog box contains the following information:

- Create an HTML File (Static Web Page)**
- Specify a name and location for the new HTML file. To control its formatting in a web browser, optionally specify a
- Enter or select the folder: MyWebAppWeb/webApplication
- File name: deptinput.htm
- Style Sheet: [] Browse...
- Buttons: Finish, Cancel

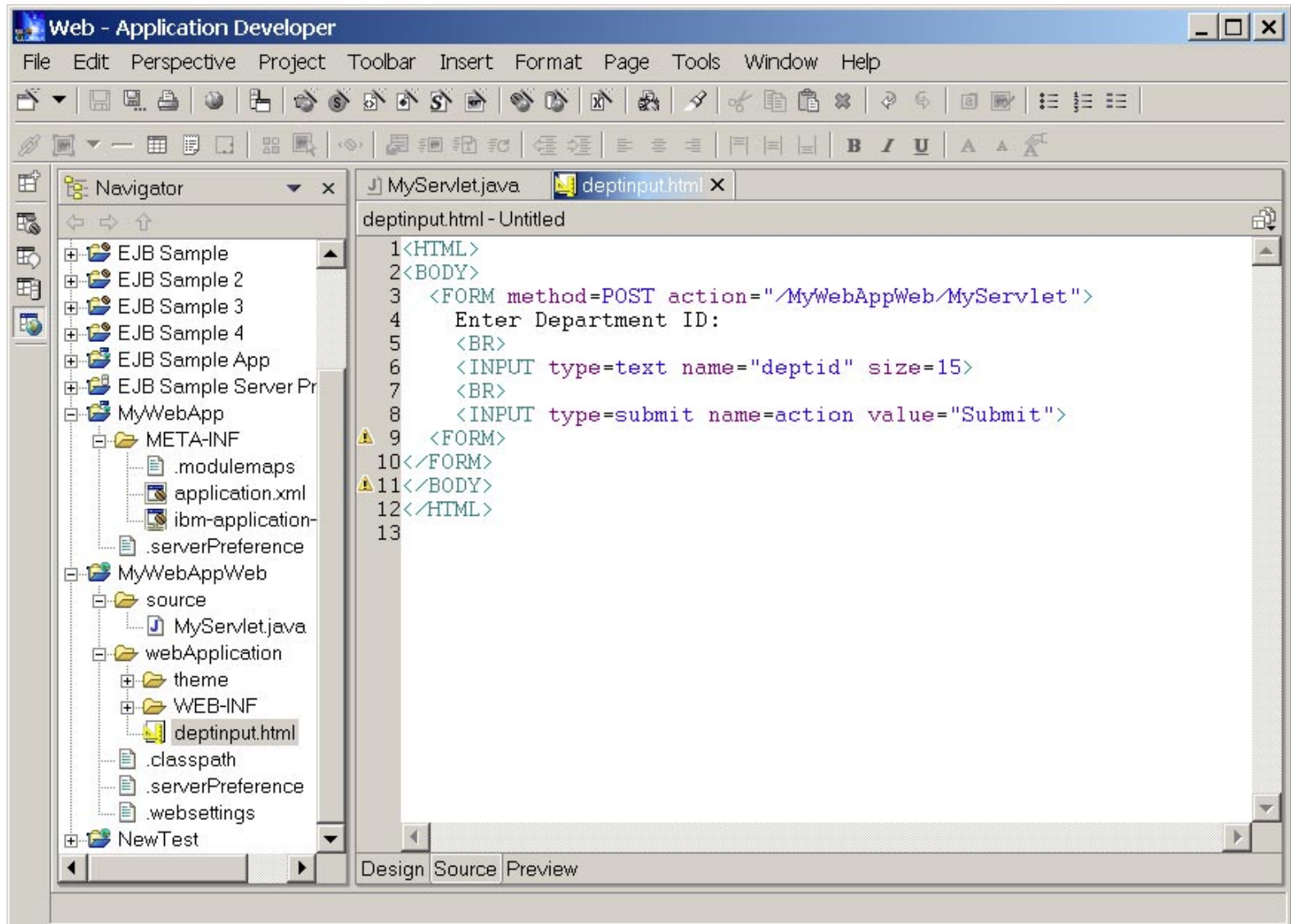
The background shows a code editor with the following code snippet:

```
new java.util.Properties(  
    property( javax.naming.InitialContext.INITIA  
        "com.ibm.websphere.naming.WsnIniti  
.InitialContext ctx = new javax.naming.Ini  
sql.DataSource)ctx.lookup("jdbc/HELLODB");  
ng.NamingException ex)
```

A white arrow points from the 'HTML File' menu item to the 'Create an HTML File' dialog box.



Implement HTML File



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Create Test Server 1/2

The screenshot shows the 'J2EE - Application Developer' window. The 'New' dialog box is open, displaying a tree view on the left with 'Server' selected. The right pane shows 'Server Instance and Configuration'. A context menu is open over the 'Other...' option. In the background, a code editor displays Java code for a servlet response.

```
HttpServletRespo
ception, IOExcept

nt " + req.getPar

</TABLE> );

tion con = ds.getConnection();
edStatement s = con.prepareStatement("SELEC
Int(1, Integer.parseInt(req.getParameter("de
ecute());
Get result = tm.getResultSet());

while(result.next())
    out.println("<TR><TD>" + result.getString(1) +

ch(SQLException ex)

.println("</TABLE></BODY></HTML>");
```

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Create Test Server 2/2

Create a New Server Instance and Configuration

Create a new server instance and configuration
Choose the properties for the new server

Server name:

Folder:

Server instance type:

- WebSphere Servers
 - WebSphere v4.0 Remote Server
 - WebSphere v4.0 Test Environment
- Apache Tomcat
- TCP/IP Monitoring Server

Template:

Description: Runs all J2EE projects directly out of the workspace.

Server configuration type: WebSphere v4.0 Configuration

Template:

Description: A server configuration for WebSphere v4.0

Create a New Server Instance and Configuration

WebSphere Server Configuration Settings

Input settings for the new WebSphere server configuration.

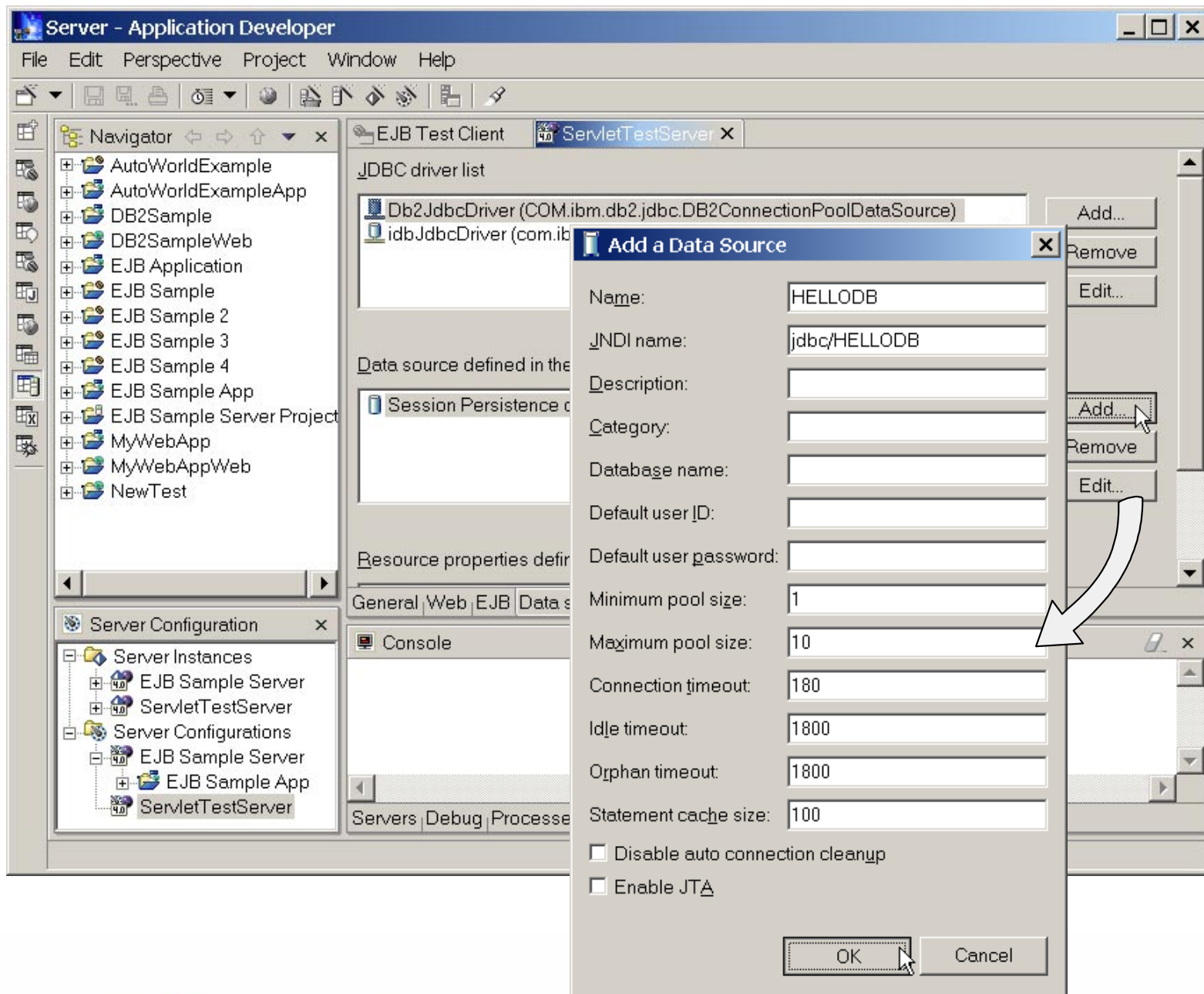
HTTP port number:



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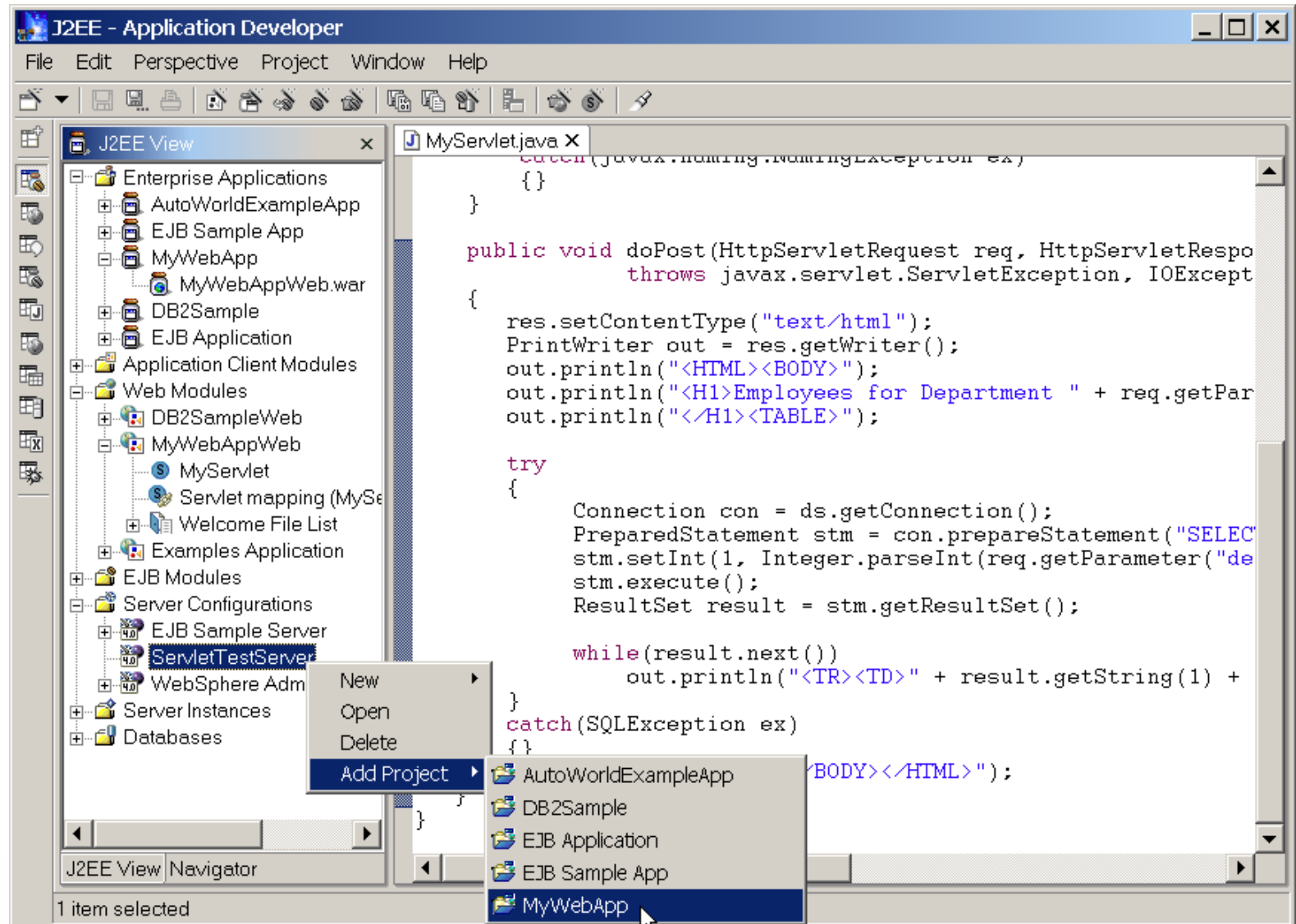
In Server Perspective: Create DataSource



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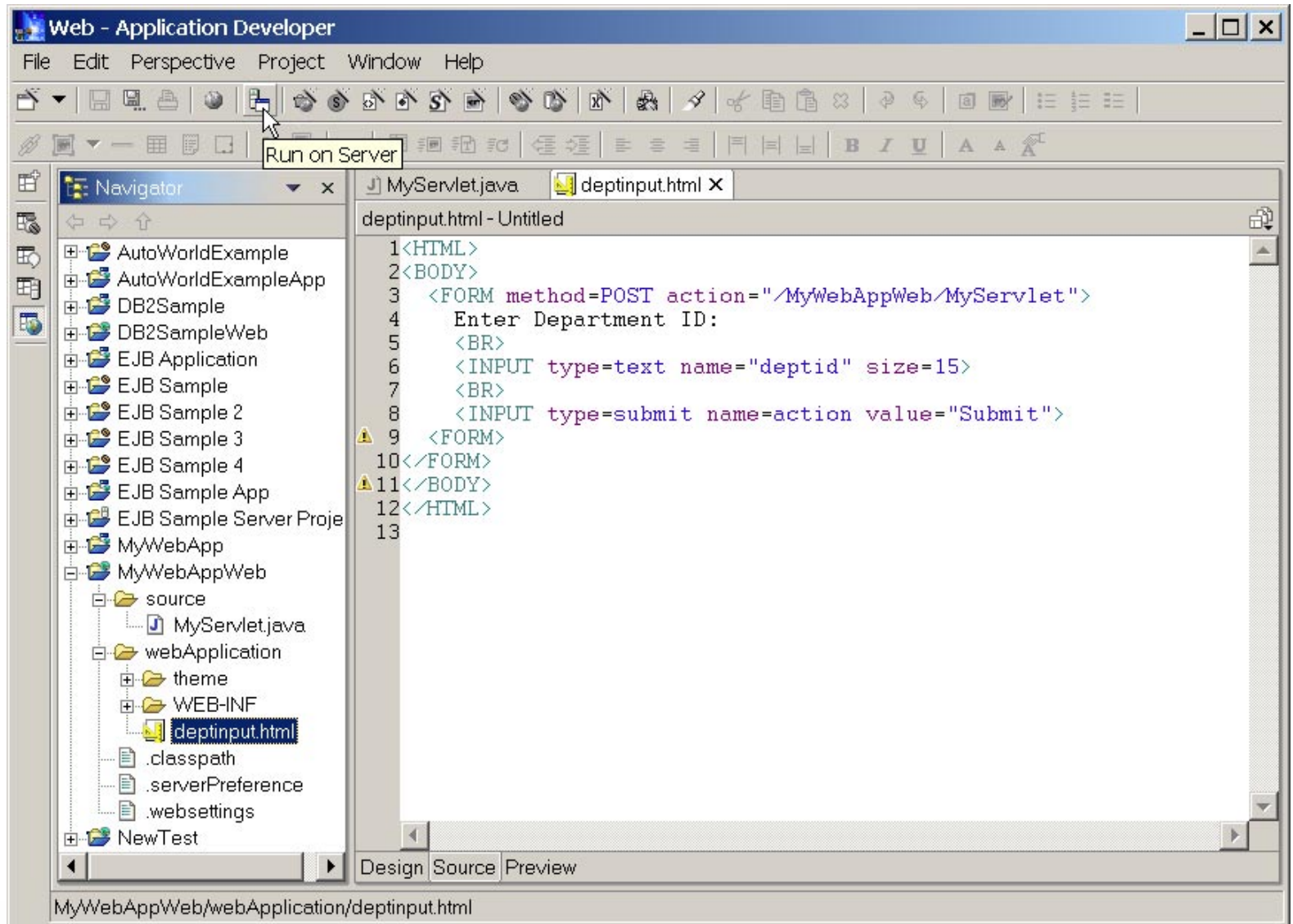
In J2EE Perspective: Add Project to Server Configuration



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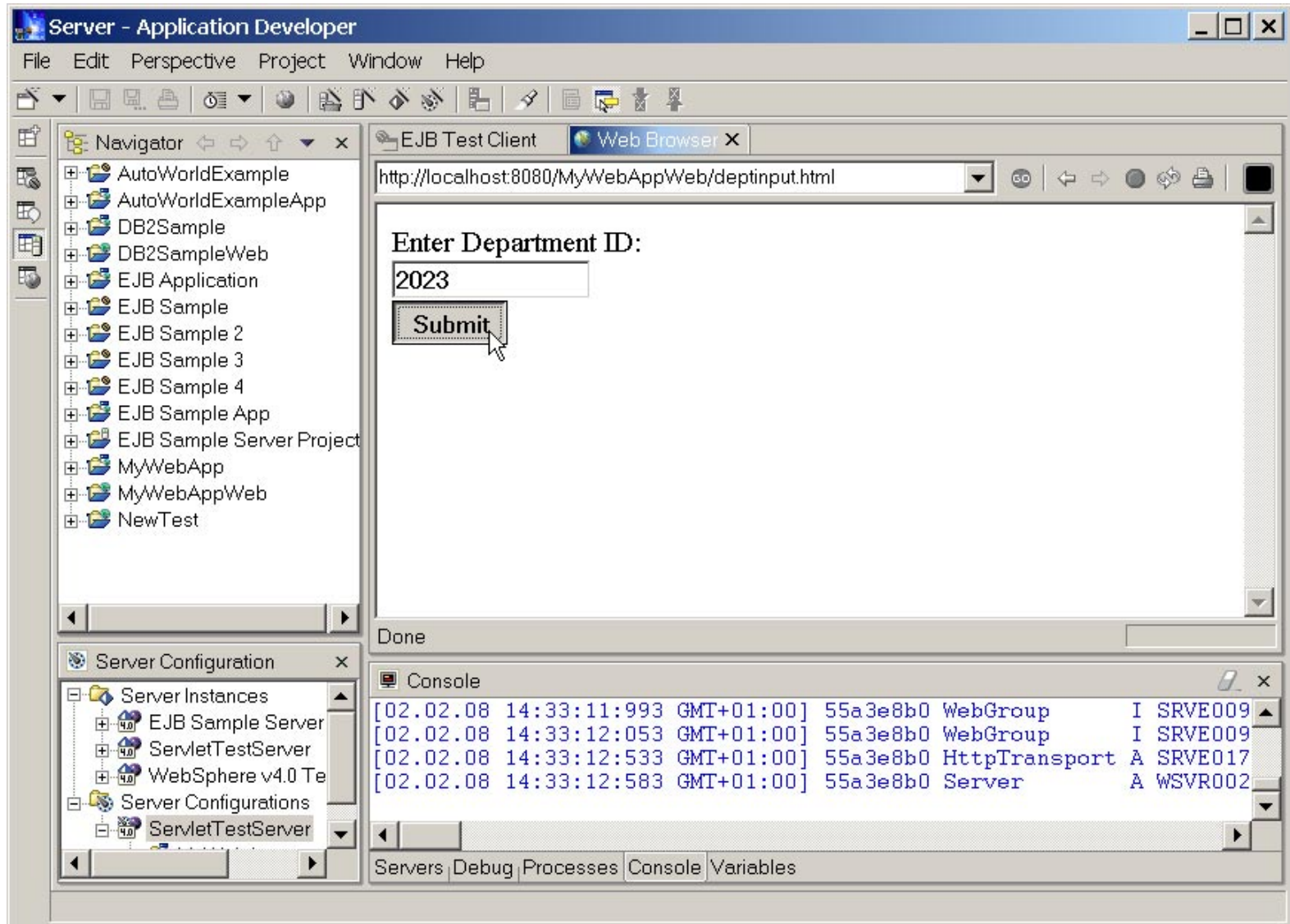
Start HTML Page in Test Server



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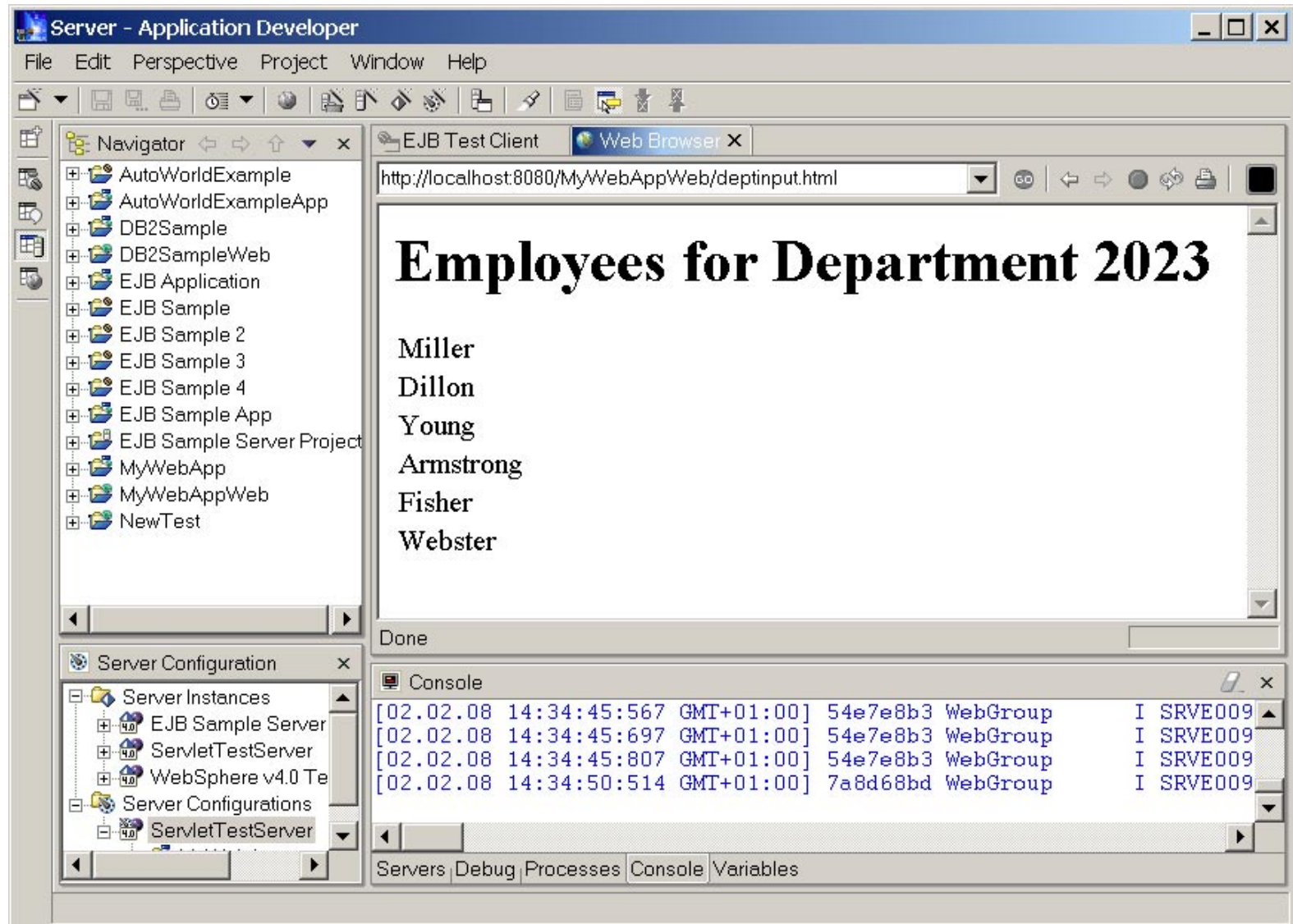


Invoke Servlet via POST



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Servlet Output



The screenshot shows the IBM Application Developer interface. The main window is a web browser displaying the output of a servlet. The URL is `http://localhost:8080/MyWebAppWeb/deptinput.html`. The output is a list of employee names for the year 2023.

Employees for Department 2023

Miller
Dillon
Young
Armstrong
Fisher
Webster

The console window at the bottom shows the following log entries:

```
[02.02.08 14:34:45:567 GMT+01:00] 54e7e8b3 WebGroup I SRVE009  
[02.02.08 14:34:45:697 GMT+01:00] 54e7e8b3 WebGroup I SRVE009  
[02.02.08 14:34:45:807 GMT+01:00] 54e7e8b3 WebGroup I SRVE009  
[02.02.08 14:34:50:514 GMT+01:00] 7a8d68bd WebGroup I SRVE009
```



Additional Information

- ❖ VSE/ESA Home Page

<http://www.ibm.com/servers/eserver/zseries/os/vse/>

- ❖ e-business for VSE/ESA customers

<http://www.ibm.com/servers/eserver/zseries/os/vse/ebus/home.html>

- ❖ e-business Connectors User's Guide

SC33-6719

Redbooks:

- ❖ e-business Connectivity for VSE/ESA

SG24-5950

- ❖ e-business Solutions for VSE/ESA

SG24-5662

- ❖ Servlet and JSP Programming

SG24-5755

We appreciate your comments at :

VSEESA@de.ibm.com



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