



IBM Software Group

IBM WebSphere Development Studio Client for iSeries: Advanced Edition

IBM Application Development Team: IBM Toronto

WebSphere. software



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This presentation reviews the Advanced Edition of WebSphere Development Studio Client for iSeries which consolidates the standard set of application tools for iSeries server and e-business development into one comprehensive, integrated and attractively priced iSeries product.

Table of contents

Quick Overview

EJB Tool

Profiling Tool

iSeries JCA Connector

WebFacing Tool - Struts

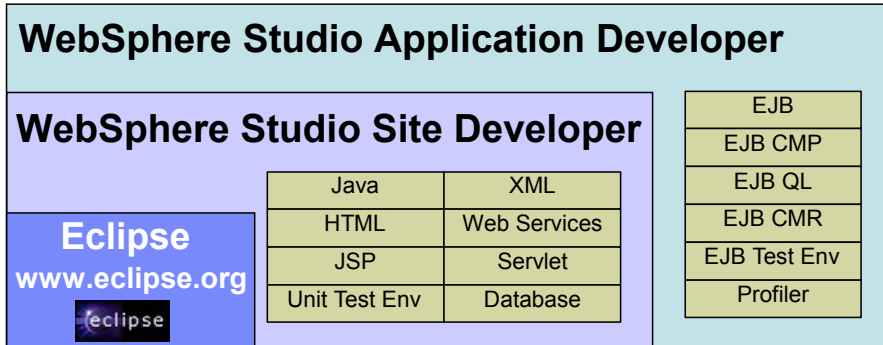
WebFacing Tool - CustomTags

Reference



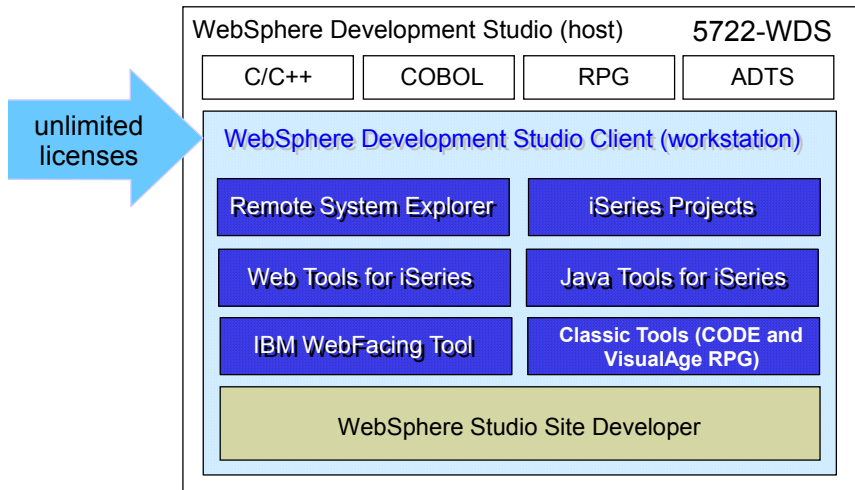
This presentation first gives you an overview of Development Studio Client and is then followed by discussion of the EJB Tool, the Profile Tool, iSeries JCA Connector, the IBM WebFacing Tool now with Struts support and the IBM WebFacing Tool with Custom Tags. The last topic covers sources of further reference information.

WebSphere Products



Version 5.0 release of WebSphere Development Studio Client for iSeries introduced the second phase of support for RPG, COBOL, CL, and DDS development in the integrated development environment. This was the third step in the ultimate goal of reproducing the development capabilities of the classic ADTS and CODE tools, in a highly integrated and productive environment, continuing to offer a consistent experience for all development work from RPG to J2EE and the Web. Two products were announced in January 2003. Both offering a new level of tool integration. The first inherited the improved Web and Java development capabilities from WebSphere Studio Site Developer, Version 5.0 while the second product named Advanced Edition inherited improved Web and Java development capabilities from WebSphere Studio Application Developer, Version 5.0.

iSeries Packaging for Version 5.0



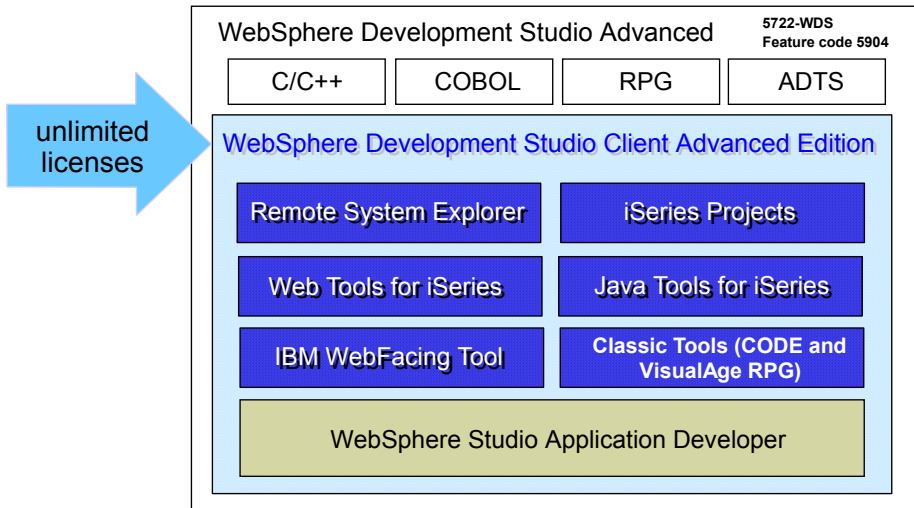
There is now only one application development product sold by IBM, for iSeries, as of V4R5. This is WebSphere Development Studio (Development Studio), which includes all four host compilers, all traditional tools (ADTS = PDM+SEU+SDA+RLU+DFU+AFP+CGU), and unlimited licenses of the workstation-based toolset named WebSphere Development Studio Client (formerly WebSphere Development Tools).

If you are an existing customer who has a subscription, you can upgrade to Development Studio free of charge. Without a Software Subscription, there is an upgrade fee. New licenses of Development Studio are priced very competitive compared to the combined prices of all constituent products. As of V5R1, there is no way to purchase the compilers or tools individually. So if you have RPG at V5R1 or higher, you must have Development Studio and hence are entitled to Development Studio Client.

For consultants who do not have an iSeries of their own, but still wish to have the client tools, Development Studio Client is also made available as a passport advantage product so it can be purchased "off the shelf" from IBM Direct.

Development Studio has been a huge success, with over 80,000 licenses sold. Just as every development machine used to have PDM and SEU, every development machine will now have all the modern Application Development tools from IBM. This ubiquity is especially important for business partners who build and sell software. These Business Partners are now free to build software using any of the

iSeries Packaging for Version 5.0



The Advanced edition of Development Studio Client, and Development Studio, is new as of April 25th 2003. Development Studio Advanced is currently the same as Development Studio, except the customer is entitled to unlimited licenses of Development Studio Client Advanced versus just Development Studio Client.

The difference of Development Studio Client Advanced over Development Studio Client is that it has additional tools (blue boxes with asterisks) and some enhancements to existing iSeries tools (green boxes with asterisks) which will be discussed later in this presentation. The majority of the new tools are related to Enterprise Java Bean (EJB) development. You'll see later that Development Studio Client Advanced is based on WebSphere Application Developer (Application Developer) versus WebSphere Studio Site Developer (Site Developer).

WebSphere Application Developer Version 5 Features

- J2EE 1.2 & 1.3
 - Tooling supports both J2EE versions
 - Application migration tools assist moving from 1.2 to 1.3
- Servlet 2.3
- JSP 1.2
- Concurrent support for J2EE 1.2 & 1.3
 - WebSphere Application Server V4
 - J2EE 1.2 support
 - WebSphere Application Server V5
 - J2EE 1.2 & J2EE 1.3 support
 - WebSphere Application Server V5 Express
 - J2EE 1.2 & J2EE 1.3 support
 - Does not support EJB's



The key features of the Advanced Edition include:

Support for J2EE 1.3 - EJB 2.0, Servlet 2.3 and JSP 1.2 specification

Concurrent support for WebSphere Application Server V4 (J2EE 1.2) and WebSphere Application Server V5 (J2EE 1.3)

New Version 5 Features

- Enterprise Java Beans 2.0
 - Require J2EE 1.3
- Enterprise Java Bean Support
 - Message Driven beans
 - Container Managed Persistence 2.0 (CMP 2.0)
 - Mapping tooling
 - EJB Query Language (EJB QL)
 - Similar to SQL language
 - EJB unit test environment



New support for J2EE 1.3 specifications - EJB 2.0, servlet 2.3, JSP 1.2

Full EJB 2.0 support includes EJB Query Language, CMP 2.0 and Message-driven beans.

Table of contents

Quick Overview

 **EJB Tool**

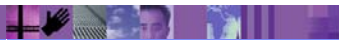
Profiling Tool

iSeries JCA Connector

WebFacing Tool - Struts

WebFacing Tool - CustomTags

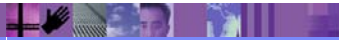
Reference



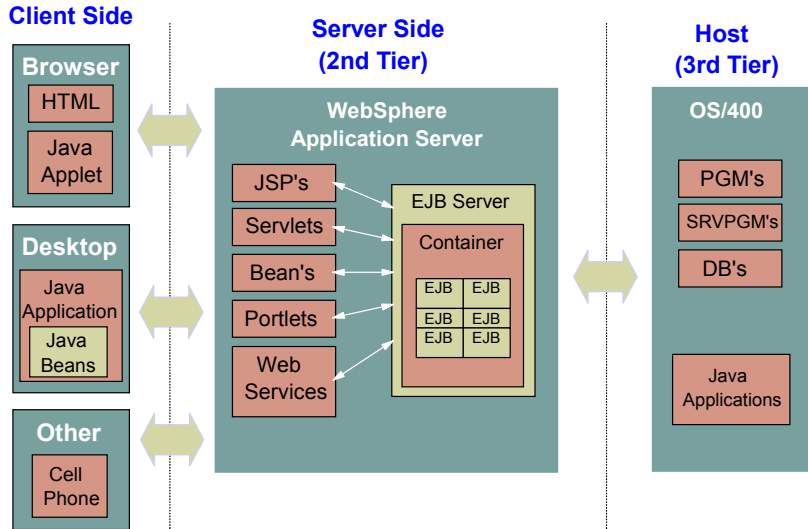
Build J2EE applications with the EJB tool.

EJB Information

- EJB's now 4 years old
- Originated from CORBA and Remote method invocation (RMI)
- Focus on simplifying server-side logic implementation
- Provide automatic support for services such as
 - transactions
 - security
 - database connectivity
 - and more
- Great online tutorials:
 - IBM DeveloperWorks - <http://www.ibm.com/developerworks>
 - JavaSoft - www.javasoft.com



EJB Information : Where are they?



Steps to building an EJB application

- Setup an EJB project
- Define EJBs
- Add business logic
 - Details are very flexible, example:
 - Business logic can be referenced in Java Beans
 - EJB can call existing applications (*PGM's etc)
 - Stored Procedures
- Optionally define relationships and inheritance
- Define finder methods
- Map entity beans to relational tables
- Generate the deployed code
- Test the EJBs in the built-in server using the universal test client
- Create client applications
 - These applications can be in separate Web Projects that share the same EAR Project

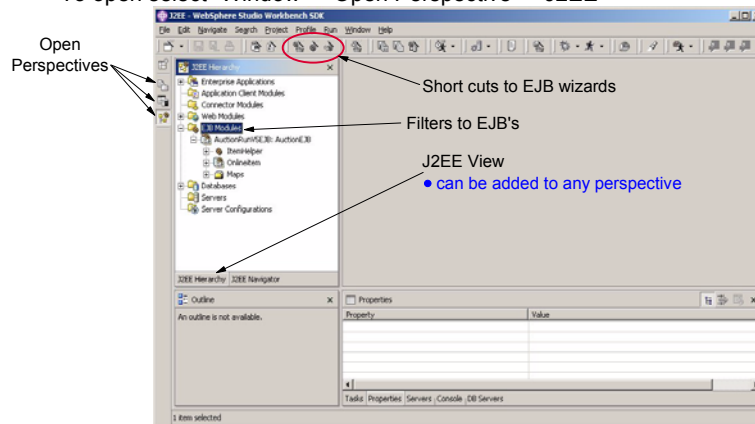


EJB 2.0 Support

▪ J2EE Perspective

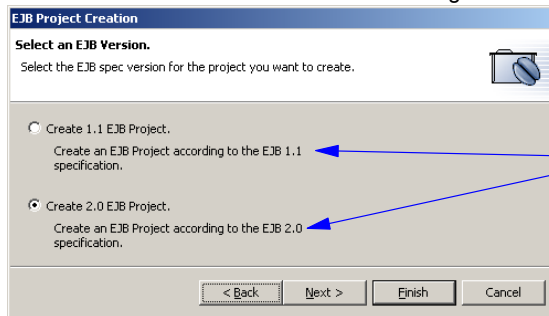
Helps to focus development on EJB tools

To open select "Window -> Open Perspective -> J2EE"



EJB 2.0 Projects

- Based on Web Projects
 - Inherits all the properties and capabilities of Web projects
- Can be associated with an existing EAR file
 - By associating it with an EAR file, other Web Applications in the same EAR file can reference the EJB logic



Can create both
EJB 1.1 or EJB 2.0

EJB 2.0 Wizards

Wizard can create:

- Message-driven bean
- Session bean
- Bean-managed persistence
- Container-managed persistence

Create an Enterprise Bean.

Create a 2.0 Enterprise Bean

Select the EJB 2.0 type and the basic properties of the bean.

Message-driven bean
 Session bean
 Entity bean with bean-managed persistence (BMP) fields
 Entity bean with container-managed persistence (CMP) fields

CMP 1.1 Bean CMP 2.0 Bean

EJB project: AuctionRunWSEJB

Bean name:

Source folder: ejbModule

Default package: com.acme.ocs

< Back Next > Finish Cancel

Wizard help wrapper database with EJB - Can select fields to expose

Add an Access Bean

Data Class Access Bean

Select Finish to accept all defaults for all access beans. To modify an access bean, select an enterprise bean from the list and update.

Enterprise beans: OnlineItem

Interfaces to use: Remote Local Remote and Local

Factory package name: com.acme.ejb

Access bean name: OnlineItemData1

Package name: com.acme.ejb

Attribute helpers:

- catalognumber
- description
- magelocn

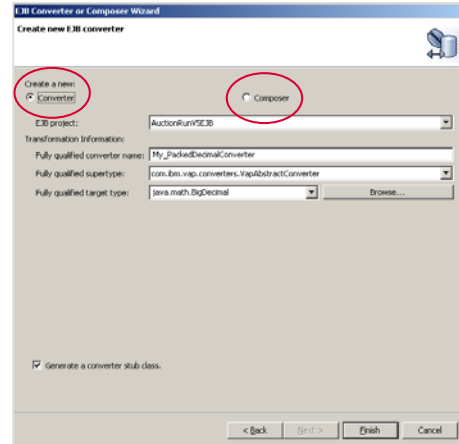
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EJB 2.0 Wizards

- EJB Converter Wizard
 - Generates a Java Bean that assists in converting a Database field to a Java field
 - EJB containers call the converter by default for all required mappings that meet its transformation
- EJB Composer Wizard
 - More Complex
 - Helps map multiple fields to multiple Database fields

i.e.: Conversion code is required if

Database field is a "PackedDecimal"
Java field could be
"java.math.BigDecimal"



EJB 2.0 Unique functionality

- Integration of EJB with JMS.
- Message-driven beans.
 - A message-driven bean is an asynchronous message consumer.
 - EJB can now act as JMS clients.
 - Prior to this it was hard for EJB's to handle asynchronous services.
- EJB query language (EJB QL)
 - A standardized query language for finding and locating beans.
 - Portable across EJB containers
 - Navigate across EJB relationships
 - Although it is not actually SQL, it is a SQL-like language that supports a subset of SQL functions.
 - An EJB QL query can be used in three situations:
 - To define a finder method of an entity bean (findXxxx)
 - To define a select method of an entity bean (selectXxxx)
 - To dynamically specify a query using the executeQuery dynamic API



Full EJB 2.0 support includes EJB Query Language, CMP 2.0 and Message-driven beans.

Message Driven bean wizard

- Transaction-aware components that process asynchronous JMS messages
- Essentially acts like a JMS message listener from outside processes

JMS - Java Message Services, a clever way of talking between processes/jobs/etc

Same idea as - DataQueues

Create an Enterprise Bean.

Create a 2.0 Enterprise Bean

Select the EJB 2.0 type and the basic properties of the bean.

Message-driven bean
 Session bean
 Entity bean with bean-managed persistence (BMP) fields
 Entity bean with container-managed persistence (CMP) fields
 CMP 1.1 Bean CMP 2.0 Bean

EJB project: AuctionRunVSEJB

Bean name: My_MessageBean

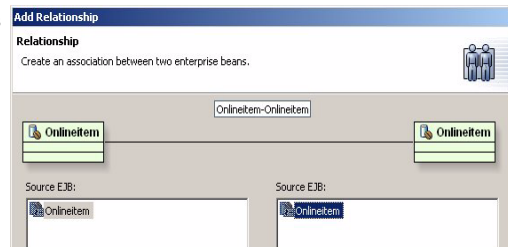
Source folder: ejbModule

Default package: com.acme.cics

< Back Next > Finish Cancel

Container Manager

- Container Manager Persistence (CMP 2.0)
 - Provides distributed, transactional, secure access to persistent data, with a guaranteed portable interface
- Container Manager Relations (CMR)
 - Originally managed by developers
 - Ability to specify relationships between EJB's
 - 1 to 1 - employee name with employee address
 - 1 to many - employee name with team members
 - many to many - employee's with benefits



EJB - Database mapping

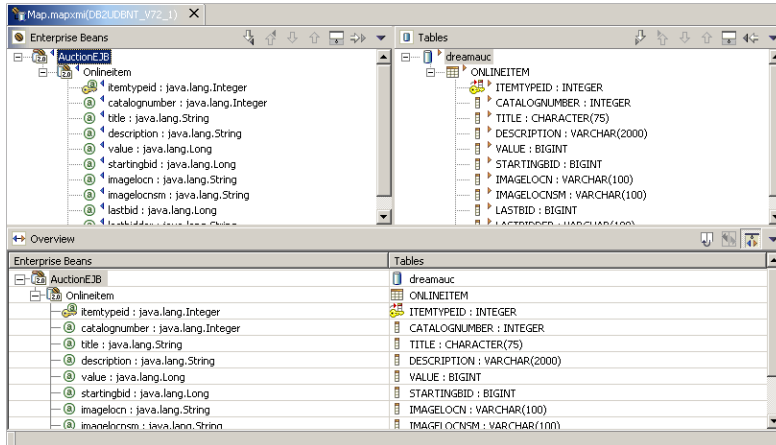
- Easily map EJB <--> database
 - Provide persistence while saving developers from complex, low-level SQL coding
- EJB to Database mapping approaches
 - Bottom Up
 - Map existing databases tables to EJB entities
 - Top Down
 - Wizard creation of EJBs
 - Generate Database/Tables from EJB Entities
 - Meet in the Middle



EJB-to-RDB mapping that provides the model, run-time, environment and interface for editing the mapping between EJBs and relational database tables with top-down, meet-in-the-middle and bottom-up capability.

Mapping Editor

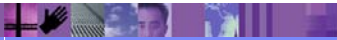
- Provides high level overview of associations in the EJB



New multiple-mapping support

EJB unit test environment

- EJB containers provide a large portion of functionality which can make testing a challenge
- Unit test environment allows user to simulate the calling of a bean
 - Can access fields
 - Pass in test data
 - Watch "Converters" translate data based on associations
- Hot-redeploy supported
 - While testing, can make changes to code, and continue testing



EJB unit test environment (continued)

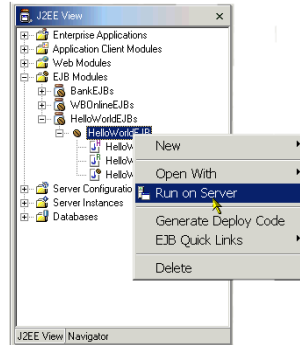
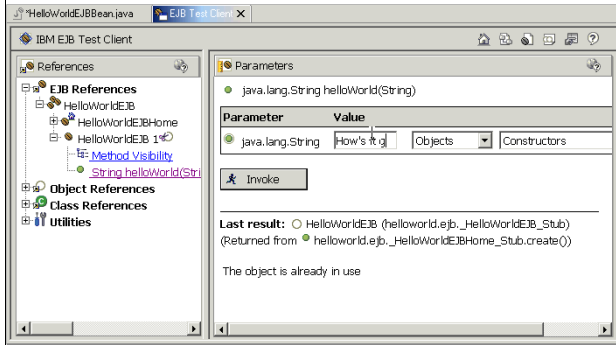


Table of contents

Quick Overview

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 **Profiling Tool**

iSeries JCA Connector

WebFacing Tool - Struts

WebFacing Tool - CustomTags

Reference

Improve application performance with profiling and tracing tools to detect, isolate, and fix performance issues early in the development cycle.

Profiling Support

- What is it?
 - Tool that collects local/remote data on a Java program's run-time behavior
 - Based on JVMPI standard
 - Present this data in the profiling views.
 - Helps visualize program execution easily, and explore patterns
 - Views include
 - Object creation & garbage collection
 - Execution sequences
 - Thread interaction
 - Object references
 - Views help with
 - finding operations that take the most time
 - find and solve memory leaks
 - easily identify repetitive execution behavior and eliminate redundancy
- Where can it be used?
 - Any Java program
 - Java Application - Java beans
 - Web Application - Servlets, EJB's, JSP's, etc...



Profiling Support (continued)

- How does it work?

Profiling depends on agents to monitor JVM

The "Agent Controller" works with agents to retrieve data

Each application process being profiled may have a profiling agent running within it

A single workbench, can interactively profile any one or many of these applications

- What deployment hosts are supported?

To interact with remote hosts, the Agent controller must be installed remotely:

iSeries

zOS

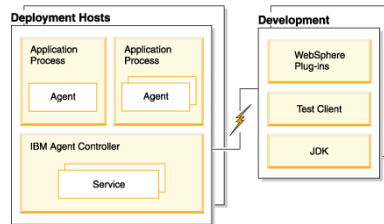
AIX

Linux_390, Linux_x86


Windows

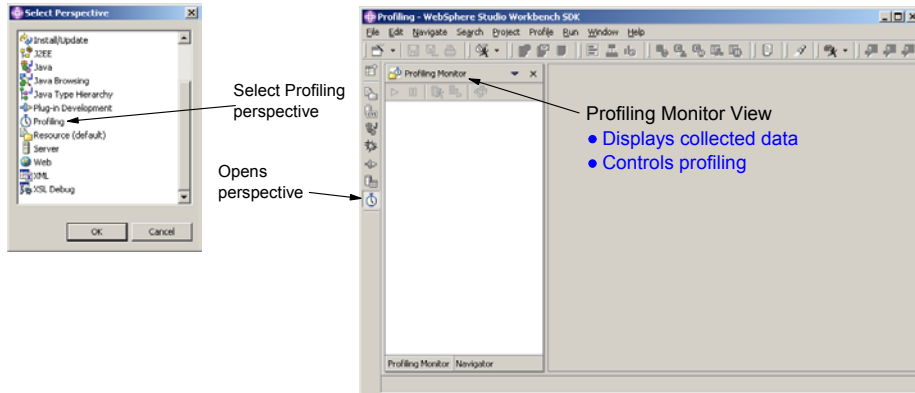
HP

Solaris



Profiling Perspective

- Helps you work with profiling data
- To start profiling launch the application via the "Profile" button 



The Profiling perspective traces and determines performance issues for iSeries Java programs

Profiling Support

Information display

Default monitor configured for local development workbench

Java applications

WebSphere unit test environment

Monitors View

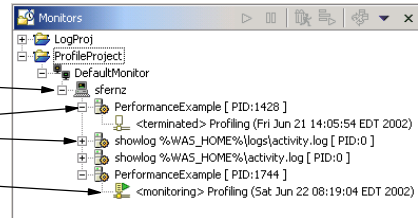
Filters by host, in this case the local development machine

Shows all applications being monitored on the selected machine

Shows current status of collected data

Is it still collecting, or has it ended

Timestamp of start and end



Profiling Support

■ Profiling Console

Shows output (including error messages) and input to your application



```

Profiling Console [terminated: PerformanceExample [PID:1792]]
add button : java.awt.Button[button0,0,0,0x0,invalid,label=0]
add button : java.awt.Button[button1,0,0,0x0,invalid,label=1]
add button : java.awt.Button[button2,0,0,0x0,invalid,label=2]
remove button : 2
Unknown Profile Option "BOUNDARY_DEPTH"
  
```

■ Monitor Views

Represent data graphically for easier understanding

Statistical profiling views

- Package Statistics
- Class Method Statistics
- Method Statistics
- Class Instance Statistics
- Instance Statistics

Graphical profiling views

- Execution Flow
- Object Reference
- Method Execution
- Method Invocation
- Heap

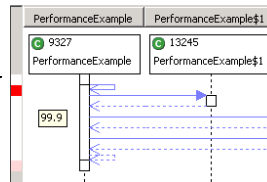


Table of contents

Quick Overview

EJB Tooling

Profiling Tooling

 **iSeries JCA Connector**

WebFacing Tool - Struts

WebFacing Tool - CustomTags

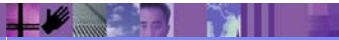
Reference



JCA Program Call connector provides a standard interface to call any *PGM, based on the J2EE Connector Architecture

iSeries JCA Connectors

- JCA Connectors
 - J2EE Connector Architecture (<http://java.sun.com/j2ee/connector>)
 - Provide a standard consistent interface for connecting to back end Enterprise Integrated Systems (EIS)
- Configure once access from many
 - Configure JCA Connector in WAS Server
 - Accessible from all Web Applications which run in the server
- iSeries JCA Connector
 - Customized for accessing a *PGM on the iSeries
 - Manages PCML support and signon support



JCA Connector Configuration

- Tooling provides simple interface for configuring the Connector
 - Pressing "Add..." searches IDE for installed JCA Connector projects

The screenshot displays the WebSphere v9.0 Tool Environment interface. The main window is titled "J2C Options" and shows configuration settings for a J2C resource adapter. The "J2C Resource Adapters" table is highlighted, with the "Add..." button circled in red. An arrow points from the text "Pressing 'Add...' searches IDE for installed JCA Connector projects" to this button. To the right, a "Create Resource Adapter" dialog box is open, showing details for a resource adapter named "SeriesRpn".

J2C Options

Scope: localhost:localhost/server1

Node Settings

Edit the J2C configuration settings.

J2C Resource Adapters:

Resource Adapter name	Display name	Vendor name	Spec version	
WebSphere Relational ...				Add... Edit... Remove

J2C Connection Factories:

Name	J2C name	Description	
			Add... Edit... Remove

Resource Properties:

Name	Type	Value

Server | Configuration | Paths | Environment | Web | Data source | Ports | Variables | Trace | Security | EJB | J2C | JMS | Applications

Create Resource Adapter

Resource Adapter Name: SeriesRpn

Display name: Series Program Call Resource Adapter

Version: 1.0

Description:

Vendor name: IBM

Spec version: 1.0

EIS type: J2E Program Call

License required:

License:

Transaction support: NoTransaction

Reauthentication support: false

Managed connection factory: com.ibm.connector2.series.pgmcall.ISeriesPgmCallManagedConn

Connection factory interface: javax.resource.cdi.ConnectionFactory

Connection factory impl: com.ibm.connector2.series.pgmcall.ISeriesPgmCallConnectionFactory

Connection interface: javax.resource.cdi.Connection

Connection impl: com.ibm.connector2.series.pgmcall.ISeriesPgmCallConnection

Archive path:

Native path:

Classpath: D:\WU\Temp\out\workspace2\SeriesRpn\connectorModule\140

OK Cancel

More Connector Tools

- Provided in WebSphere Studio Application Developer Integration Edition
- WSAD-IE contains everything in WSAD plus more
- Tools designed to focus on
 - Connectors
 - Business Flow

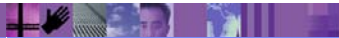


Table of contents

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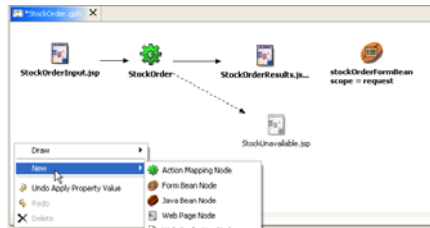
WebFacing Tool - CustomTags

Reference

IBM is also making it easier to leverage and extend Web applications created with the IBM WebFacing Tool. IBM has provided an option during the code generation phase to output Struts-compliant Web application infrastructure that can be easily enhanced. The Struts-compliant runtime can now leverage the Struts tools to provide more customization capability.

WebFacing Tool - Struts

- What is Struts
 - A framework for building web applications based on Model-View-Controller
 - Provides internal caching and lower runtime memory requirements
- Easier integration
 - Extension points can integrate with other Struts-based services
 - Dedicated diagram editor helps organize your web application



WebFacing Tool - Struts

- **Enabling Struts in WebFacing Projects**

When creating a new project select "Enable Struts support"

- **When project is created**

Struts enabled WFRun.jar
Logon.jsp becomes starting point

WebFacing Project
Project name must be specified

Project name:

Use default

New project location:

Enterprise Application Project: New Existing

Existing project name:

Context root:

WebFacing project features:

Enable Struts support
 Generate JSP custom tags

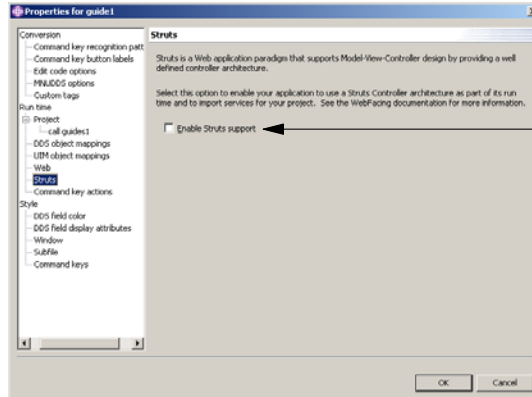
Enables a run-time architecture based on the Struts framework and exports services for WebFacing projects. See the WebFacing documentation for more information.

< Back | Next > | Finish | Cancel

WebFacing Tool - Struts

- **Enabling Struts in existing WebFacing Projects**
Project properties can also enable the Struts support

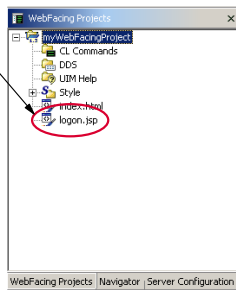
- **Enabling Struts has the same effect as project creation**
Struts enabled WFRun.jar
Logon.jsp becomes starting point



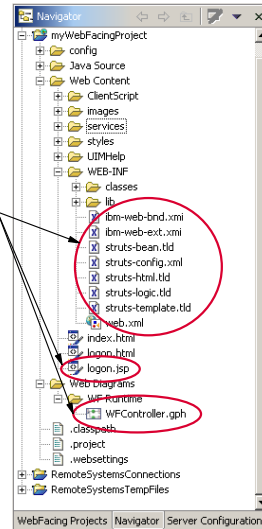
WebFacing Tool – Struts Objects

- **New objects added to projects**
Logon.jsp becomes the new entry point into the WebFacing project
Additional runtime support is also included, IBM Toolbox for Java

WebFacing Projects view helps point to new items



New objects

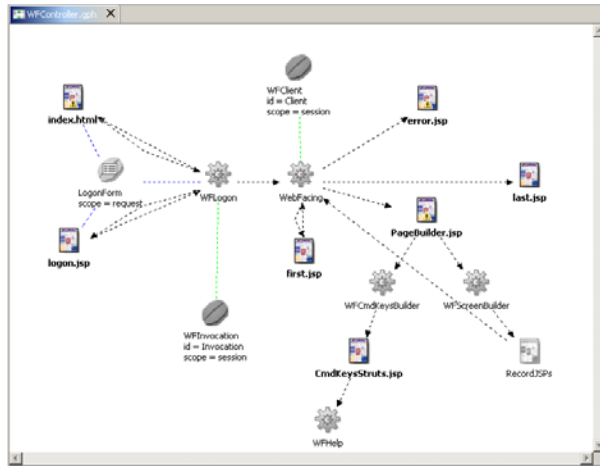


Struts Diagram

- **Struts Diagram helps understand structure**
WebFacing diagram is read-only and provided for documentation

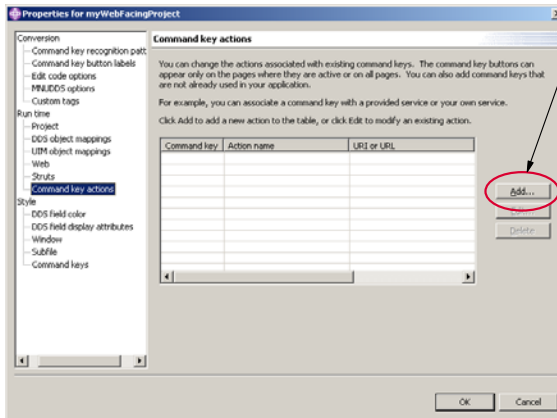
This diagram is a representation of all WebFacing Applications.

Helps extend a WebFacing Application
First extension:
WRKSPLF



Command Keys

- **WRKSPLF Support (Report Service)**
First extension to WebFacing Struts runtime
No conversion required to enable
Associated with "Command key actions"



Clicking the "Add..." button allows you to associate the "Report Service" with any command key

IBM is also providing a Web interface to the most requested system support - WRKSPLF.

Key Association

■ Associating a key with Report Service

Can specify any command key
If other vendors have provided services, they would appear in this list
You can also specify the button label

■ The last option allows you to control visibility

Unchecked, the command key will appear on screens even if the DDS screen did not have it.
Checked, you are replacing the function of an existing key.

The new key will only appear on screens that have enabled the selected command key
This can be controlled by the RPG application

Command key: F9
Action name: Report Service
URI or URL: RetrieveListOfReports.do
Target frame: *NEW
Button label: List Reports
 Enable only when the command key is active
OK Cancel

WebFacing Example

■ WRKSPLF example:

Our original screen has no reference to F9
Add button called "List Reports"

Notice no printing button

The screenshot shows a web browser window displaying a customer inquiry screen. The browser's address bar contains the URL: `http://localhost:9080/wf/test/WFLogin?inv=4951654&currCacheOff=104682007375`. The page title is "call guides1" and the page content includes "03/04/03" and "CelDial - Customer Inquiry". A prompt says "Enter a customer number and press Enter." followed by a text input field labeled "Customer number" and a "Number, F4 for list" label. A vertical menu on the left contains the following items: Enter, Exit, Prompt, Print, Cancel, and HELP. A red circle highlights this menu, with an arrow pointing to the text "Notice no printing button".

An "Add command key action" dialog box is open over the browser window. It has the following fields:

- Command key: F9
- Action name: Report Service
- URI or URL: RetrieveListOfReports.do
- Target frame: *NEW
- Button label: List Reports
- Enable only when the command key is active:

Buttons for "OK" and "Cancel" are at the bottom right.

WebFacing Example

- **WRKSPLF example:**

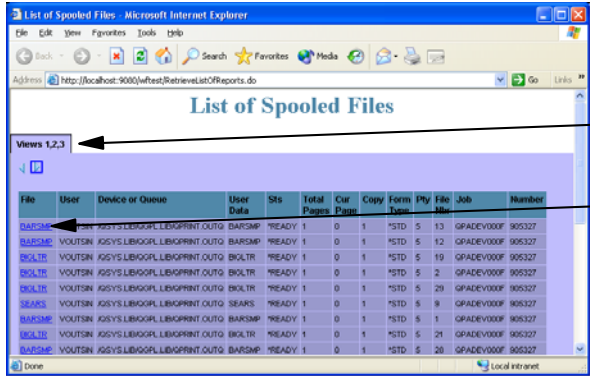
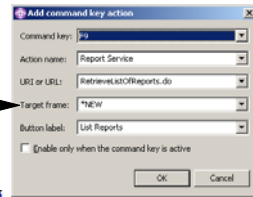
After adding the command key, just restart application
This key is now accessible via F9 or the button
And based on our decision, its available on every page.

Notice new
"List Reports"
button



WebFacing Example

- WRKSPLF example:**
 Pressing F9 or the button launches support
 Can control browser with "Target Frame"
 *NEW will launch a new browser to handle the output from the service
 *SAME will use the existing browser

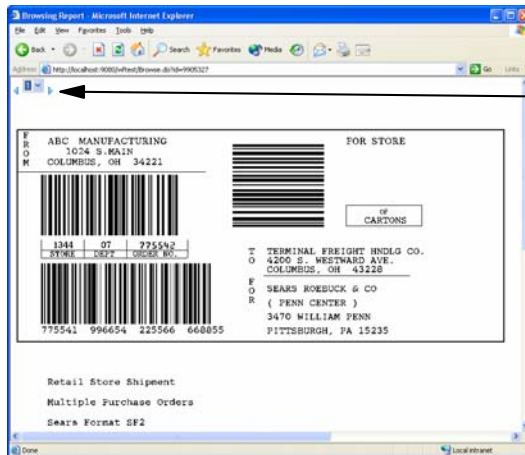


- Lots of spooled files for my userid, so 3 pages were created.
- Spooled files become links.

WebFacing Example

■ WRKSPLF example:

Selecting a Spooled File link brings up the GIF image of each page



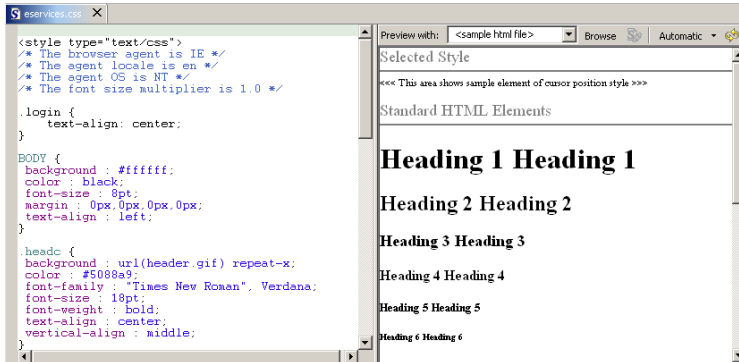
- User can page through using previous & next buttons
- User can also select a page from the drop-down

WebFacing Example

■ WRKSPLF example:

You can customize the Spooled Files list by editing the `eservices.css`

The Cascading Style Sheet editor helps to simplify this process



Helps Change:

- Colours
- Fonts
- Font sizes
- Table size
- Table colours
- etc...

WebFacing with Struts

■ Associating a key with any web application

This includes a URL

The Action name helps you find the action in the generated code.

■ Same controls as before

Unchecked, the command key will appear on screens even if the DDS screen did not have it. Checked, you are replacing the function of an existing key.

The new key will only appear on screens that have enabled the selected command key
This can be controlled by the RPG application



Command key: F8

Action name: go to ibm

URI or URL: http://www.ibm.com

Target frame: *NEW

Button label: Big Blue

Enable only when the command key is active

OK Cancel

WebFacing with Struts

- **Web Site call example:**

After adding the command key, just restart application
Can be any web application

Notice new
"List Reports"
button

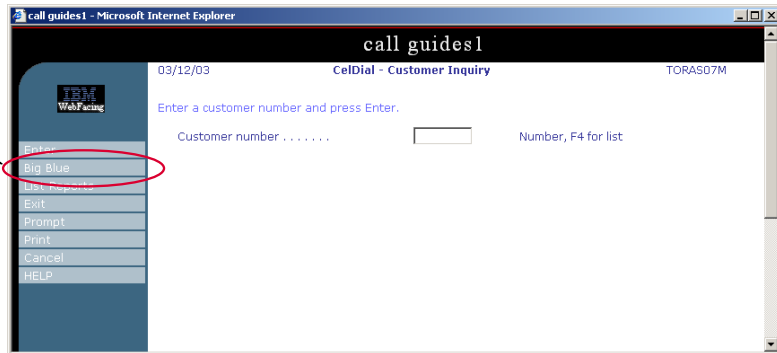


Table of contents

Quick Overview

EJB Tooling

Profiling Tooling

iSeries JCA Connector

WebFacing Tool - Struts

 **WebFacing Tool - CustomTags**

Reference

Visual Custom Tags bring some of the power of DDS to Web pages. You can use IBM and user-defined custom tags to enhance customization

WebFacing Tool - Custom Tags

- What is it?

- WebFacing is now extensible

- At WebFacing conversion time it is now possible to interact with the DDS to JSP conversion process

- Change the HTML that is emitted into the JSP for each field

- Example: Date field becomes an icon that launches another link

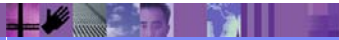
- Who is it for?

- Advanced users who are interested in writing a custom tag library for use with WebFacing Tool

- Requires advanced understanding of HTML, Java and JSP tags

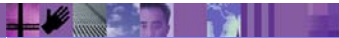
- Could be for internal use

- Could also offer support to others



WebFacing Tool - Custom Tags

- How to extend?
 - Based on Eclipse extension points
 - Requires knowledge of Eclipse (www.eclipse.org)
 - Create a plugin that extends the WebFacing Tool by providing appropriate Generators
 - Eclipse tooling helps build plugins
 - These Generators would then be called by WebFacing during conversion
- 3 Generator Types
 - 1: Handle all fields types that are directed to it
 - `com.ibm.etools.iseries.webfacing.convert.external`
(Interface) `IFieldTagGenerator`
 - 2: Generator will key off of WebSettings values on the field
 - `com.ibm.etools.iseries.webfacing.convert.external`
(Interface) `IWSTagGenerator`
 - 3: The main HTML construct that is emitted
 - `com.ibm.etools.iseries.webfacing.convert.external`
(Interface) `IWSSubTagGenerator`



WebFacing Tool - Custom Tags

- **Future**
 - More to come
 - Future extensions based on user feedback

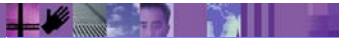


Table of contents

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- WebSphere Studio Tools for the Enterprise Kits
<http://www.ibm.com/websphere/enterprisetools/>
- WebSphere Studio family
<http://www-3.ibm.com/software/ad/adstudio/>
<http://www-3.ibm.com/software/info1/websphere/index.jsp?tab=products/studio>
- WebSphere Studio Developer Domain (WSDD)
www.ibm.com/websphere/developer/zones/studio
- WSAD Migration Guides
www.ibm.com/websphere/developer/zones/studio/migration.htm
- WebSphere Studio Partner Program
www.ibm.com/partnerworld
- WebSphere Studio Plug-in Central
<http://www7b.boulder.ibm.com/wsdd/downloads/plugin/>
- Education
<http://www-4.ibm.com/software/ad/studioappdev/education>
- Eclipse
<http://www.eclipse.org>



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- **Acknowledgment:**

This presentation is a collaborative effort of the IBM Toronto iSeries Application Development presentation team, including work done by:

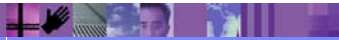
Alison Butterill, David Muir

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Summary

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iSeries JCA Connector

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WebFacing Tool - CustomTags

Reference



This presentation gave you an overview of Development Studio Client and is then followed by discussion of the EJB Tool, the Profile Tool, iSeries JCA Connector, the IBM WebFacing Tool now with Struts support and the IBM WebFacing Tool with Custom Tags. The last topic covered sources of further reference information.



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IBM WebSphere Development Studio Client for iSeries: Advanced

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 e-business software

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