



WebSphere Development Studio Client Advanced Edition



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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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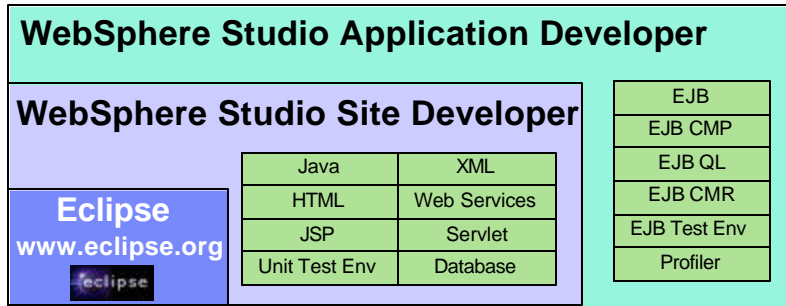
Agenda

- ▶ Quick Overview
- ▶ EJB Tooling
- ▶ Profiling Tooling
- ▶ iSeries JCA Connector
- ▶ WebFacing Tool - Struts
- ▶ WebFacing Tool - CustomTags
- ▶ Reference

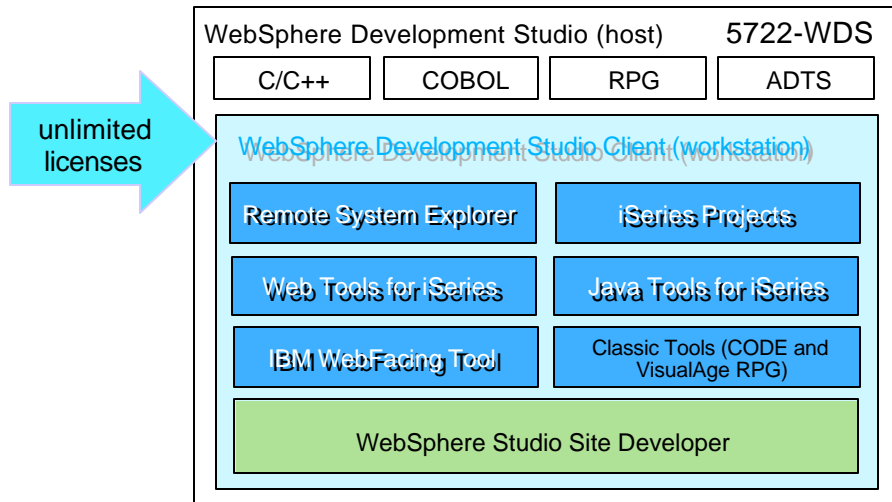
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- ▶ Quick Overview

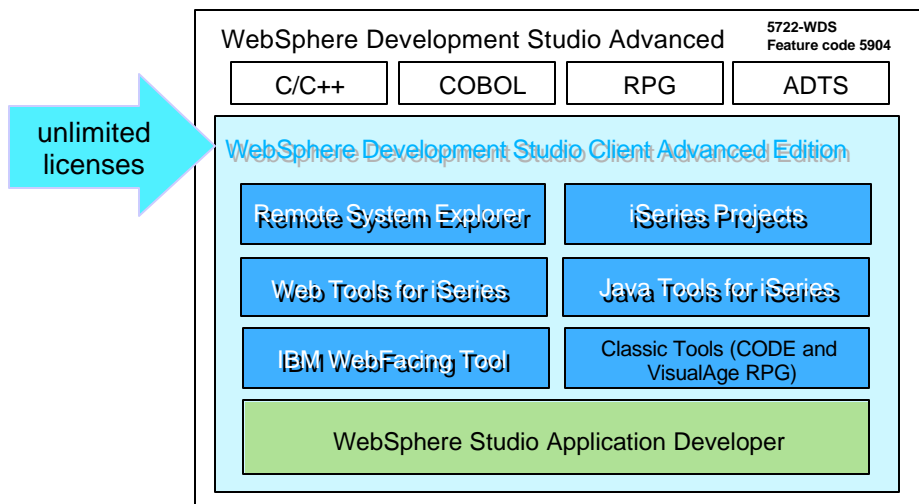
WebSphere Products



iSeries Packaging for Version 5.0



iSeries Packaging for Version 5.0



WSAD V5 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

New V5 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

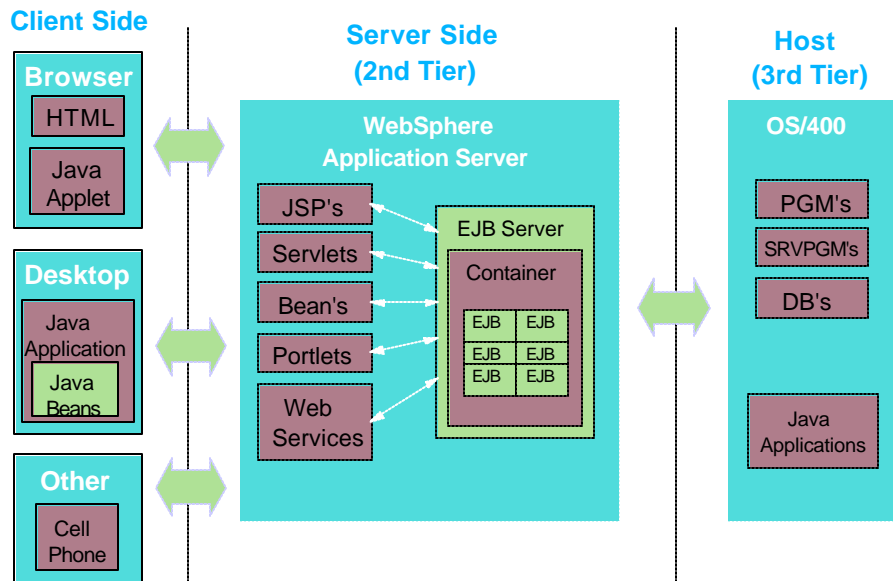
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- ▶ EJB Tooling

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



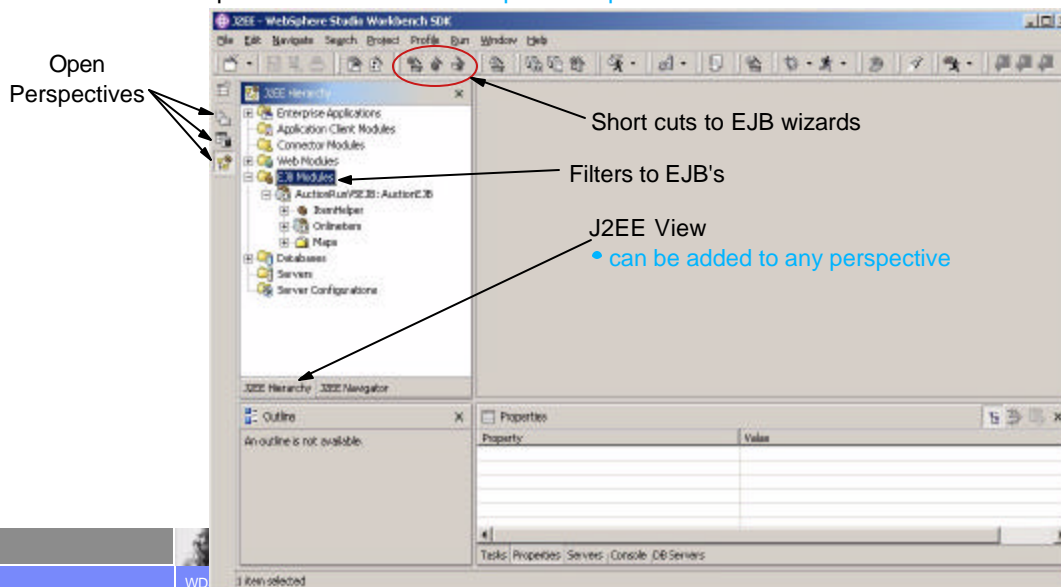
EJB Applications

- ▶ **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



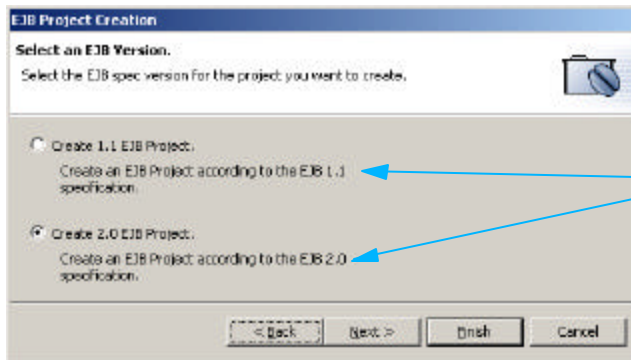
EJB 2.0 Support

- **J2EE Perspective**
 - ▶ Helps to focus development on EJB tools
 - ▶ To open select "**Window -> Open Perspective -> J2EE**"



EJB 2.0 Projects

- **EJB 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

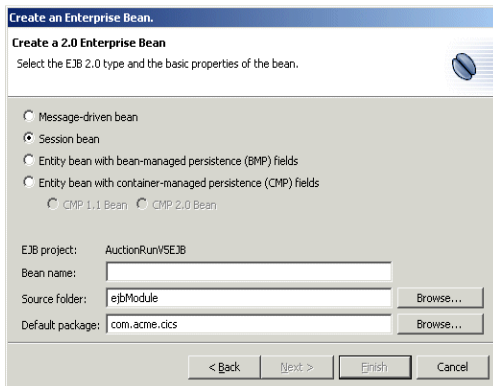


Can create both EJB 1.1 or EJB 2.0

EJB 2.0 Wizards

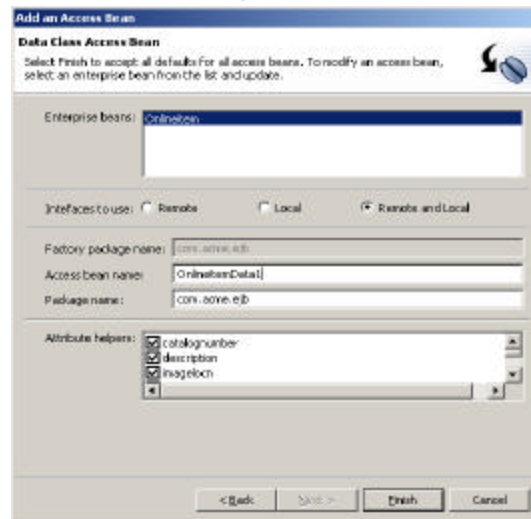
Wizard can create:

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



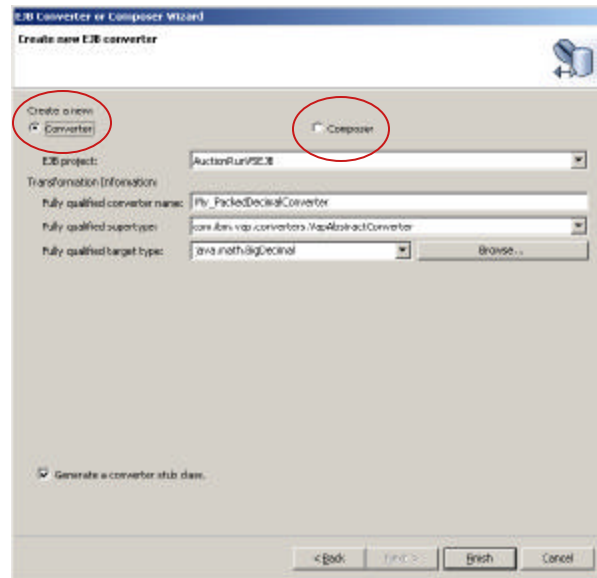
Wizard help wrapper database with EJB

- Can select fields to expose



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"

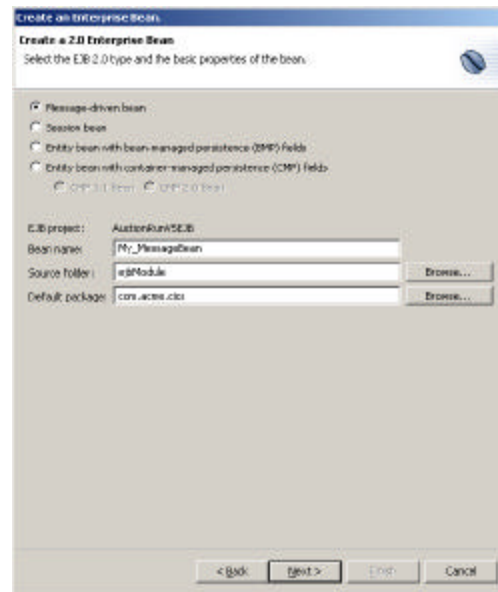
EJB 2.0 Support

- **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

EJB 2.0 Support

- **Message Driven bean wizard**

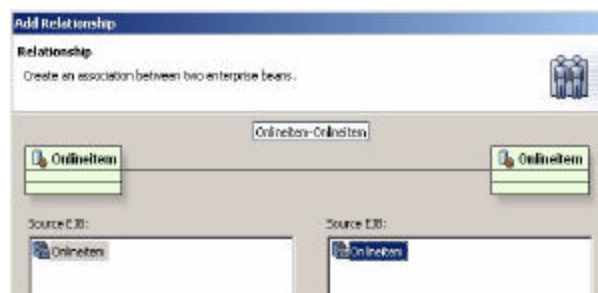
- ▶ Transaction-aware components that process asynchronous JMS messages
- ▶ Essentially acts like a JMS message listener from outside processes
 - ✓ **JMS** - Java Message Services, a clever way of talking between processes/jobs/etc
 - ✓ Same idea as - **DataQueues**



EJB 2.0 Support

- **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

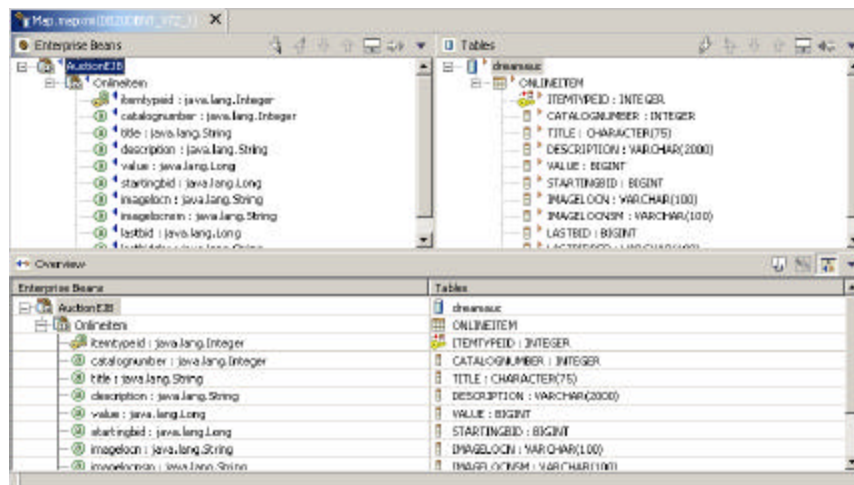


EJB - Database mapping

- **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

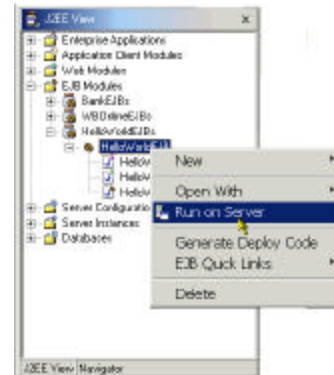
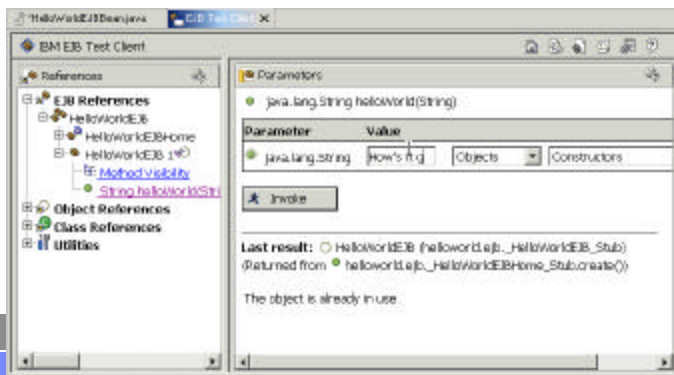
EJB - Database mapping

- **Mapping Editor**
 - ▶ Provides high level overview of associations in the EJB



EJB 2.0 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



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WDS Advanced Edition

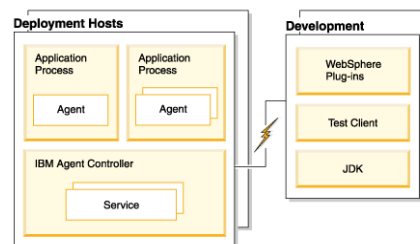
- ▶ Profiling Tooling

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

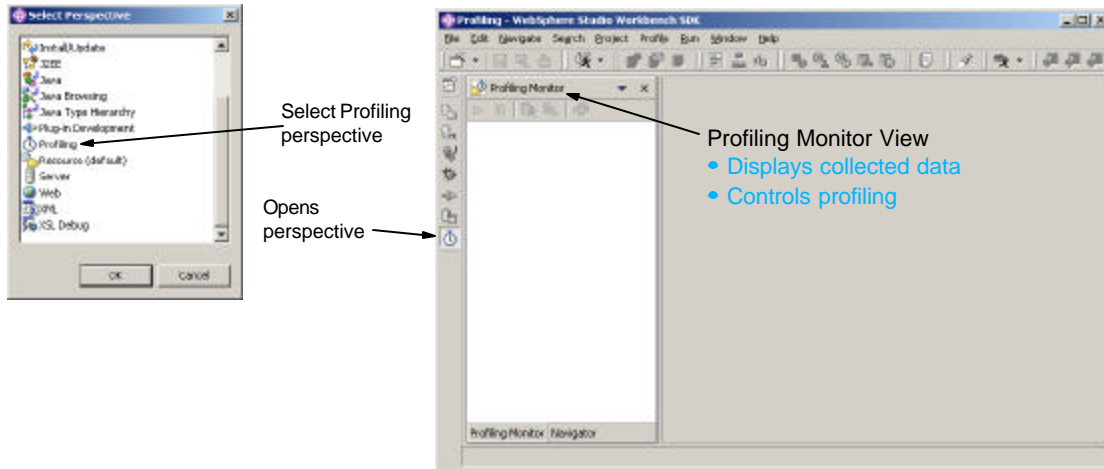
- **How does it work?**
 - ▶ Profiling depends on agents to monitor JVM
 - ▶ The "Agent Controller" works with agents to retrieve data
 - ▶ Each application process being profiled may have a profiling agent running within it
 - ▶ A single workbench, can interactively profile any one or many of these 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 Support

- **Profiling Perspective**

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



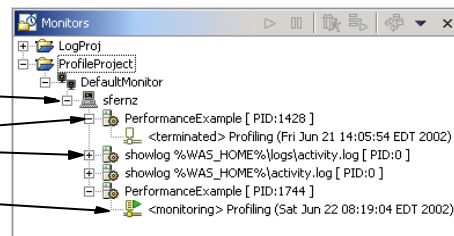
Profiling Support

- **Information display**

- ▶ Default monitor configured for local development workbench
 - ✓ Java applications
 - ✓ WebSphere unit test environment

- **Monitors View**

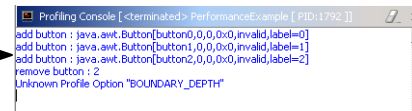
- ▶ Filters by host, in this case the local development machine
- ▶ Shows all applications being monitored on the selected machine
- ▶ Shows current status of collected data
 - ✓ Is it still collecting, or has it ended
 - ✓ Timestamp of start and end



Profiling Support

- **Profiling Console**

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

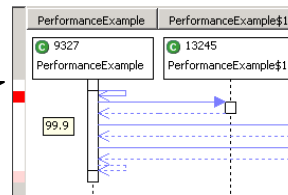


```

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



WDS Advanced Edition

- ▶ iSeries JCA Connector

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

iSeries JCA Connectors

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

The screenshot shows the 'J2C Options' dialog box in the IBM WebSphere IDE. The 'J2C Resource Adapters' table is empty, and the 'Add...' button is circled in red. An arrow points from this button to the 'Create Resource Adapter' dialog box, which is open and shows the configuration for a 'SeriesPgmCall' resource adapter. The 'Add...' button in the 'J2C Options' dialog is highlighted with a red circle, and an arrow points from it to the 'Create Resource Adapter' dialog box, indicating that clicking 'Add...' opens this configuration window.

Resource Adapter name	Display name	Vendor name	Spec version
WebSphere Relational ...			

Name	JNDI name	Description

Name	Type	Value

Create Resource Adapter

Resource Adapter Name: SeriesPgmCall

Display name: iSeries 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.iSeriesPgmCall.ISeriesPgmCallManagedConn

Connection factory interface: javax.resource.cdi.ConnectionFactory

Connection factory impl: com.ibm.connector2.iSeriesPgmCall.ISeriesPgmCallConnectorFac

Connection interface: javax.resource.cdi.Connection

Connection impl: com.ibm.connector2.iSeriesPgmCall.ISeriesPgmCallConnector

Archive path:

Module path:

Classpath: D:\MUTemp\out\workspace2\iSeries\src\connectorModule\j2c

iSeries JCA Connectors

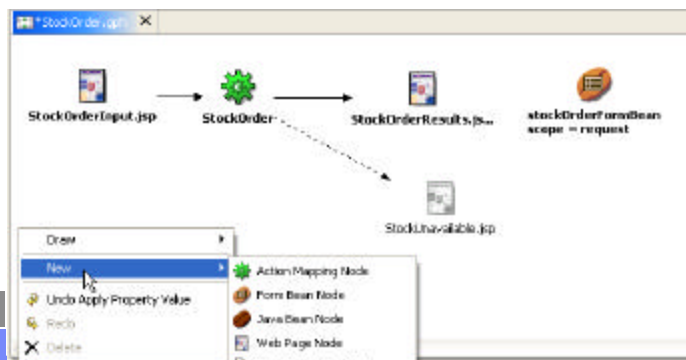
- **More Connector tooling**
 - ▶ Provided in WebSphere Studio Application Developer Integration Edition
 - ▶ WSAD-IE contains everything in WSAD plus more
 - ▶ Tooling designed to focus on
 - ✓ Connectors
 - ✓ Business Flow

WDS Advanced Edition

- ▶ WebFacing - Struts

WebFacing Tool - Struts

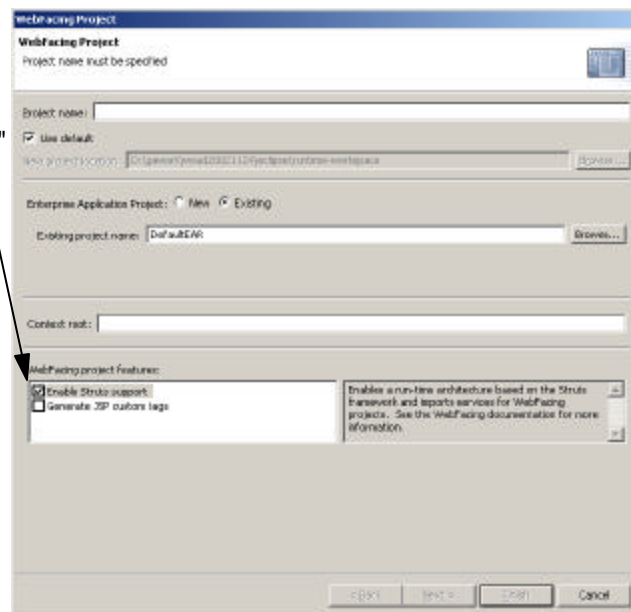
- **What is Struts**
 - ▶ A framework for building web applications based on Model-View-Controller
 - ▶ Provides internal caching and lower runtime memory requirements
- **Easier integration**
 - ▶ Extension points can integrate with other Struts-based services
 - ▶ Dedicated diagram editor helps organize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



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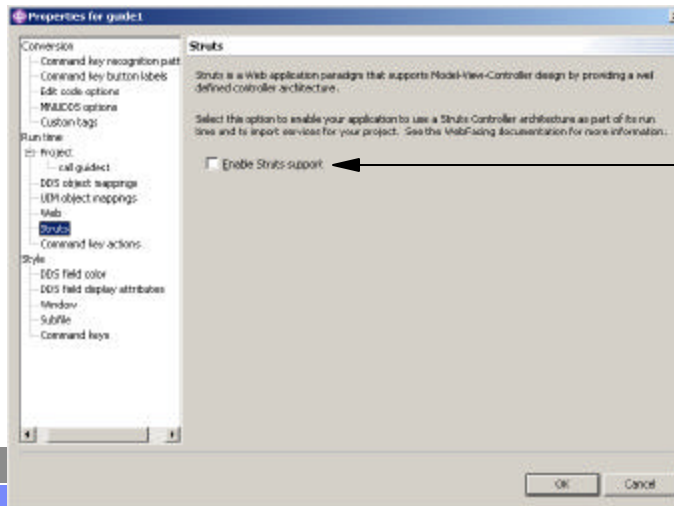
WebFacing Tool - Struts

- **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 Tool - Struts

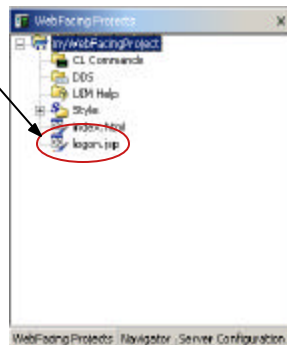
- **Enabling Struts in existing WebFacing Projects**
 - ▶ Project properties can also enable the Struts support
- **Enabling Struts has the same effect as project creation**
 - ▶ Struts enabled WFRun.jar
 - ▶ Logon.jsp becomes starting point



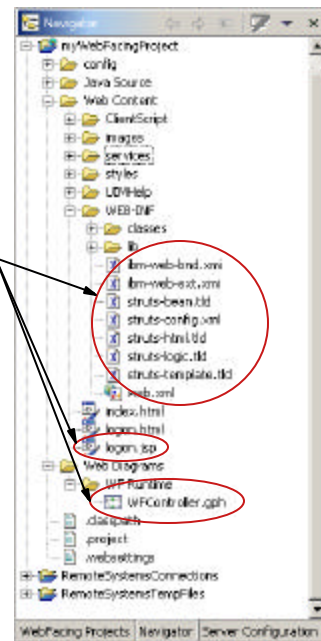
WebFacing Tool - Struts

- **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

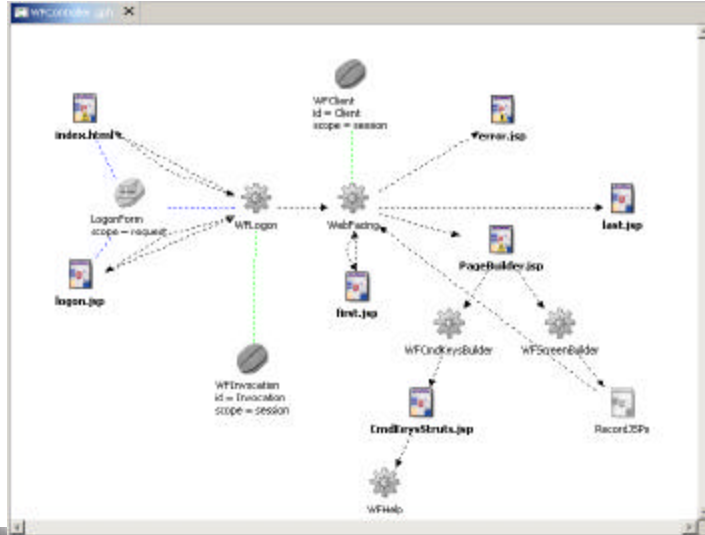


WebFacing Tool - Struts

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

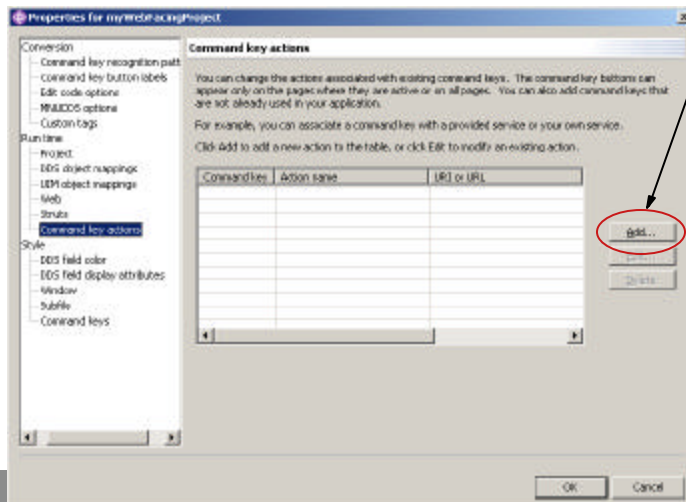
- This diagram is a representation of all WebFacing Applications.

- Helps users extend a WebFacing Application
- First extension:
 - ✓ **WRKSPLF**



WebFacing Tool - Struts

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

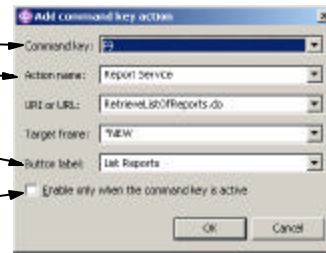


▶ Clicking the "Add..." button allows you to associate the "Report Service" with any command key

WebFacing Tool - Struts

- **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**

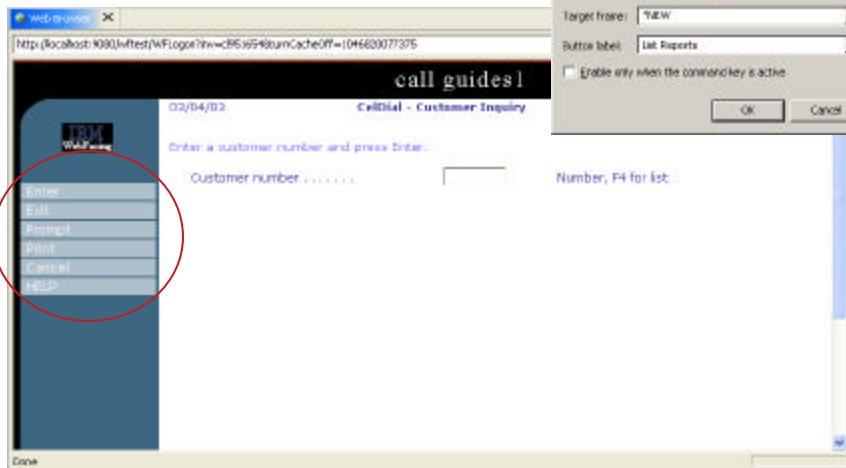
- ▶ Unchecked, the command key will appear on screens even if the DDS screen did not have it.
- ▶ Checked, you are replacing the function of an existing key.
 - ✓ The new key will only appear on screens that have enabled the selected command key
 - ✓ This can be controlled by the RPG application

WebFacing Tool - Struts

- **WRKSPLF example:**

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

Notice no printing button



WebFacing Tool - Struts

• 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.

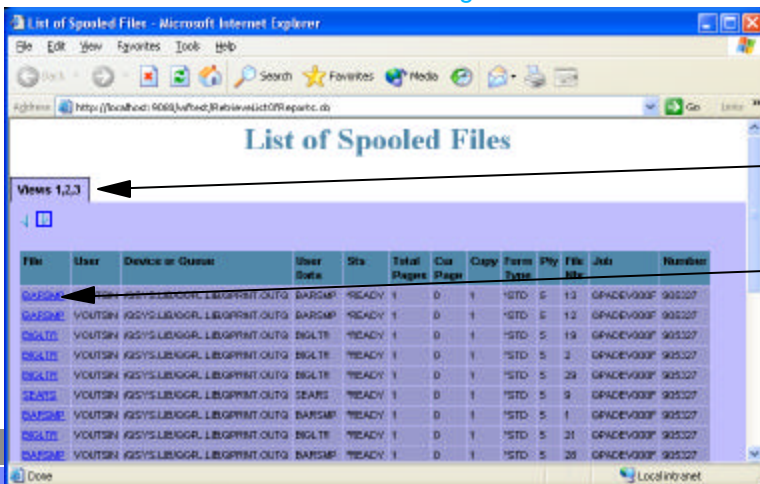
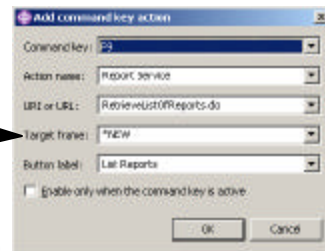
Notice new "List Reports" button



WebFacing Tool - Struts

• 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

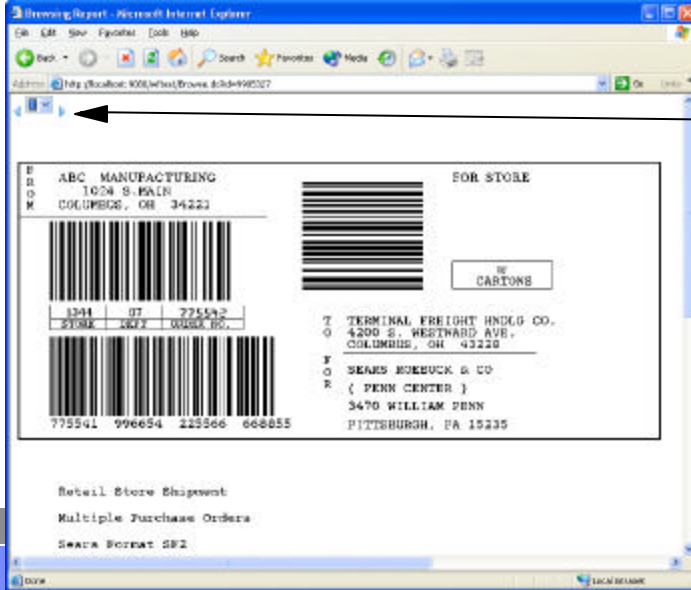


- Lots of spooled files for my userid, so 3 pages were created.
- Spooled files become links.

WebFacing Tool - Struts

- WRKSPLF example:**

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

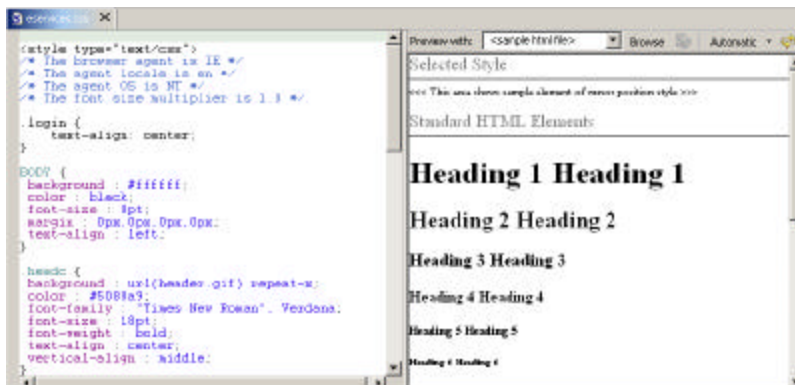


- User can page through using previous & next buttons
- User can also select a page from the drop-down

WebFacing Tool - Struts

- 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...

WDS Advanced Edition

▶ WebFacing Tool - Custom Tags

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

WDS Sc Advanced Edition

▶ Reference

- ★ **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>