

Guided Tour of WDS and WDS_c For RPG and COBOL programmers

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the power of one

IBM System i5 ITSO Technical Forum 2006

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Redbooks
International Technical Support Organization

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Strategy & Packaging Eclipse & Rational Studio family

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iSeries Application Development Strategy



Build Community



Build Excitement

iSeries Application Development Strategy

New Packaging

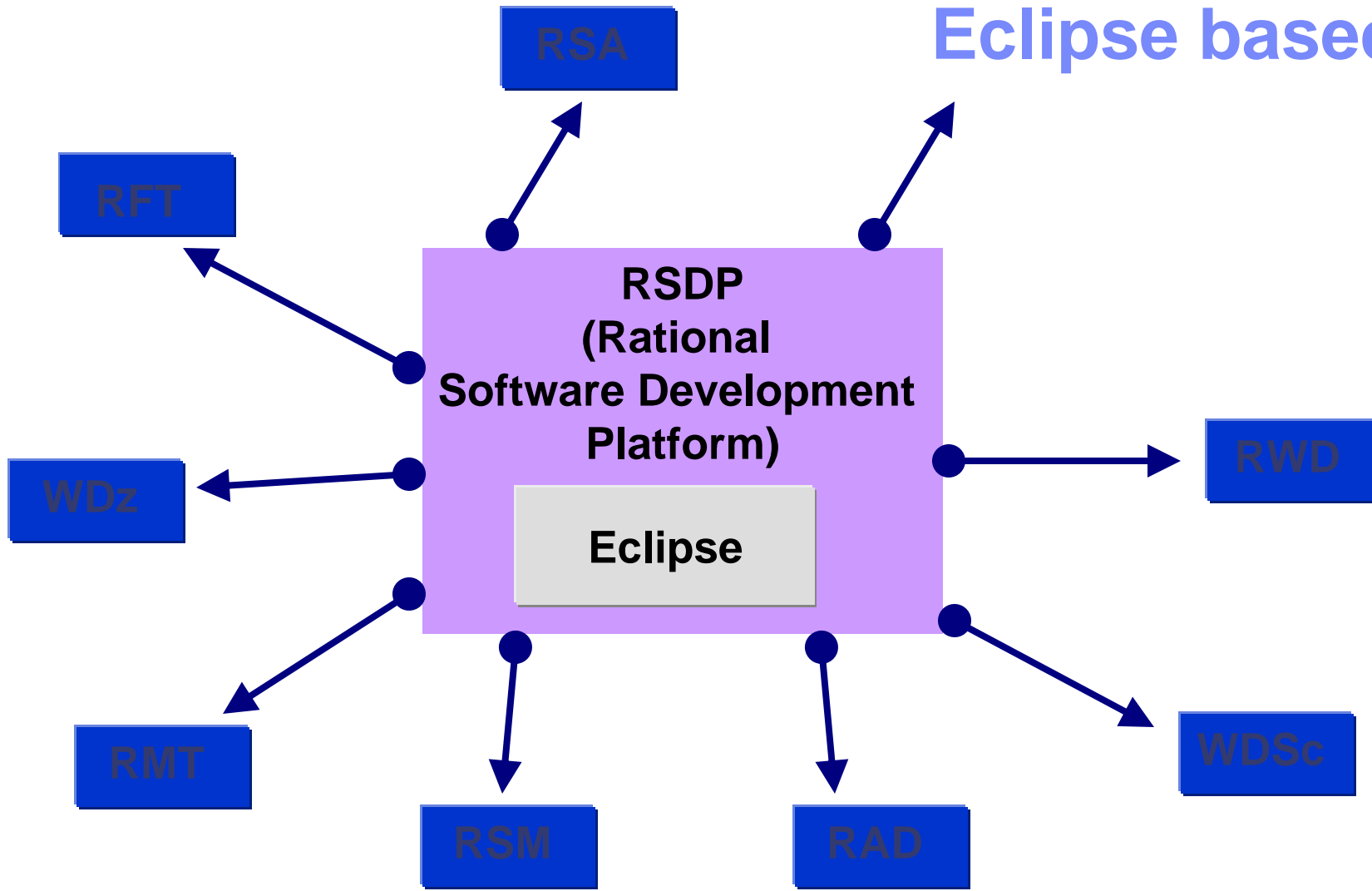
New Technology

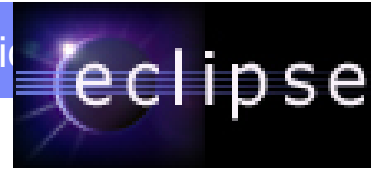
New Tools

New User Interface

Rational Family Tools ... Componentization

Eclipse based...





Eclipse – Java Toolset

- Now based on Eclipse V3
- A base **I**ntegrated **D**evelopment **E**nvironment (IDE)
 - Comes with built-in rich Java tools
 - Extensible via plug-ins
- Used as basis of products
 - Product = Eclipse + plug-ins
- Open source
 - Contributed by IBM, managed by consortium
- Popular!
 - Millions of user downloads
 - 45 products offerings powered by Eclipse
 - Over 115 companies in consortium
 - Over 175 companies writing plug-ins



Rational
the software development company



Instantiations



Borland

catalyst
SYSTEMS CORPORATION



FUJITSU THE POSSIBILITIES ARE INFINITE



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Technologies

Build Better Software™



MONTAVISTA
SOFTWARE



TRANS-ENTERPRISE



i n v e n t



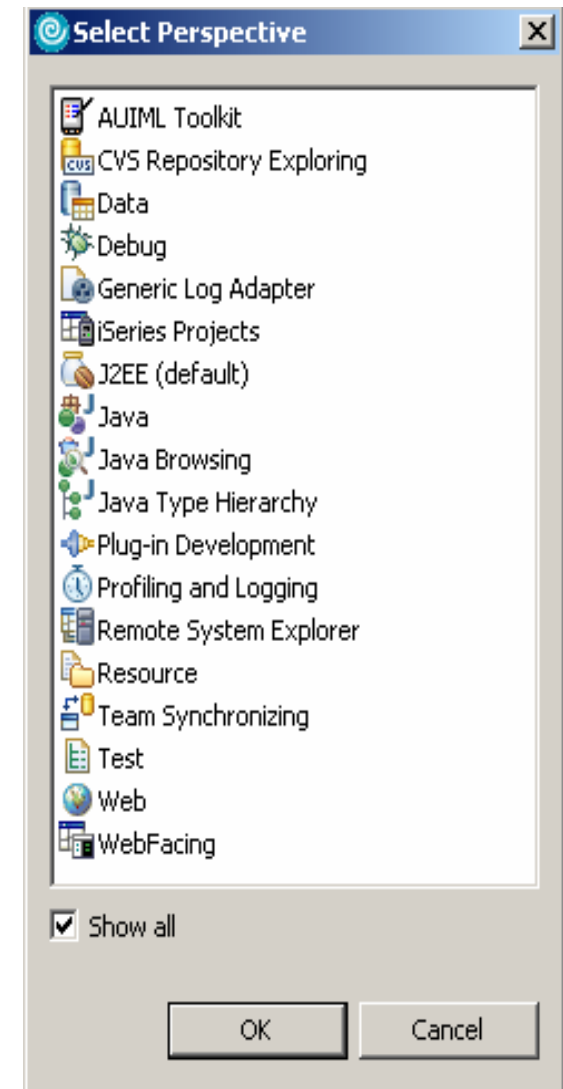
serena™ Automating Change to Enterprise Code and Content

SYBASE



New term “Perspectives” in Eclipse

- **Users work with perspectives**
 - Collection of **views** and **editors**
 - Tools for a particular task
 - Allows for role-based development
 - Many perspectives are pre-supplied for specific tasks like **Java, Web, XML, RPG/CBL**
 - Users can create their own perspectives
- **The user interface is very Windows-like**
 - Build from a **Java wrapper of OS widgets**
 - Behaves and feels like any other native application
 - Views can be re-sized and re-positioned through drag ‘n drop



Sample of Eclipse workbench (RSE perspective)

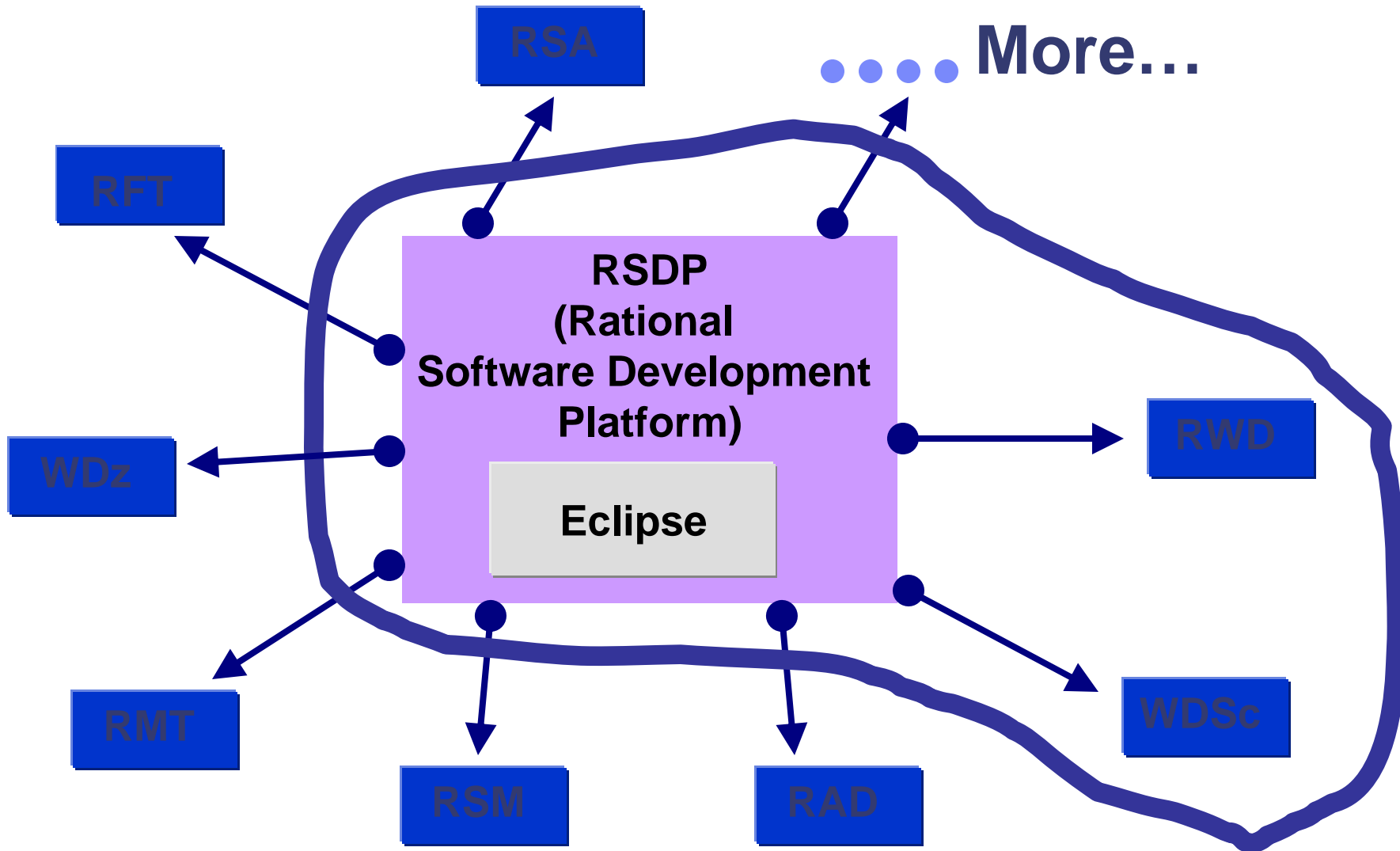
The screenshot displays the Eclipse RSE perspective with several views highlighted by blue boxes and labels:

- Editor:** The central window showing the source code of GETDATA.RPGLE.
- View:** The Outline view on the right showing the project structure.
- View:** The Remote System Details view at the bottom, which is highlighted with a green box and a green arrow pointing to it from the 'Other open views' label.
- View:** The Properties view at the bottom left.
- View:** The Remote Scratchpad view at the bottom left.

The Editor view contains the following code:

```
Line 1      Column 1      Replace
.....1.....2.....3.....4.....+
000100      *
000200      *
000300      *
000400      *
000500      *
000600      *
000700      * F spec for file CUSTOML3 keyed by c
000800      FCUSTOML3  IF   E           K DISK
000900      F*
001000      D*Input parameter from Web page
001100      DCustnoi          S
001200      D* Data structure to specify output str
001300      D CSTRUC          E DS
001400      D feedback        S           20
001500      C *entry          plist
```

WebSphere Development Studio Client



WebSphere Development Studio

Current 5722-WDS customers with software subscription for V5R3, to upgrade to WDSc V6.0 use feature #: 2656
Available after GA

RPG	COBOL
C/C++	PDM SEU SDA RLU

Upgrade from WDS 6.0 to 6.0.1 using Rational Product updater

Unlimited Licenses

New WDS Lite
Technology preview

iSeries	iSeries	iSeries	iSeries	Web Facing WDHT support	iSeries Projects	+CODE +VisualAge RPG	
Java™	Debug	Struts Web	Web Service		RSE		
JSF	EGL Java generation	Trace	Profiling	DB	XML	App Server	HATS Toolkit

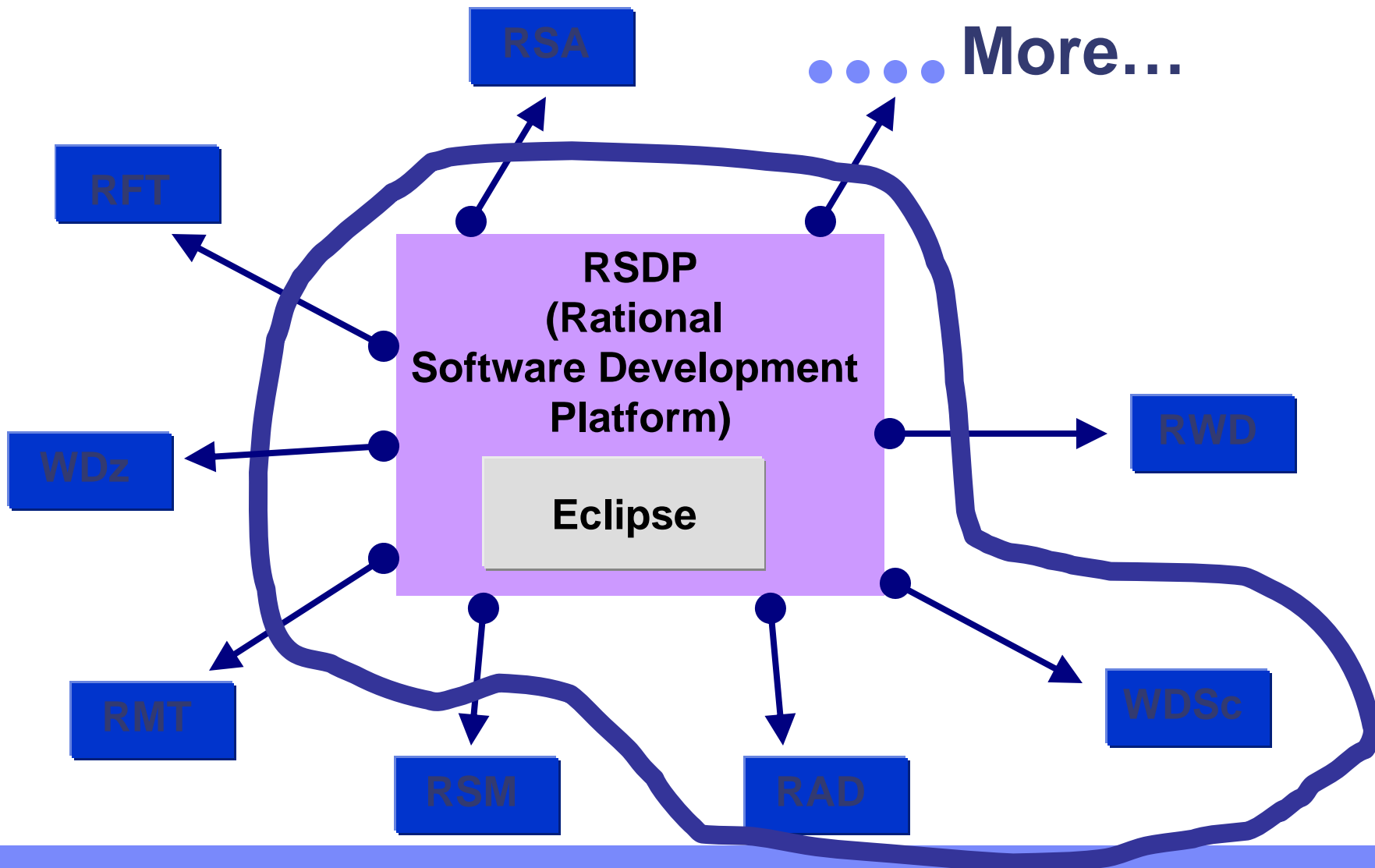
www.ibm.com/software/awdtools/iseries

WebSphere Development Studio Client V6.0.1 based on RWD V6

WDS V5R4 and WDSC V 6.0 and 6.0.1

- WDS V5R4
 - RPG enhancements
 - COBOL enhancements
- WDS Sc 6.0 is built with
 - Eclipse 3.0
 - WDS Sc Lite Technology Preview added in V6.0.1
 - WebFacing does not depend on CODE/400
 - Product co-exist with WDS Sc 5.x.x
- CODE/400 and VARPG shipped on separate CDs
 - Now optional install

WebSphere Development Studio Client - Advanced

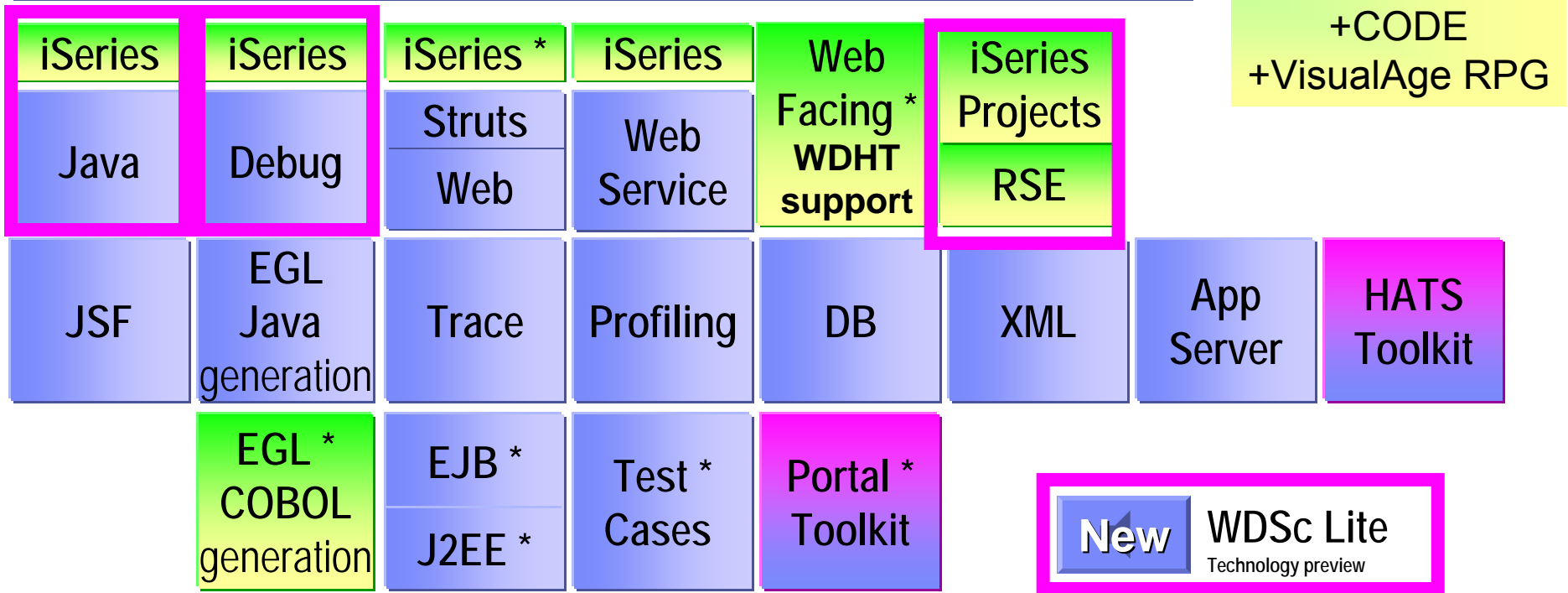


WebSphere Development Studio Client Advanced Edition 6.0.1

*Workstation License
order through Passport Advantage*

**Upgrade from WDS 6.0 to 6.0.1 using Rational
Product updater**

http://www.lotus.com/services/passport.nsf/WebDocs/Passport_Advantage_Home



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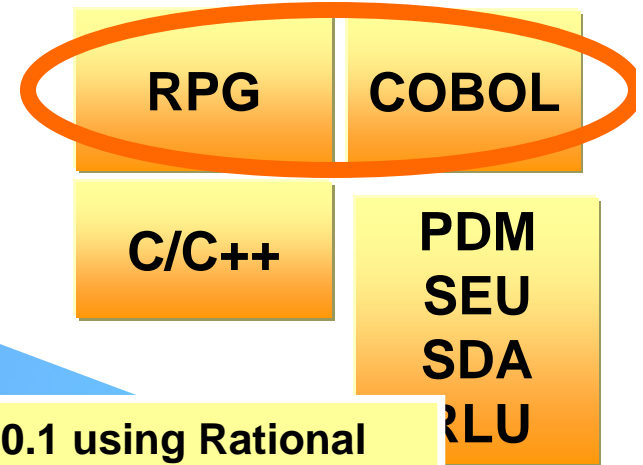
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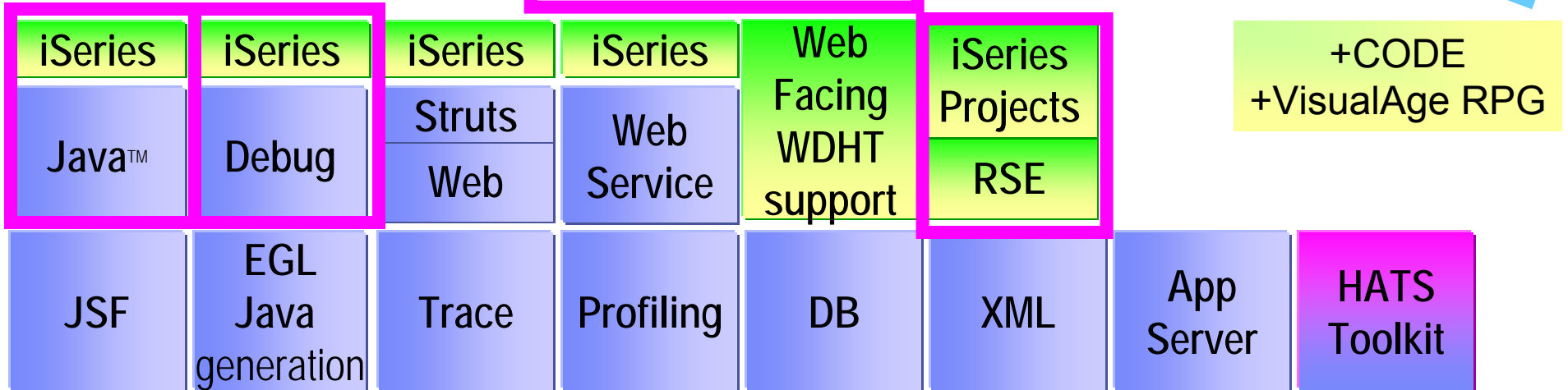
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Upgrade from WDS Sc 6.0 to 6.0.1 using Rational Product updater

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New WDS Sc Lite
Technology preview



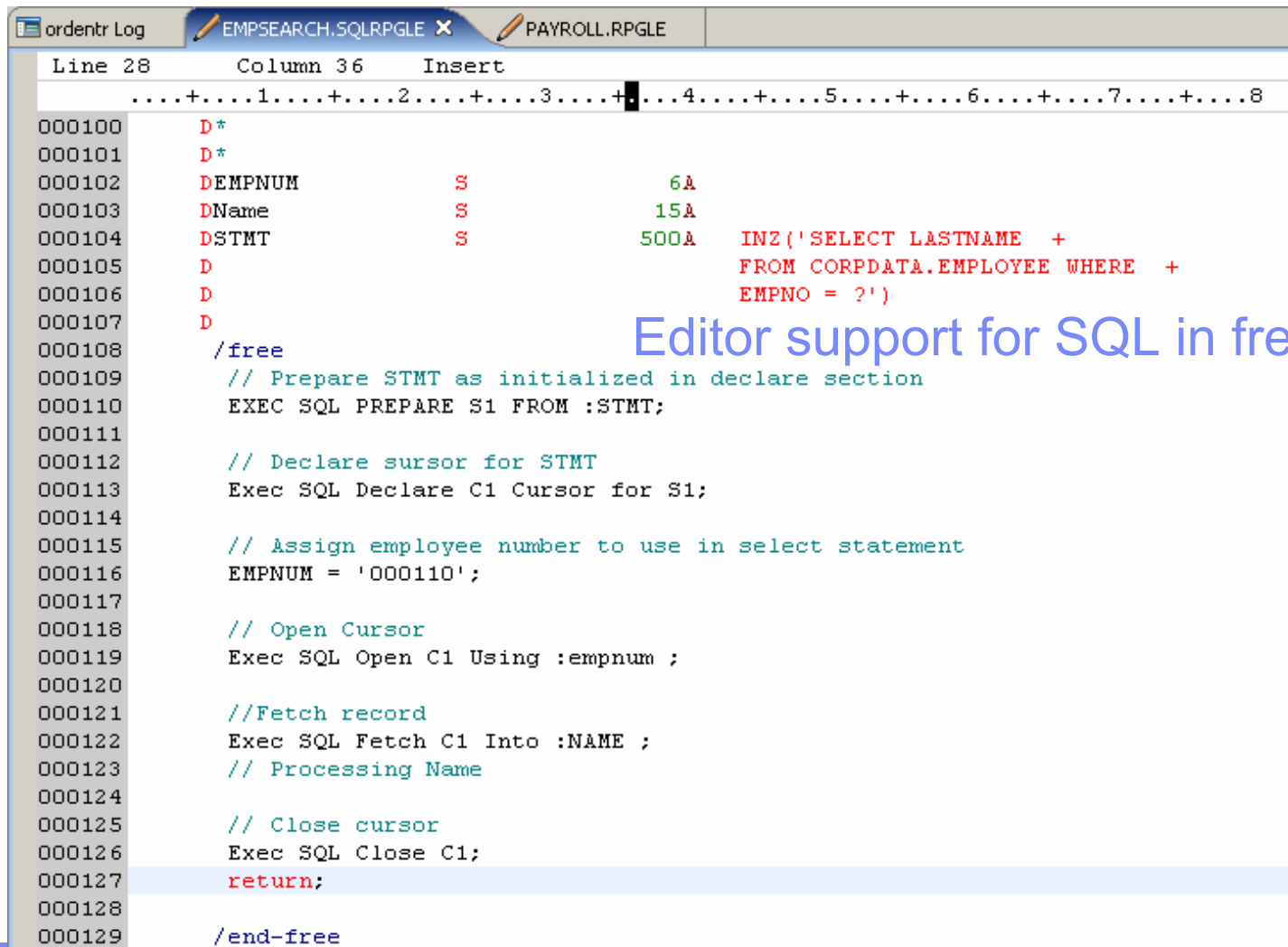
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WebSphere Development Studio Client V6.0.1 based on RWD V6

RPGIV V5R4

- Data structure copy
 - New operation code
 - Eval corresponding EVAL-CORR
 - Changed Prefix keyword
 - To remove Prefix from field names on external described structures
- XML support
 - New built –ins:
 - %XML
 - %Handler
 - New operation codes
 - XML-INTO
 - XML-SAX
- New prototyped parameter option
 - OPTIONS(*NULLIND)
- New Debug keyword values
 - *INPUT, *XMLSAX, *DUMP
- Embedded SQL support in free-form RPG
- SEU, add syntax checking for free-form RPG

Embedded SQL support in free form RPG



```
ordentr Log  EMPSEARCH.SQLRPGLE x  PAYROLL.RPGLE
Line 28      Column 36      Insert
.....1.....2.....3.....4.....5.....6.....7.....8
000100      D*
000101      D*
000102      DEMPNUM          S          6A
000103      DName           S          15A
000104      DSTMT           S          500A  INZ('SELECT LASTNAME +
000105      D              FROM CORPDATA.EMPLOYEE WHERE +
000106      D              EMPNO = ?')
000107      D
000108      /free
000109      // Prepare STMT as initialized in declare section
000110      EXEC SQL PREPARE S1 FROM :STMT;
000111
000112      // Declare sursor for STMT
000113      Exec SQL Declare C1 Cursor for S1;
000114
000115      // Assign employee number to use in select statement
000116      EMPNUM = '000110';
000117
000118      // Open Cursor
000119      Exec SQL Open C1 Using :empnum ;
000120
000121      //Fetch record
000122      Exec SQL Fetch C1 Into :NAME ;
000123      // Processing Name
000124
000125      // Close cursor
000126      Exec SQL Close C1;
000127      return;
000128
000129      /end-free
```

Editor support for SQL in free-form RPG

EVAL Corresponding

EVAL-CORR

An "EVAL-CORR" can be coded as opcode to move subfields in data structures with the same field names.

Example

```
D ds1      ds      qualified
D num      10i 0
D extra    d
D char     20a  varying
D otherfld 1a
```

* DS1 has some same fields as DS2

```
D ds2      ds      qualified
D char     25a
D otherfld 5p 0
D num      15p 5
```

// assign corresponding fields from DS1 to DS2

```
EVAL-CORR ds2 = ds1;
```

// Equivalent to ...

```
EVAL ds2.num = ds1.num;
```

```
EVAL ds2.char = ds1.char;
```

'otherfld' not assigned

XML Support overview ...

★ XML-INTO variable %XML(xml_document)

- Reads from an XML document into a field, data structure or array

★ XML-INTO %HANDLER(prototype : communication_area) %XML(xml_document)

- Reads from the XML document where there are zero or more repeated XML elements all the same.
- Repeatedly builds up an array of information about the XML elements and passes it to the handling procedure indicated by the prototype, until all the XML elements have been handled. The procedure also gets passed the communication_area variable as a parameter.

★ XML-SAX %HANDLER(prototype : communication_area) %XML(xml_document)

- Reads from the XML document. For every XML *event* (*start-element, character-data, attribute-value etc*), it calls the handling procedure indicated by the prototype passing it information about the XML event. The handling procedure also gets passed the communication_area variable as a parameter.
- First parameter of %XML can be a string actually containing XML data, for example '<a>Hello', or it can be the name of an XML document, for example 'mydata.xml'.
- Second optional operand for %XML specifies options to control the parsing of the XML document. (It doesn't have to be a literal.)

For example, %XML(xmldata : 'doc=file')

indicates that the first operand of %XML is the name of a file. Other options for XML-INTO control how to handle extra data or missing data, in the XML document. The "path" option indicates where to find the data in the XML (the necessary data may not be in the very first XML element).

EXAMPLE: XML-INTO variable %XML(xml_document)

```

D*****
*
D info          DS
D name          10A
D val           5I 0 DIM(2)
D*****
    
```

Target Field



```

MyFile.XML
<info>
  <name>George</name>
  <val>10</val>
  <val>-5</val>
</info>
    
```

/free

```
XML-INTO info %XML('myfile.xml' : 'doc=file');
```

// info now has the value

// name = 'George'

// val(1) = 10

// val(2) = 5

Source of XML

Options



COBOL V5R4

Version 5 Release 4

- * XML GENERATE:

- * Null-terminated Nonnumeric Literal:

- * TRIM, TRIML and TRIMR Intrinsic Functions:

- * DISPLAY-OF Intrinsic Function:

- * NATIONAL-OF Intrinsic Function:

- * *NOCOMPRESSDBG/*COMPRESSDBG
Compiler Options:

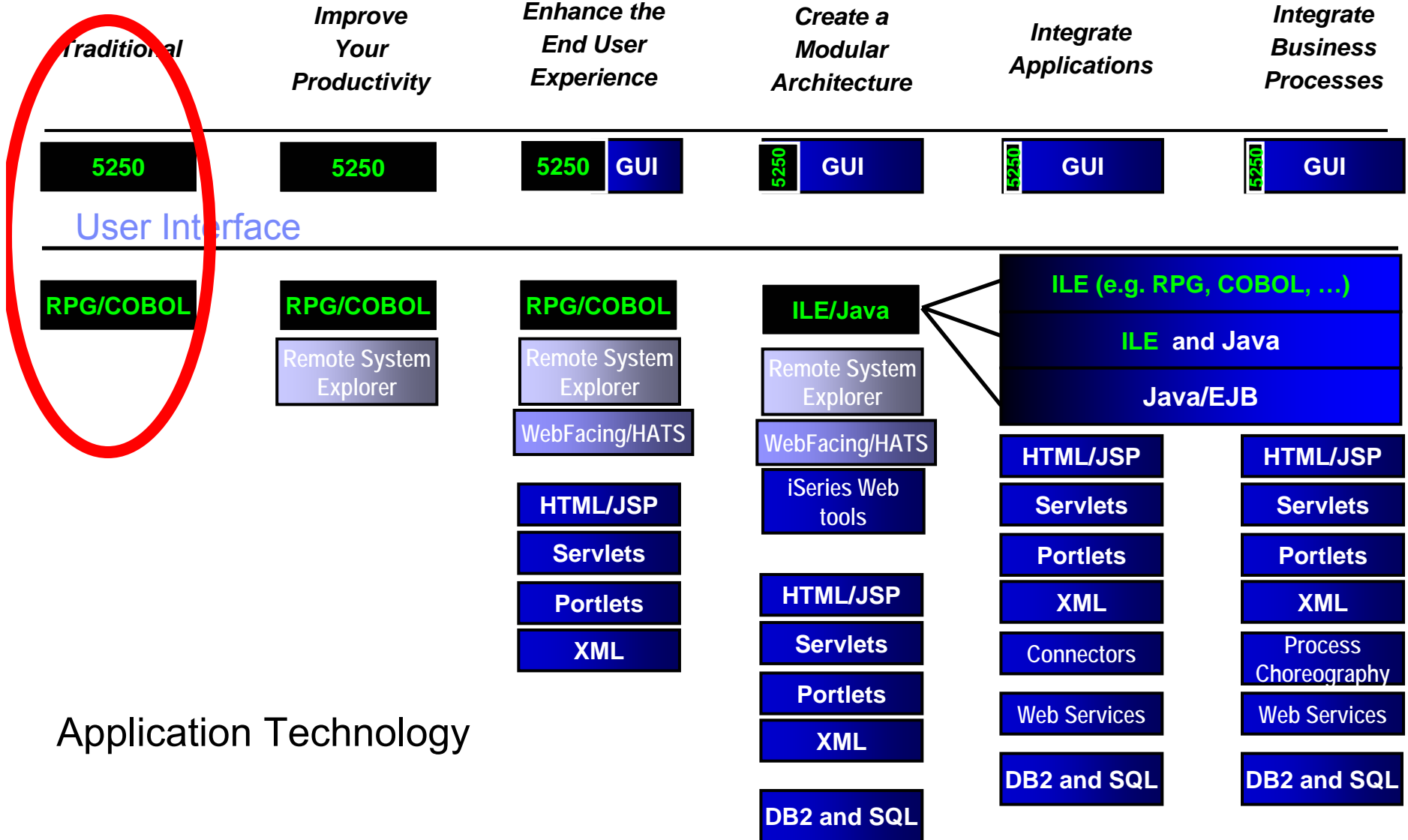
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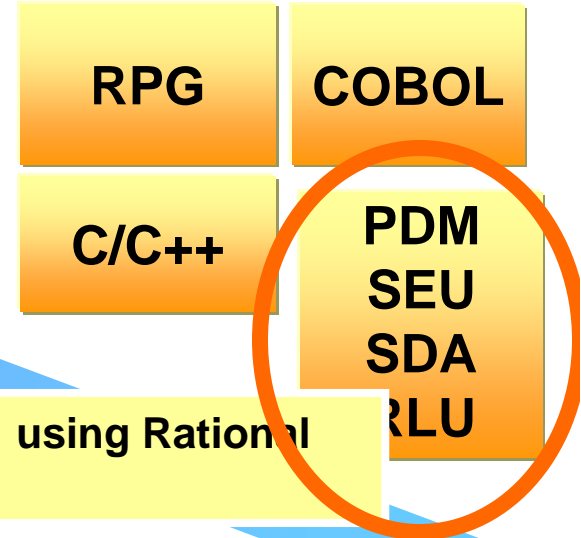
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iSeries Developer Roadmap



WebSphere Development Studio

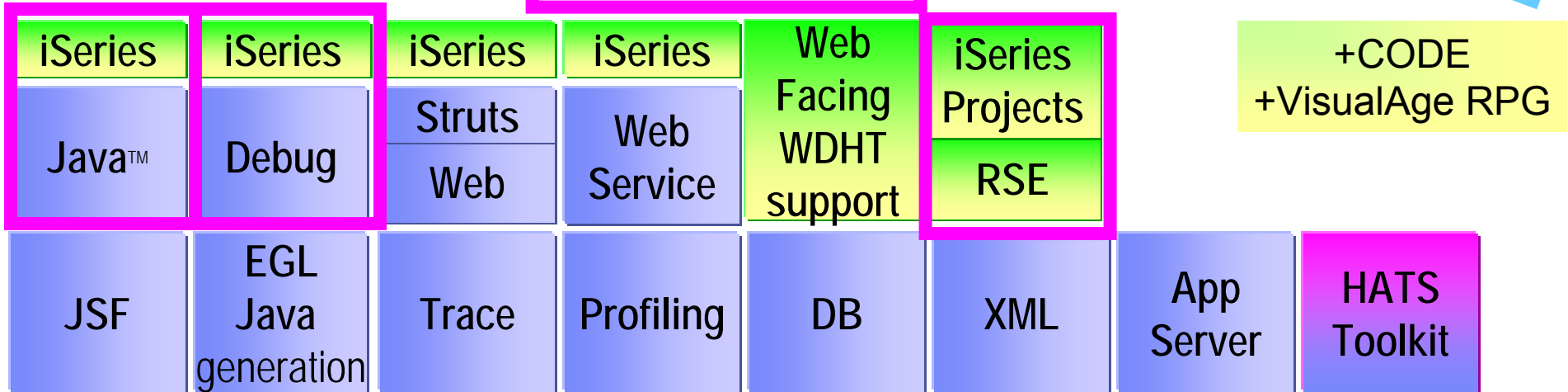
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Available after GA



Upgrade from WDS 6.0 to 6.0.1 using Rational Product updater

Unlimited Licenses

New WDSc Lite
Technology preview



www.ibm.com/software/awdtools/iseries

WebSphere Development Studio Client V6.0.1 based on RWD V6

```
Session A - [24 x 80]
File Edit View Communication Actions Window Help
Work with Objects Using PDM TORAS1FB
Library . . . . . APILIB _____
Position to . . . . . _____
Position to type . . . . . _____
Type options, press Enter.
 2=Change      3=Copy      4=Delete      5=Display      7=Rename
 8=Display description  9=Save      10=Restore    11=Move ...
```

ization

Today

```
Opt Object      Type      Attribute  Text
---  ---
---  CHGITEM      *PGM      DFU         CHGITEM
---  CSTMRINQR    *PGM      RPGLE      calling
---  DPCXRPG      *PGM      RPGLE      Sample
---  DQXRPG       *PGM      RPGLE      Data qu
---  INITP        *PGM      CLP
---  INVOKEJAVA   *PGM      CLE         C with
---  ORDENTR      *PGM      RPGLE      Parts 0
---  ORDENTRCL    *PGM      CLLE        call RP
Parameters or command
===> _____
F3=Exit      F4=Prompt  F5=Refresh
F9=Retrieve   F10=Command entry  F23=More o
```

```
Session A - [24 x 80]
File Edit View Communication Actions Window Help
Columns . . . . : 6 76
SEU==>
Edit APILIB/QRPGLSRC
0018.00 C*-----
0019.00 C      *ENTRY      PLIST
0020.00 C      PARM          OPTION      1
0021.00 C      PARM          IID
0022.00 C      PARM          INAME
0023.00 C      PARM          IPRICE
0024.00 C      PARM          IDATA
0025.00 C      OPTION      CASEQ      'S'      ONEREC
0026.00 C      OPTION      CASEQ      'A'      ALLREC
0027.00 C      OPTION      CASEQ      'F'      NXTREC
0028.00 C      OPTION      CASEQ      'E'      ENDPRG
0029.00 C      CAS          BADOPT
0030.00 C      ENDCS
0031.00 C*-----
0032.00 C* SUBROUTINE - ONEREC
0033.00 C* This subroutine attempts to find the requested item in the
0034.00 C* ITEM file. If the record is found, set the OPTION parameter
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve  F10=Cursor  F11=Toggle
F16=Repeat find  F17=Repeat change  F24=More keys
02/009
Connected to remote server/host toras1fb using port 23
```

No enhancements



WebSphere Development Studio

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RPG	COBOL
C/C++	PDM SEU SDA RLU

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New WDS Lite
Technology preview

iSeries	iSeries	iSeries	iSeries	Web Facing WDHT support	iSeries Projects	+CODE +VisualAge RPG	
Java™	Debug	Struts Web	Web Service		RSE		
JSF	EGL Java generation	Trace	Profiling	DB	XML	App Server	HATS Toolkit

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WebSphere Development Studio Client V6.0.1 based on RWD V6

San Marco (Italy) ERP sample - VARPG

POOL ITALIA - Simulazione M.P.S. - M.R.P.

Help

Numero Lancio: 00010 SIMULAZIONE DEL 05/03
 Data Inizio Pianif.: 5/03/01 Proprietà: 0 Magazzino: 100

PARAMETRI | DATI LANCIO | ORDINI SIMULATI | IMPEGNI MATERIALI | IMPEGNI TEMPO | CARICO C.d.L. | RISIMULAZIONE/CONFERMA

Solo C.d.L. Simulazione

< Carico -100% -75% -50% -25% 0 +25% +50% +75% +100% > Carico

Ricalcolo Carico C.d.L. Simulazione

Centro di Lavoro	Descrizione	Potenz. Giorni Ore	Um	Nr. ORE Totale Periodi	Nr. ORE Prima	Sett. 10/2001 gg.05	Sett. 11/2001 gg.05	Sett. 12/2001 gg.05	Sett. 13/2001 gg.05	Sett. 14/2001 gg.05	Sett. 15/2001 gg.05	Sett. 16/2001 gg.05	Sett. 17/2001 gg.05
402	Piegatura	16		229,29			2,25	2,25	39,15	32,00	42,19	19,80	
502	Verniciatura caldo	32		219,66					8,33	30,75	98,26	56,49	
601	Assemblaggio	40		999,96		3,08	287,77	69,02	176,46	143,50	87,74	89,23	
602	Confezionamento	16		529,81		2,50		225,56	33,32	24,99	43,32	43,66	
701	Collaudo	16		32,69		33	7,90	1,02	1,32	99	2,64	2,85	
804	Assemblaggio	48		34,78									
TOTALE				3.578,15		5,91	460,31	656,01	541,62	601,99	526,87	317,92	

Grafico

Grafico Dettagliato

Bilanciamento Totale Potenziale Totale

BILANCIAMENTO CENTRI SELEZIONATI

CdL	Mch	Descrizione	Data	Articolo	De
602	055	Linea conf. 1	19/03/2001	30001000	ELETTROPOMPA
602	055	Linea conf. 1	19/03/2001	30001001	ELETTROPOMPA
602	055	Linea conf. 1	19/03/2001	30001001	ELETTROPOMPA
602	055	Linea conf. 1	19/03/2001	30001001	ELETTROPOMPA
602	055	Linea conf. 1	19/03/2001	30001001	ELETTROPOMPA
602	055	Linea conf. 1	19/03/2001	30001001	ELETTROPOMPA
602	055	Linea conf. 1	19/03/2001	30001001	ELETTROPOMPA
602	055	Linea conf. 1	19/03/2001	30001001	ELETTROPOMPA
602	055	Linea conf. 1	19/03/2001	30001001	ELETTROPOMPA
602	055	Linea conf. 1	19/03/2001	30001002	ELETTROPOMPA
602	055	Linea conf. 1	19/03/2001	30001002	ELETTROPOMPA

Chiudi Grafico | Stampa Grafico | Potenziale/Ore: 16.0000

Totale Carico Periodi: 294.5700
 Totale Potenziale Periodi: 640.0000

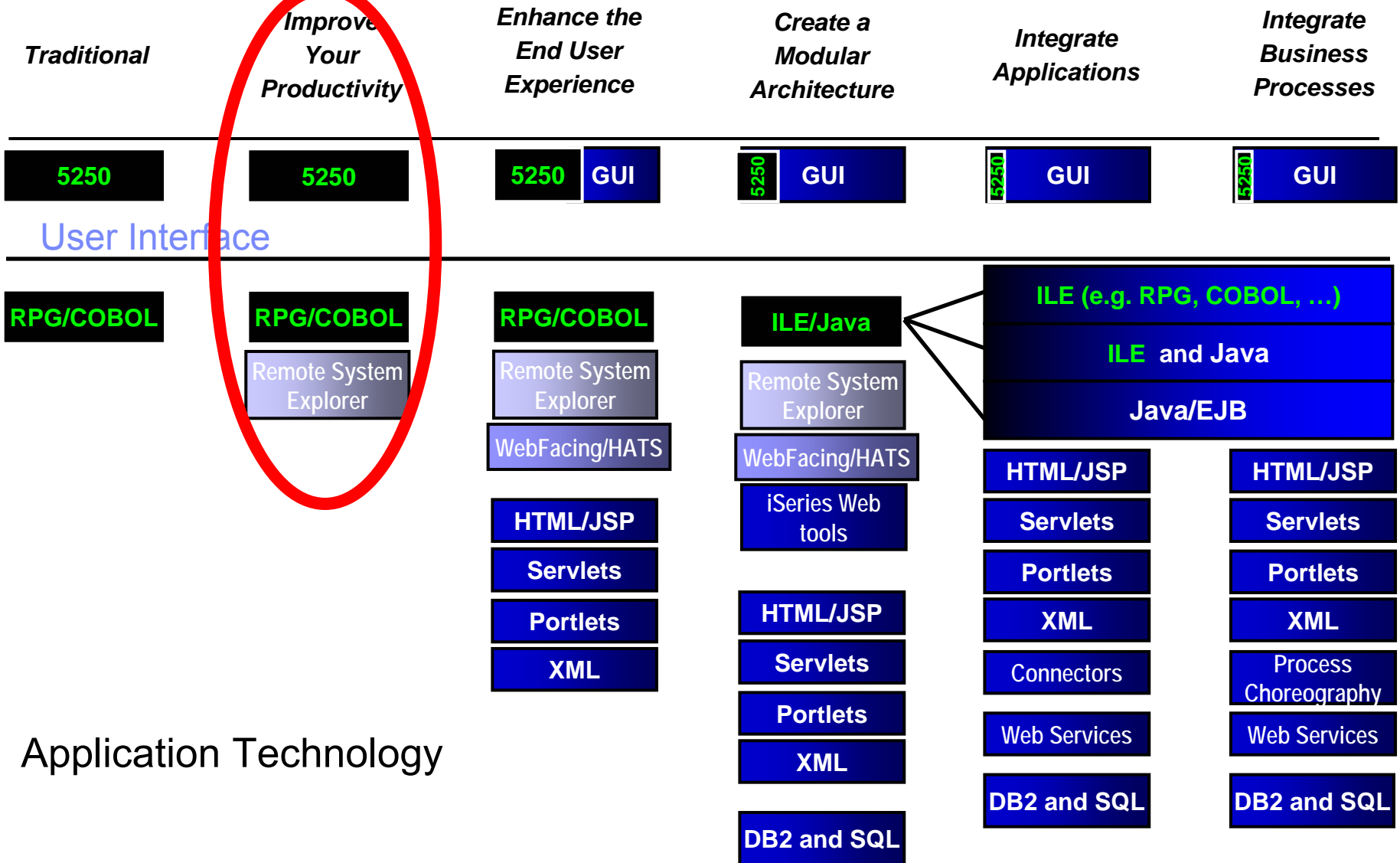
New in VARPg for version 6.0

- Language level has been updated to V5R3. The following function is now available in Version 6.0
 - New built in Function %SUBARR
 - Direct conversion of date/time/timestamp to numeric using %DEC
 - Second parameter for %TRIM, %TRIMR and %TRIML indicating character to trim
 - New prototype option ... OPTIONS(*TRIM) to pass trimmed parameters
 - Relaxing the rule for using result data structure for I/O to externally-described files and record formats

What about CODE/400?

- 90% of the CODE/400 Functionality is in Remote System Explorer... We will cover this in few minutes!
- Trying to totally move CODE function into Eclipse and WDS

iSeries Developer Roadmap



WebSphere Development Studio

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New WDS Sc Lite Technology preview

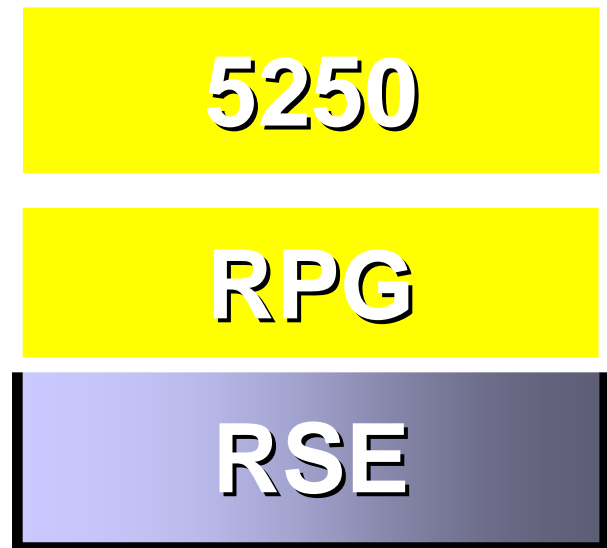
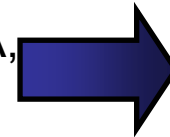
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WebSphere Development Studio Client V6.0.1 based on RWD V6

Better Tools ...RSE

- **Move iSeries application development to Eclipse Integrated Development Environment (IDE)**
- **Remote System Explorer (RSE)**
 - ▶ Provides iSeries server access from Eclipse IDE (included in WebSphere Development Studio Client for iSeries)
 - ▶ 21st century follow-on to PDM, SEU, SDA, RLU, & system debugger
- **Value Proposition**
 - ▶ Improves productivity over host 3GL tools
 - ▶ Provides easy access to advanced application development tools from IBM & vendors



RSE Too big? What is IBM doing about it?

Introducing WDS Sc Lite Technology Preview

- Added capabilities to limit workbench functionality to E/C/D for iSeries
 - For Both Standard and Advanced
- Need to install the whole product first
- Option to select level of functionality
 - Use Rational Product Updater,
 - Add 500MB of disk space requirement
- Memory (RAM) required at runtime will be 256 Meg for E/C/D
- Fully supported Technology Preview
 - In future release we will have more componentization
 - Install on demand

The screenshot displays the Remote System Explorer interface for a project named PAYROLL.RPGLE. The main window is divided into several panes:

- Left Pane (PDM-like tree & table views):** Shows a hierarchical tree of project files and libraries, including QUSRSYS, WFLAB20, LIB6961, WFLAB10, WEISS, VARLABXX, VDWW130, RSELABXX, CLC1, CLR1, MYCOMPILE, PAYROLL, PAYROLLC2, PAYROLLD, PAYROLLG, COMPARE, EMPMST, EVFEVENT, MSTDSP, PRJMST, QCBLLSRC, QCLSRC, QCMSRC, QDDSSRC, QRPGLSRC, QRPGLSRC, QRPGLSRC, REFMST, RSNMST, and MYCOMPILE.
- Top Center Pane (SEU-like editor):** Displays the source code for PAYROLL.RPGLE. Line 96 is highlighted, showing a comment: "next executable operation." Below it, a SELECT statement is visible, including conditions for EMPAPL, EMPTAG, PRJAPL, PRJTAG, RSNAPL, and RSNTAG. Error messages are present: "RNF7030: The name or indicator EMES is not defined." and "RNF7018: The operand RSNTAX of EXSR is not a subroutine name."
- Right Pane (Outline view):** Shows a tree of global definitions, including Files (MSTDSP, EMPMST, PRJMST, RSNMST), Fields, Indicators, Main Procedure, and Subroutines (ACDES, ADDCDE, CHGCDE, DELCDE, EDITSL, EMPTAG, INVCDE, MAIN, PRJTAG, RSNTAG).
- Bottom Pane (Error list):** A table listing compilation errors. The table has columns for ID, Message, Severity, Line, Location, and Connection.

ID	Message	Sev...	Line	Location	Connection	
RNS9308	Compilation stopped. Severity 30 errors found in program.		50	0	RSELABXX/QRPGLSRC(P...	toras07m
RNF7018	The operand RSNTAX of EXSR is not a subroutine name.	30	95	RSELABXX/QRPGLSRC(P...	toras07m	
RNF5184	Factor 2 must be '0' or '1' when the Result is an indicator...	30	364	RSELABXX/QRPGLSRC(P...	toras07m	
RNF7515	Move operands ERR and EMES have types that are not ...	30	365	RSELABXX/QRPGLSRC(P...	toras07m	
RNF5178	ENDSR operation is missing for subroutine EDITSL; ENDS...	30	0	RSELABXX/QRPGLSRC(P...	toras07m	
RNF7030	The name or indicator EMES is not defined.	30	365	RSELAP...	toras07m	
RNF7030	The name or indicator RSNTAX is not defined.	30	95	RSEL...	toras07m	
RNF7031	The name or indicator *IN03 is not referenced.	00	1	RSELAB...	toras07m	
RNF7031	The name or indicator *IN04 is not referenced.	00	1	RSELABXX/QRPGLSRC(P...	toras07m	
RNF7031	The name or indicator *IN05 is not referenced.	00	1	RSELABXX/QRPGLSRC(P...	toras07m	
RNF7031	The name or indicator *IN06 is not referenced.	00	1	RSELABXX/QRPGLSRC(P...	toras07m	

Debug Perspective

Resume, Suspend, Terminate, Step Over/Into/Return

Call Stack

Examine / Change Fields

Current Line

Break Point

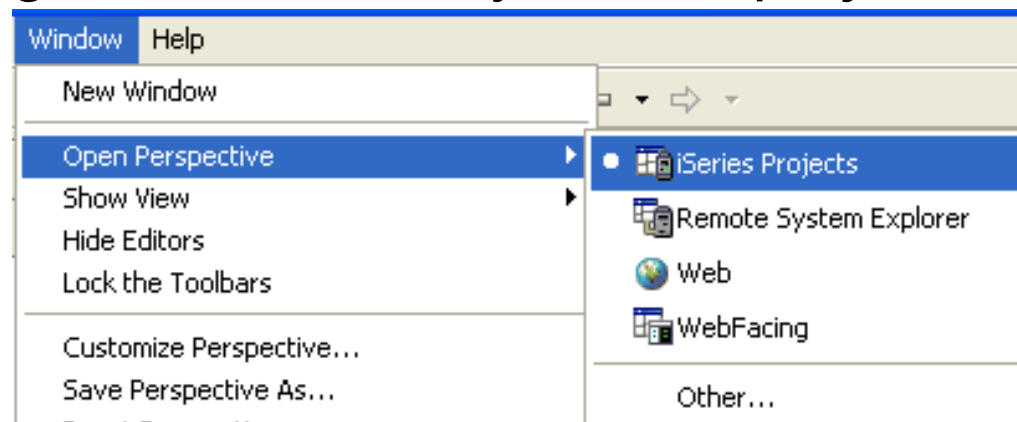
Input / Output console

Supports

- OPM / ILE RPG
- OPM / ILE CBL
- OPM / ILE CL
- C
- C++
- Java

iSeries Projects

- **Want to work without being connected to system i**
- **Want to work using team support in Eclipse**
- **A special project type**
 - For holding source destined to be compiled on iSeries
- **A dedicated perspective**
 - For working with all and only iSeries projects

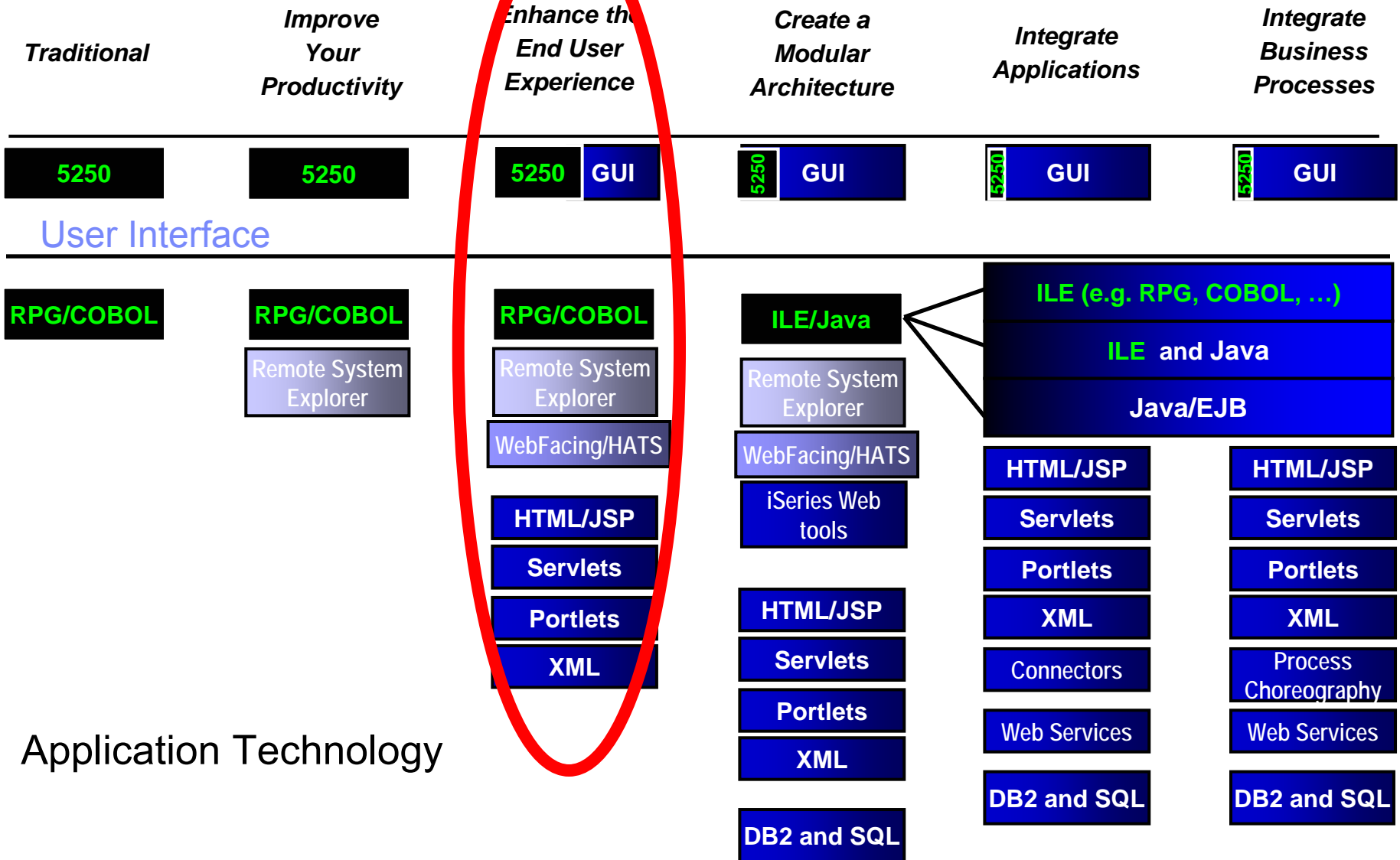


iSeries Projects Perspective

The screenshot displays the iSeries Projects perspective in the WebSphere Development Studio Client. The main editor window shows the source code for PRTORDERR.RPGLE, with a blue box labeled "Editor" overlaid on the code. The Project Navigator on the left shows a tree view of the project structure, with a blue box labeled "Project Navigator" overlaid. The Outline window on the right shows the project's structure, with a blue box labeled "Outline" overlaid. The Remote Systems window at the bottom left shows the local system and the iSeries Objects, with a blue box labeled "RSE" overlaid. The Build Job Monitor window at the bottom right shows a table of build jobs, with a blue box labeled "Build Job Monitor" overlaid.

Date/Time Submitted	Job	Project	Status
Sep 18, 2003 11:57:42 AM	011903/COULTHAR/LBEH...	toras07m_ORDLIB	Finished
Sep 18, 2003 8:37:04 PM	012056/COULTHAR/LBEH...	toras07m_ORDLIB	Finished

iSeries Developer Roadmap



WebSphere Development Studio

Current 5722-WDS customers with software subscription for V5R3, to upgrade to WDSc V6.0 use feature #: 2656
Available after GA

RPG	COBOL
C/C++	PDM SEU SDA RLU

Upgrade from WDS 6.0 to 6.0.1 using Rational Product updater

Unlimited Licenses

New WDS Lite
Technology preview

iSeries	iSeries	iSeries	iSeries	Web Facing WDHT support	iSeries Projects	+CODE +VisualAge RPG
Java™	Debug	Struts Web	Web Service		RSE	
JSF	EGL Java generation	Trace	Profiling	DB	XML	App Server HATS Toolkit

www.ibm.com/software/awdtools/is/series

WebSphere Development Studio Client V6.0.1 based on RWD V6

WebFacing

The image shows two overlapping windows. On the left is a terminal window titled 'Session A - [24 x 80]' with a menu bar (File, Edit, Transfer, Appearance, Communication, Assist, Window, Help) and a toolbar (PrtScn, Copy, Paste, Send, Recv, Display, Color, Map). The terminal content includes:

```

A0570075 Cost Model Maintenance...
Syr Style. . . . . Customer . . . Color Fob
F98 YP1998 1
Htsus#/Harmonizing : 6201.93.3000
Type information. Then press Enter.
Description...
  ARGENTINA
Country . . . . . ARG 000048
Mix % . . . . .
Htsus#/Harmonizing 1111.11.1111
Approved by . . . .
Approval date . . .
    
```

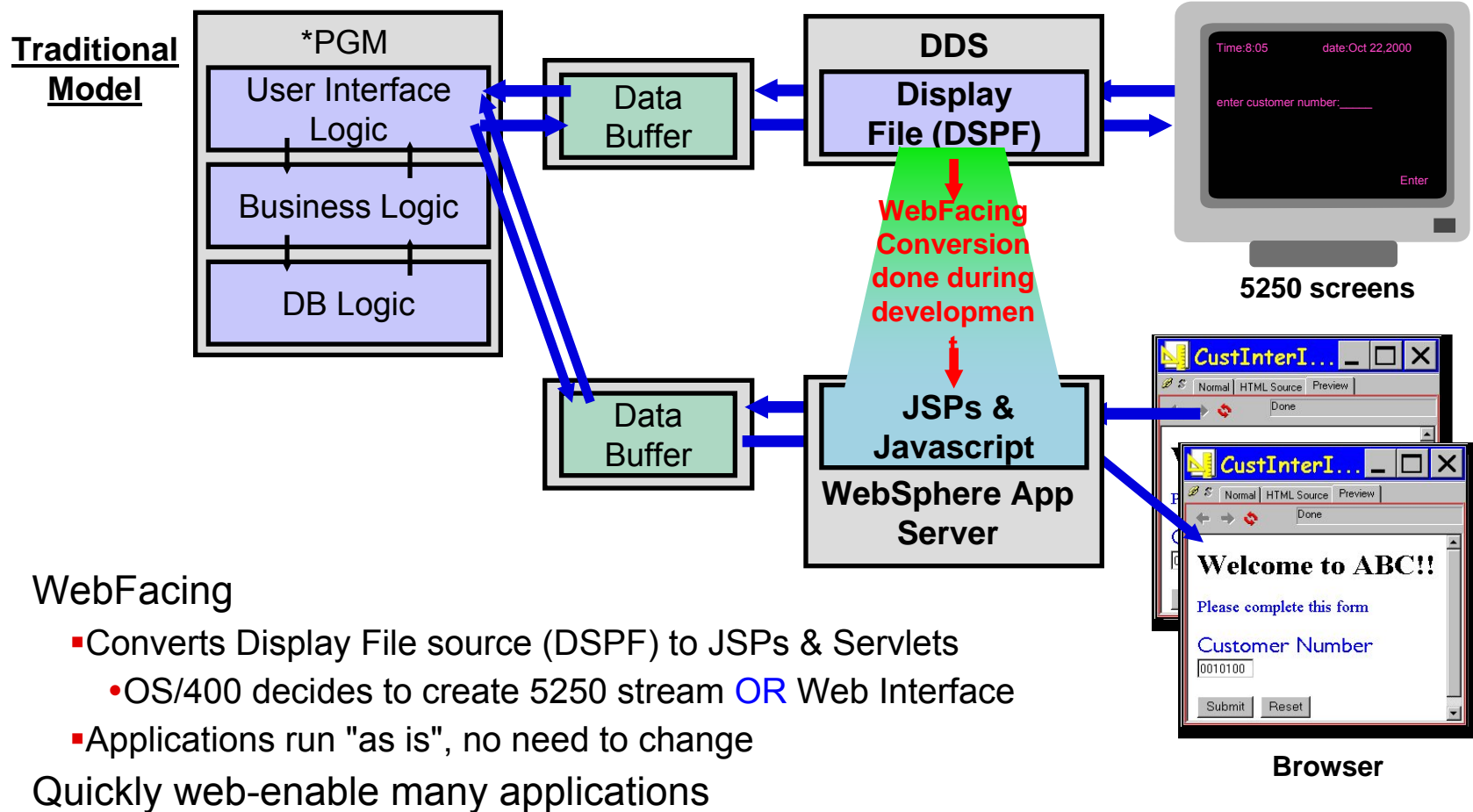
At the bottom of the terminal, it says 'Connected to remote server/host 206.96.12.34 using port 23'.

On the right is a Microsoft Internet Explorer window titled 'AppSphere - Microsoft Internet Explorer'. The address bar shows 'http://206.96.12.34:6600/appsphere/servlet/com.ibm.as400ad.webfacing.runtime.httpcontroller.ControllerServlet?inv=APPCON'. The page content includes:

- Logo: APPCON
- Header: AppSphere
- Page Title: A0570075 Cost Model Maintenance... Header
- Navigation menu: Enter, Panel help, Field help, Exit, Cancel, Delete
- Table:

Syr	Style.	Customer . . .	Color	Fob	Change
F98	YP1998	1		ARG	Status . . . <input type="checkbox"/>
- Text: Htsus#/Harmonizing : 6201.93.3000
- Text: Type information. Then press Enter.
- Form fields: Description... (ARGENTINA), Country... (ARG), Mix %..., Htsus#/Harmonizing (1111.11.1111), Approved by..., Approval date...
- Image: A red dress.

Better User Interface: IBM WebFacing Tool



WebFacing

- Converts Display File source (DSPF) to JSPs & Servlets
 - OS/400 decides to create 5250 stream OR Web Interface
- Applications run "as is", no need to change

Quickly web-enable many applications

WebFacing

- **Given DSPF DDS input, **generates a Web application** that is still driven by the unchanged iSeries business logic.**
 - **DDS and UIM-Help become JavaServer Pages (JSPs), XML and a controller Servlet. All generated for you.**
 - **JSP == Display File for the Web**
- **Does require DDS source – Evolves source as a step in application modernization**
- **No runtime fee until V7.**
- **No interactive cycles**
- **Advanced-only capability**
 - **Portal support**
 - **Support for single signon using Enterprise Identity Manager**
 - **Support for extension points based on Struts actions**
 - **Support for viewing spool files**
 - **Support for positional CCS**

WebFacing

The screenshot displays the WebFacing interface within the WebSphere Development Studio Client. The main window shows a web browser displaying a converted application titled "CALL ORDENTR" (Parts Order Entry). The application form includes fields for Customer number (0006), Customer name (MATTATA, Bob W), and Address (53RD Ave.). A table below the form lists "Opt Part" and "Description" with a "Qty" column. The interface also features a menu with options: Prompt, Accept Order, Cancel, and HELP. A status bar at the bottom indicates the server status, showing "WebSphere v5.0 Test Environment (2)" as Stopped and "WebSphere v5.0 Test Environment (3)" as Started.

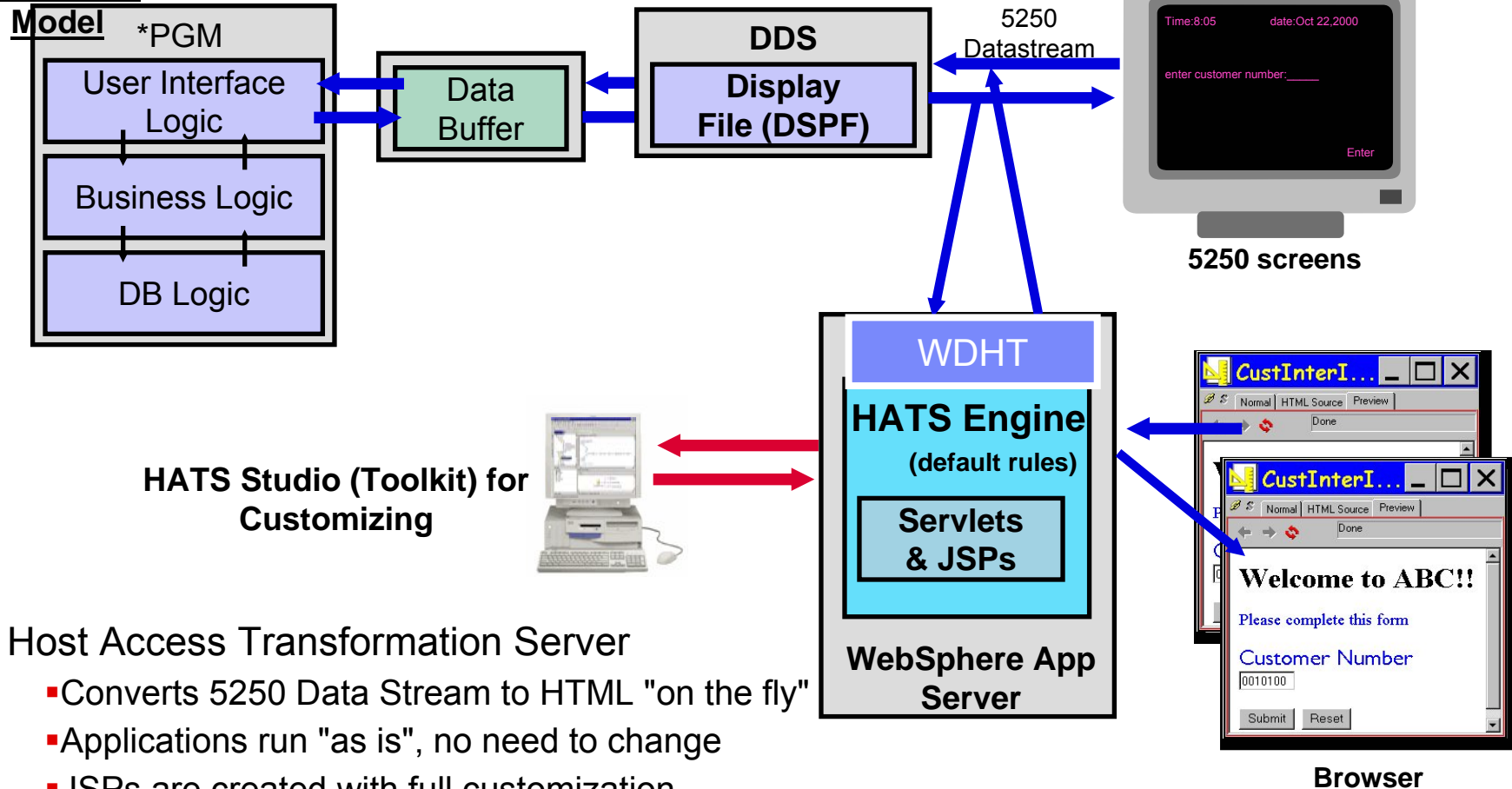
Conversion inputs, outputs

Converted app. in Web browser

Built-in & remote Web Application Servers

Better User Interface: HATS

Traditional



Host Access Transformation Server

- Converts 5250 Data Stream to HTML "on the fly"
- Applications run "as is", no need to change
- JSPs are created with full customization

Quickly web-enable many applications

WDHT enablement in HATS 6.0.4 for i5/OS V5R4

Using WDHT will allow to run applications
without using OLTP

Original
5250 App.

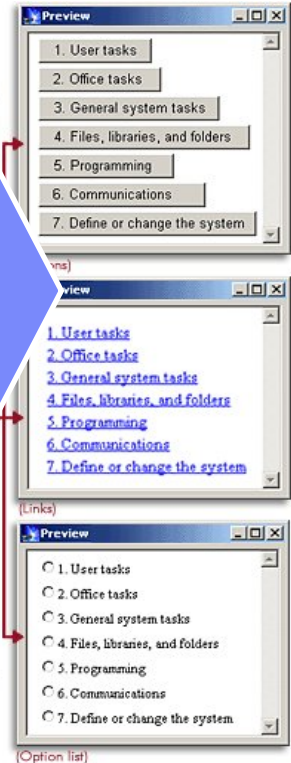
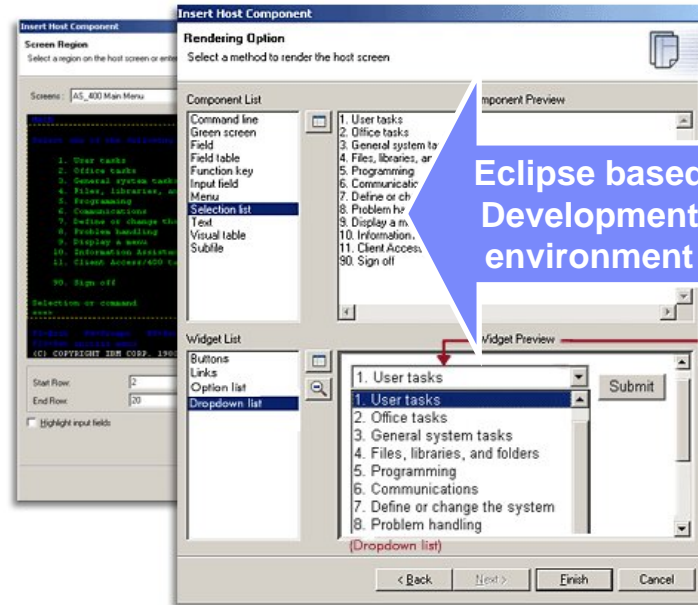
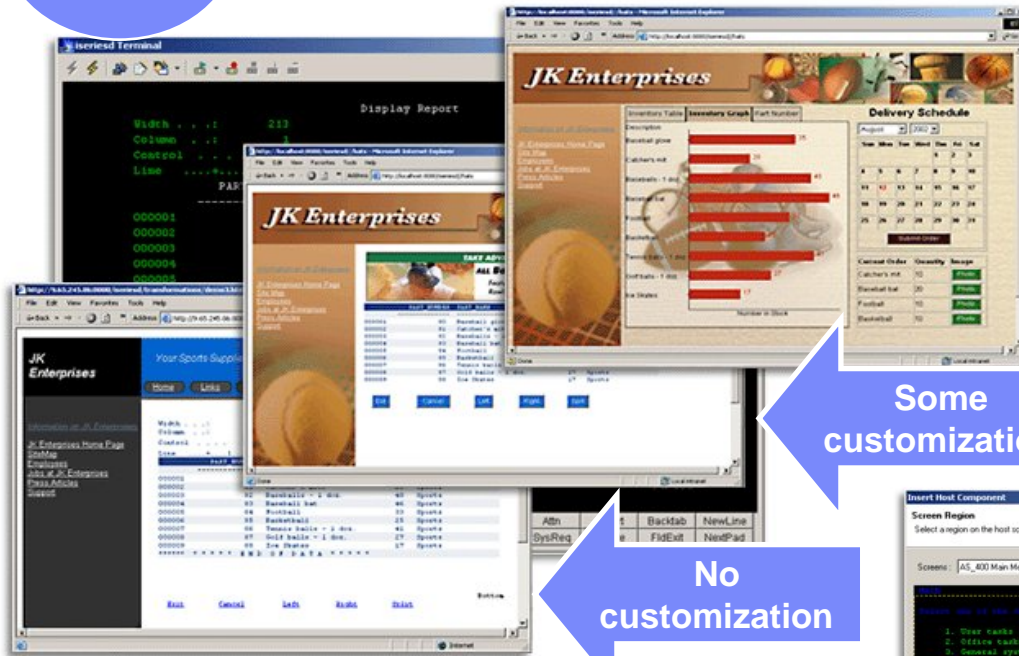
HATS

Full
customization

Some
customization

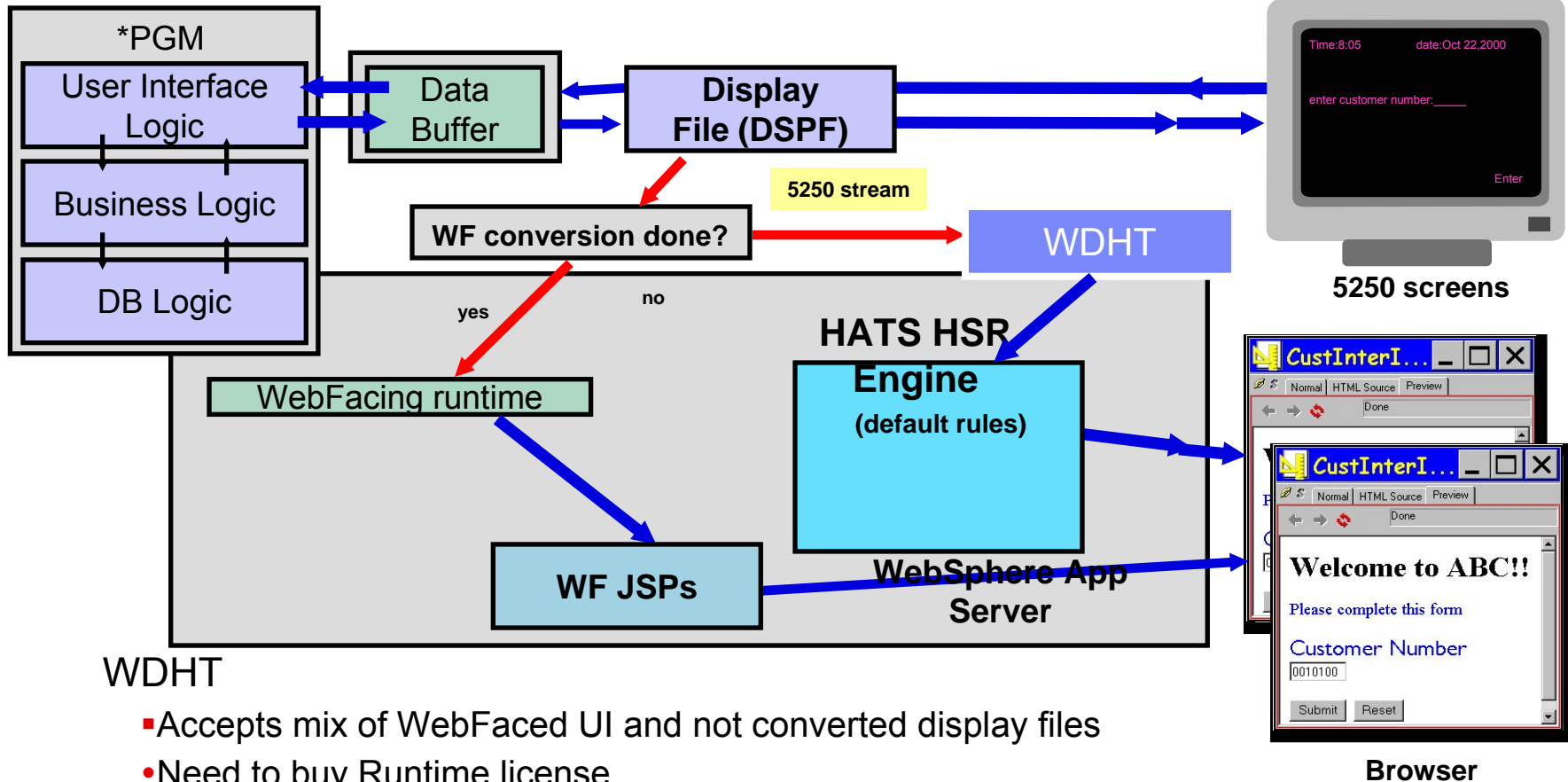
No
customization

Eclipse based
Development
environment



IBM WebFacing Deployment Tool with HATS technology (WDHT)

Traditional Model



WDHT

- Accepts mix of WebFaced UI and not converted display files
- Need to buy Runtime license
- No need for OLTP (no interactive system capability needed)

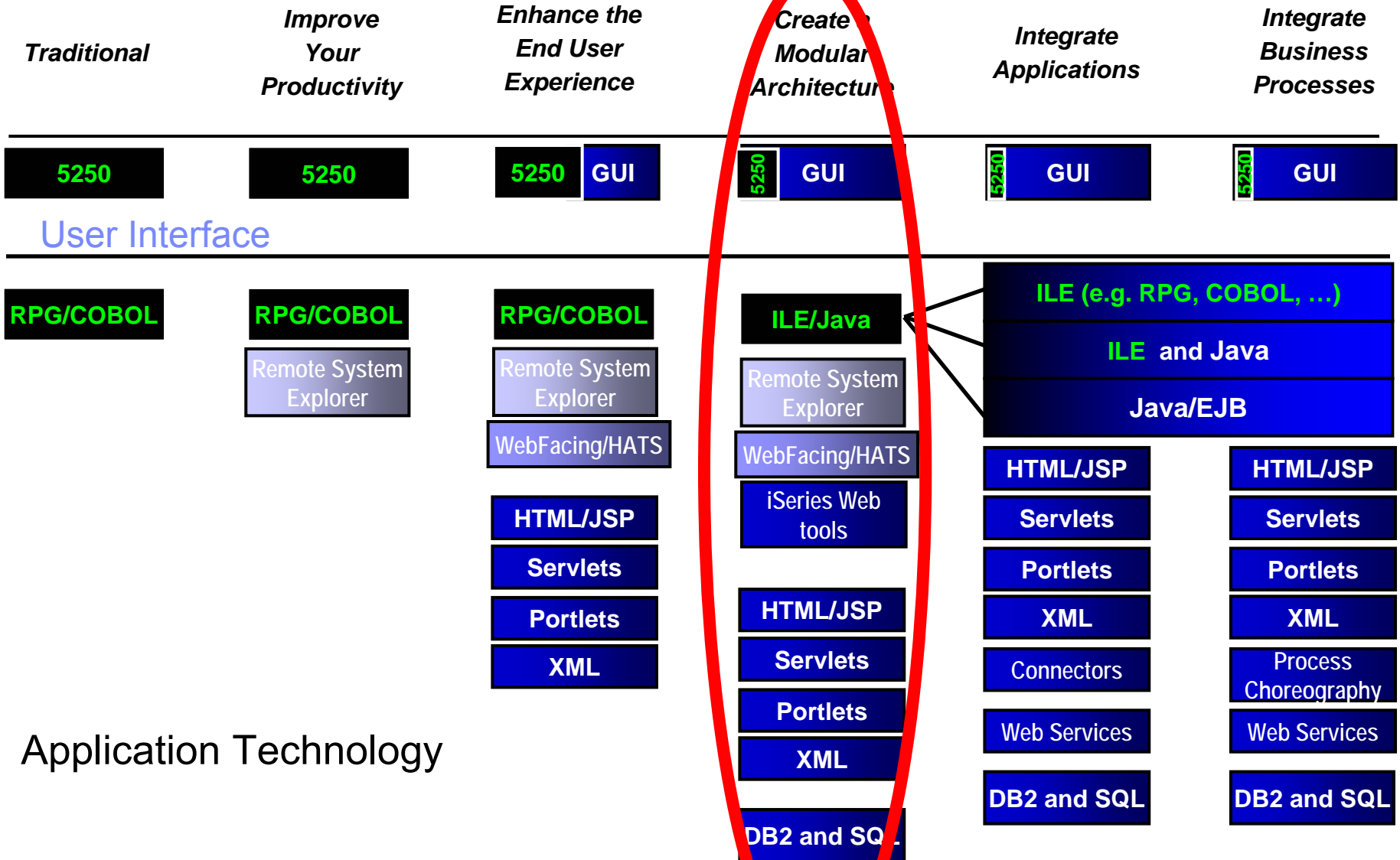
Quickly web-enable many applications, mix of WebFaced and non WebFaced UI allowed

No need to install HATS toolkit for WDHT enablement in WDS_c workbench

WebFacing Deployment Tool with HATS Technology (WDHT) V6.0.1

- Customers need to buy WDHT license to deploy and run applications
- Fully converted WebFacing applications currently don't need WDHT
- WebFacing applications that are not completely converted will need WDHT
 - When application at runtime encounters screens in non converted display files WDHT will provide default conversion using HATS datastream conversion
 - HATS customization is currently not support in a WDHT mixed WebFacing/HATS environment only default transformation will occur
- HATS V6.0.4 now uses WDHT
 - WDHT provides for HATS applications runtime environment that doesn't require OLTP in V5R4
 - HATS applications support full customization (not mixed with WebFacing screens)
- WDS Sc contains 2 WDHT licenses for testing purposes

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www.ibm.com/software/awdtools/iseries

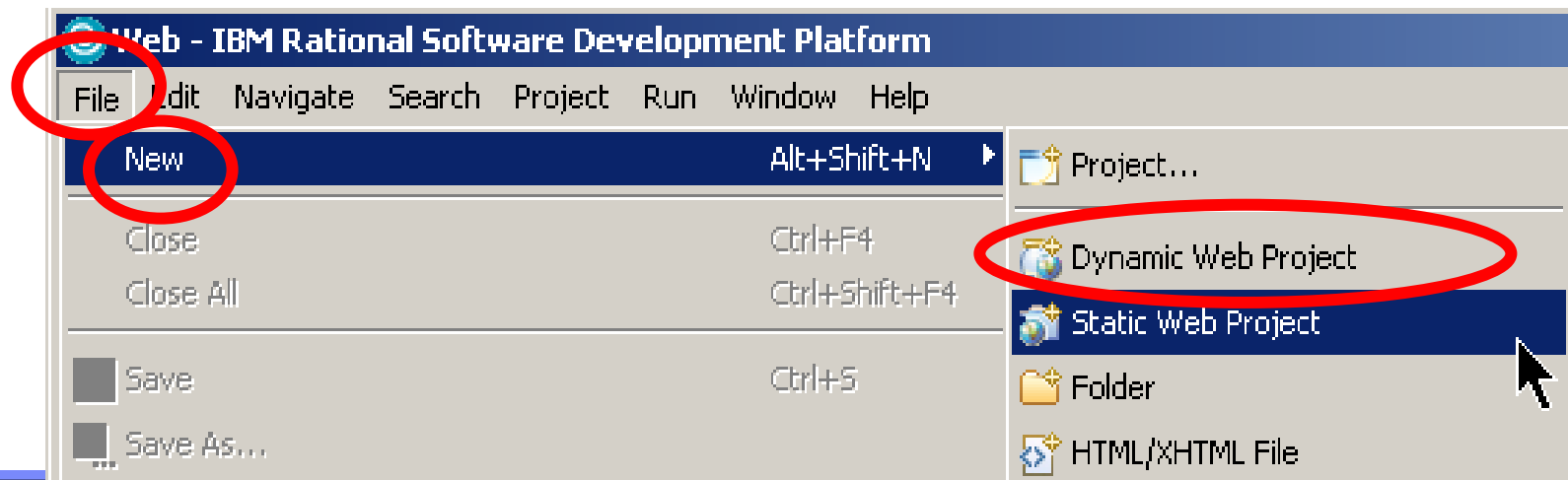
WebSphere Development Studio Client V6.0.1 based on RWD V6

Web Tools inherited from RWD and RAD

- **Web Projects and Perspective**
 - J2EE-defined folder structure for Web Apps
 - Superset of Java projects (inherits Java Tools)
 - Automatic creation/maintenance of web.xml file
- **Editor support**
 - Create/Edit/Validate/Debug JSP and HTML files
 - Images and animation
 - Cascading Style Sheets (CSS)
- **Import/Export from/to a variety of sources**
 - HTTP/FTP/WAR/EAR
- **Link viewing and management**
 - Converting links, flagging broken links, and fixing up links as linked resources are moved or renamed

Web Projects

- **One of the project types in WDS**
 - ▶ With its own perspective
 - ▶ With its own "new" wizard
 - ▶ With its own set of tools
- **Created with J2EE folder layout**
- **Created with simple web.xml file**
 - ▶ Automatically updated as resources are created
 - ▶ Has specialized web.xml editor



Web Application

▶ Standard Web App folder structure:

+Web application folder (root folder)

+**source**

–*all non-deployed files (java)*

+**WebContent**

–*all Web files (html, jsp, gif, ...)*

collectively known as "Web Resources"

+**META-INF**

–MANIFEST.MF

maps dependent jar files in other Web apps

+**theme**

–*.css style sheets*

Web application deployment descriptor:

▶ identifies servlets, security, env vars, mime types, key pages, external references and session configuration info

+**WEB-INF**

–web.xml

+**classes**

–*Java classes of this app (usually generated)*

+**lib**

–*Supporting classes and jar files*

J2EE
1.3

Page designer tool

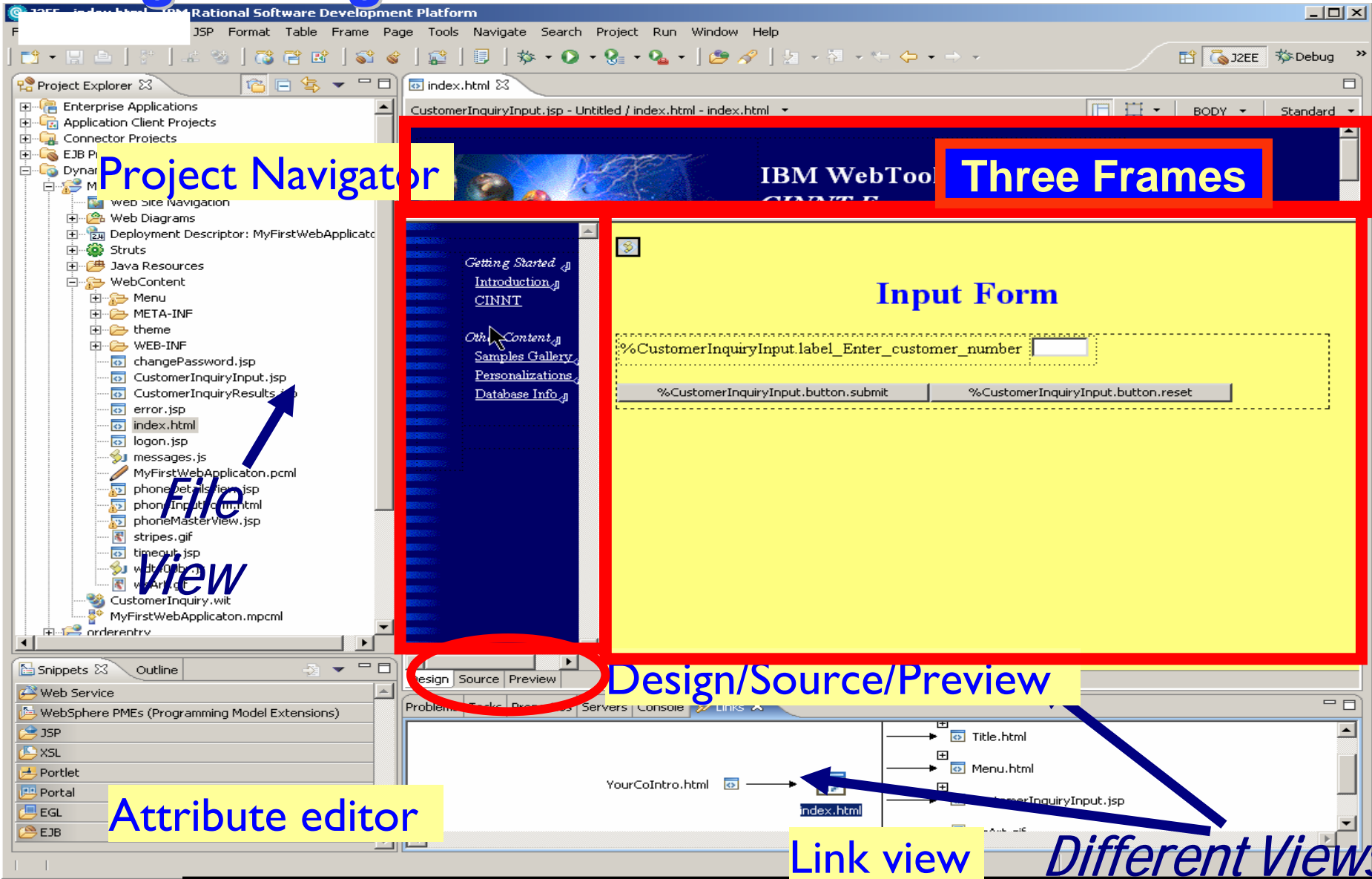
- **Page Designer for jsf, jsp & HTML**

- **Frame wizard**
- **WebArt designer**
- **AnimatedGIF designer**
- **Spell Checker**
- **HTML validator**
- **HTML to XHTML converter**
- **Attribute dialog**

- **Link utilities**

- o **fix broken links**
- o **Convert links**

PageDesigner



Project Navigator

Three Frames

File View

Design/Source/Preview

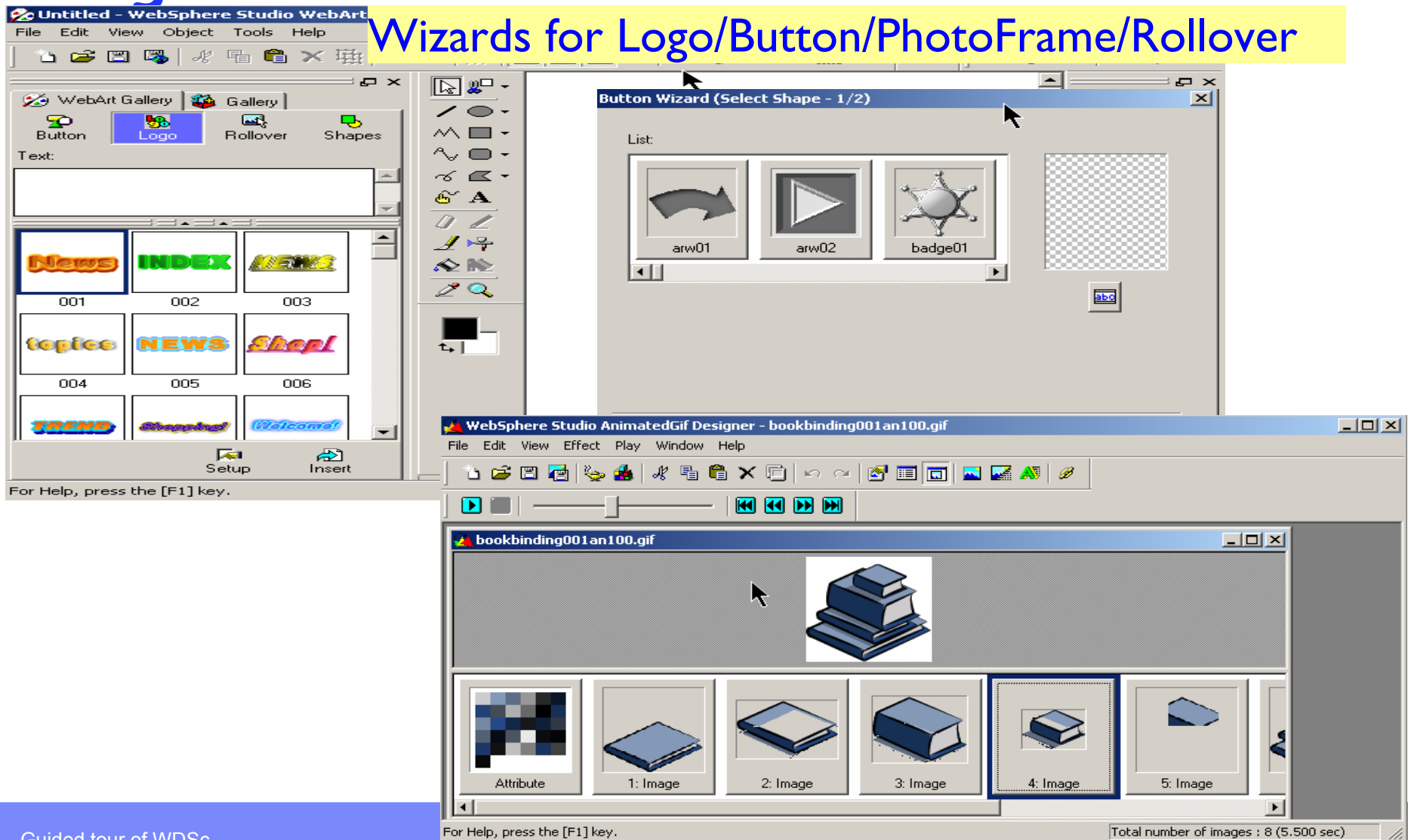
Attribute editor

Link view

Different Views

WebArt Designer and Animation GIF designer

Wizards for Logo/Button/PhotoFrame/Rollover



IBM System i5 Web Tools

● **iSeries Web Tools, at a glance**

▶ **Tools optimized for iSeries developers!**

■ **Host Information wizard**

- ✓ Set runtime information such as library list and sign-on information, to be used by glue generated by all Web Interaction wizards for this Web project

■ **Web Interaction wizard**

- ✓ Generate a Web front end for your RPG/COBOL programs without having to write Java code. Wizard generates JSP UI and Servlet logic to call program on System i5.



iSeries Web Host Information Wizard

► Information used at runtime by all generated Web servlets in this Web project

- Name of host with biz logic
- User ID and password for signing on, or choose to prompt
- Library list, curlib , initial program for runtime

iSeries Web Tools Run-time Configuration

Specify the run-time configuration for program call of iSeries Web development tools

iSeries host name: DeptServer

User ID: COULTHAR

Password: ****

Prompt for iSeries user ID and password

Runtime library list:

Library	Library Position
ACCPAY	*LAST

Library: Add

Remove Move Up Move Down

Current library: *USRPRF

Initial command: CALL INITPHIL

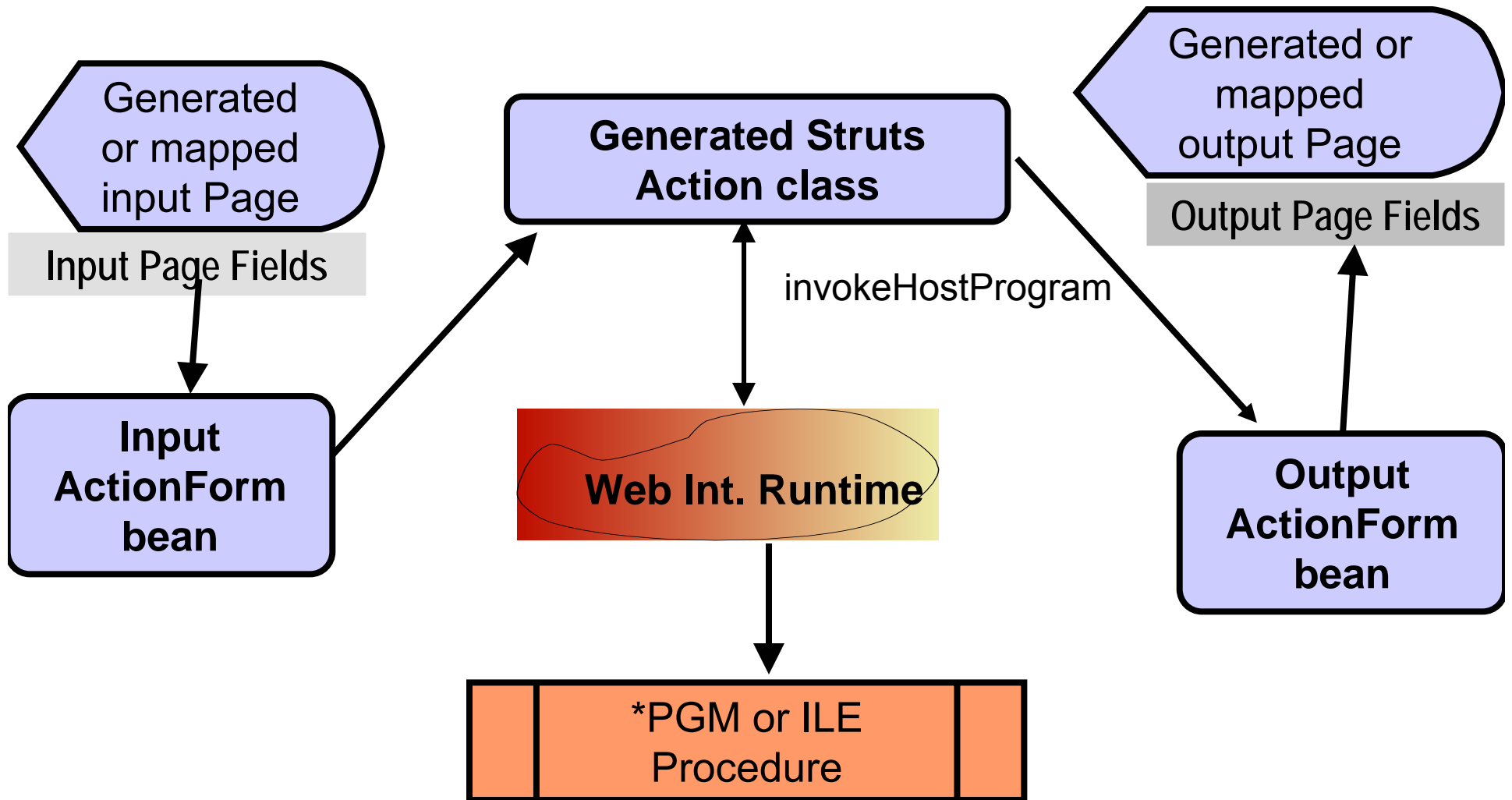
Display detailed runtime errors

Use program call JCA connector

Specify the JNDI name:

Finish Cancel

Web Interaction – How it works



Web Interaction Wizard

- **Two modes to interaction wizard:**
 - 1. Generate input/output Web pages**
 - Given the parameter description of the API to call
 - 2. Generate mappings**
 - Given the input/output pages
 - Given the parameter description of the API to call
 - Given the mappings
 - ✓ between input parms & input fields
 - ✓ between output parms & output fields

Creates applications based on STRUTS framework

New standard framework java server faces (jsf)

- **Wait something better than STRUTS is here**
- A new standard framework fully supported in WDS*c*
 - Tool support for jsf
 - Page designer
 - Binding support of data beans and UI controls
 - Web diagram editor for jsf
 - Quick edit for small pieces of Java code

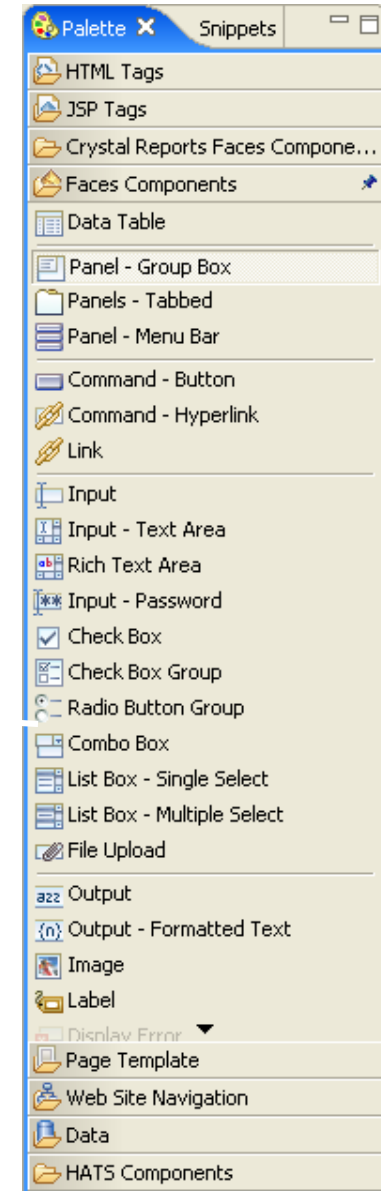
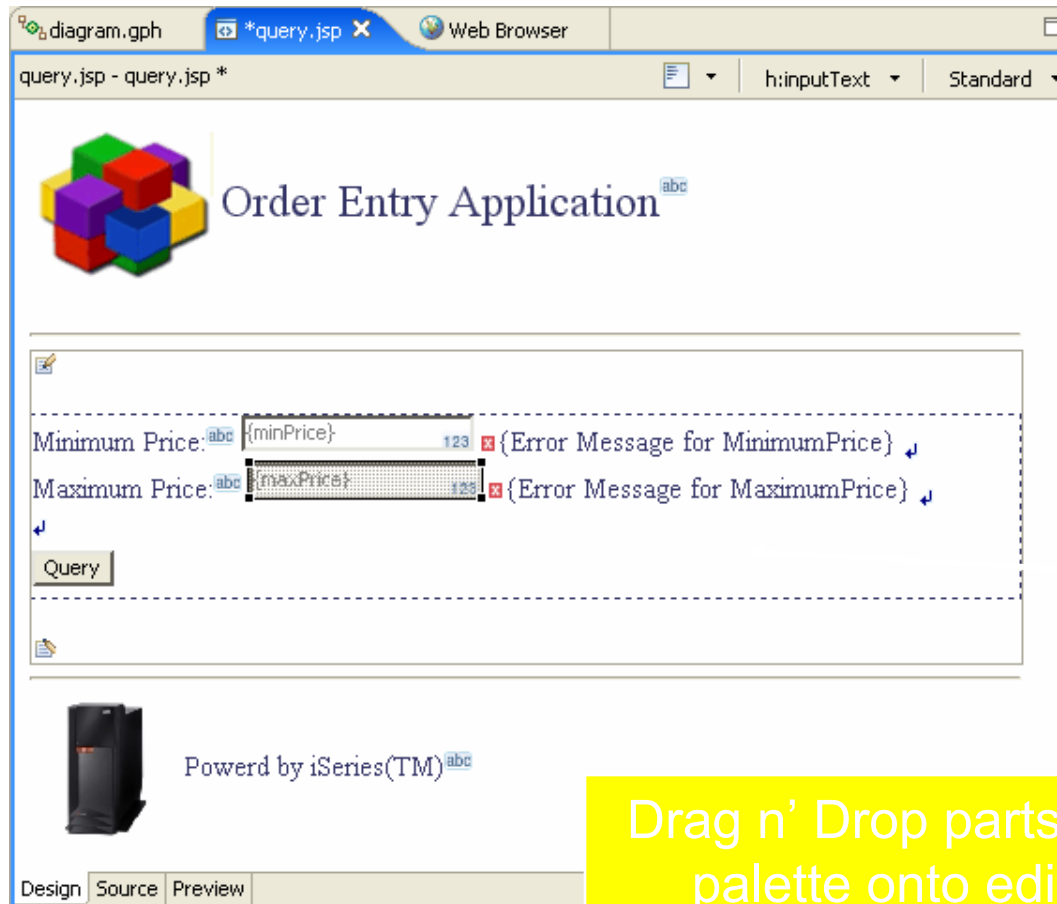
JSF Features

- **Web page development**
 - Event driven architecture
 - Direct binding of UI components to model data
 - Just like externally described workstation files
- **Navigation framework**
 - Also referred to as “Controller” in MVC
- **Validation and error feedback**
- **Session and object management**
 - Managed beans
- **Internationalization (i18n)**
- **Easy database integration**
 - Easily create pages to display and update data using SQL

Web Page Development

- JSF contains a collection of UI components to make Web page development easier
 - Each component has extensive properties for customizing look and behavior of component
 - Components can be bound to variables for automatically:
 - Displaying the value of variable
 - Assigning value to a variable on page submit
 - Components have associated “events” which you can write code for
 - JavaScript for client side events
 - onclick, ondblclick, onkeypress, ...
 - Java code for server side events
 - Value Changed, Command, ...

Web Page Development



Drag n' Drop parts from palette onto editor

Web Page Development

Specify look and feel properties for components

Write JavaScript / Java code for events in Quick Edit view

Navigation

- JSF provides framework for specifying navigation rules
 - Commonly referred to as “Controller”
 - For example:
 - When submit request from this page then invoke this action
 - If result of action is “success” then display *nextpage.jsp*
 - If result of action is “error” then display *error.jsp*
- Rules stored in *faces-config.xml* file as navigation rules
- Use Web Diagram editor to graphically layout application
 - Automatically adds navigation rules

Navigation – Web Diagram Editor

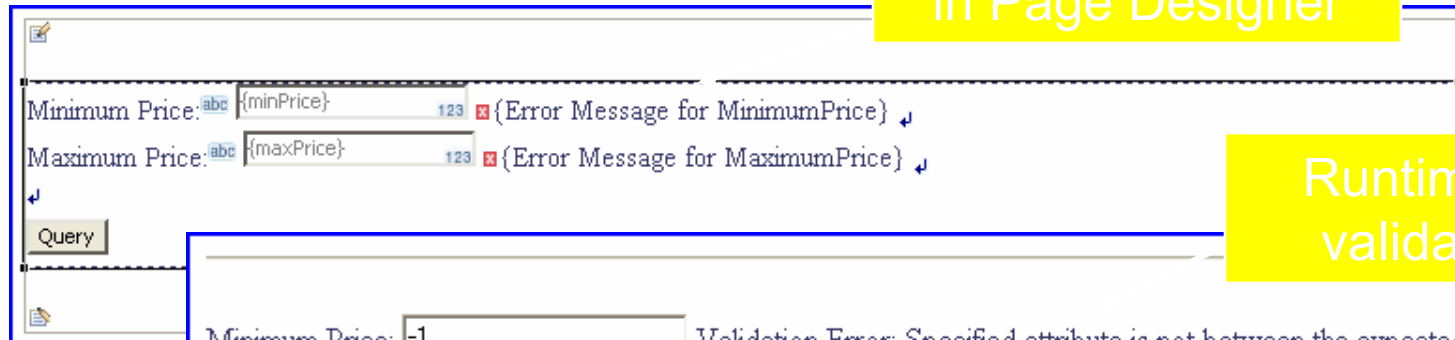
The screenshot displays the Web Diagram Editor in IBM WebSphere Studio. On the left, the Project Explorer shows a project structure with 'Web Diagram' highlighted by a red circle and an arrow pointing to the diagram area. The diagram area shows three files: 'query.jsp', 'results.jsp', and 'details.jsp'. A context menu is open over the diagram, with 'Connection' selected. The Palette on the right shows various web components like 'Web Parts', 'Web Application', and 'Web Page'. Two yellow callout boxes provide instructions: 'Right click in editor to draw connections' and 'Drag n' Drop parts from palette onto Web Diagram editor'.

Validation and Error Feedback

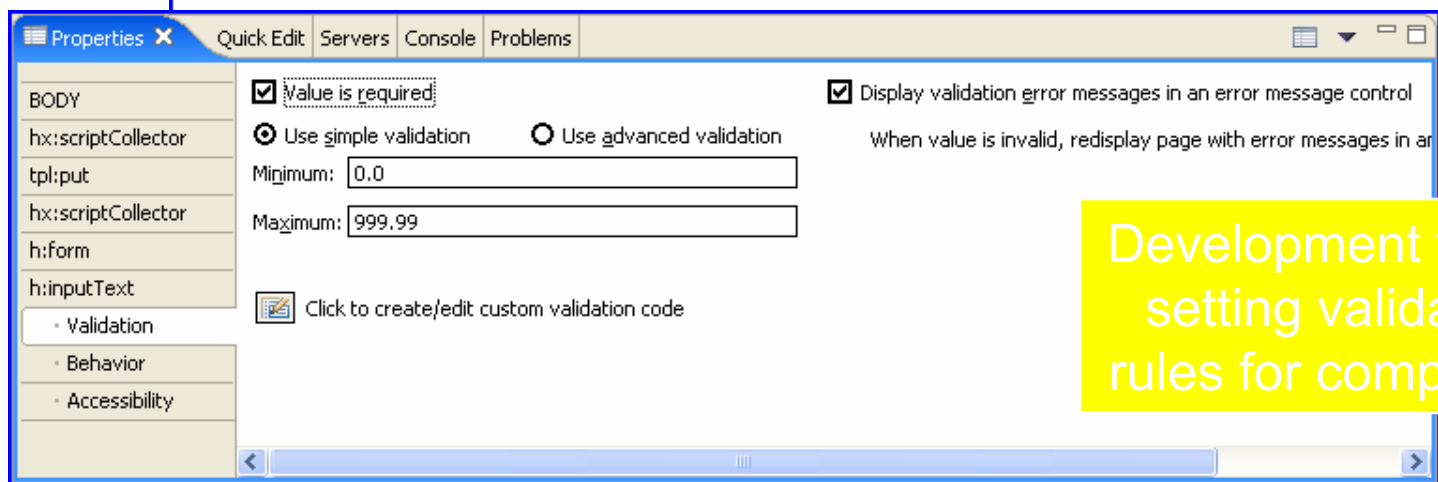
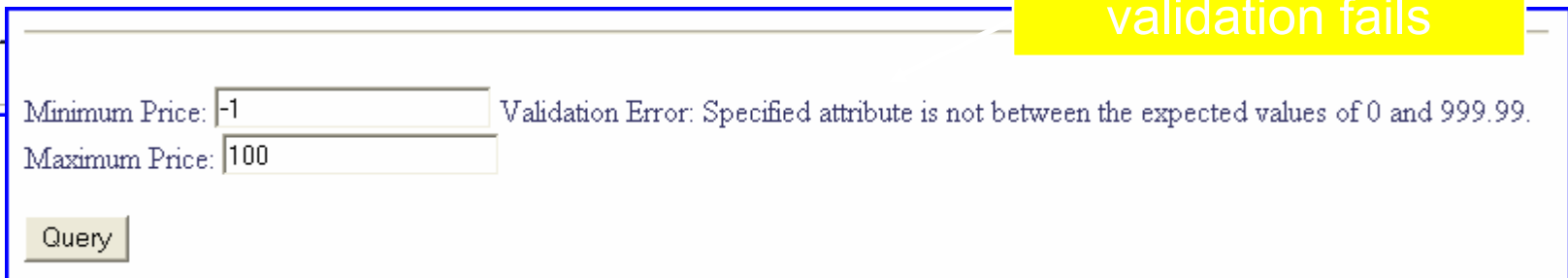
- JSF provides rich support for input validation and error messages
- Input validation
 - Optionally associate each UI component with a messages component
 - Specify validation rules for UI component
 - JSF performs validation when page submitted
 - Page redisplayed with error messages if validation fails
- Error Messages
 - Insert general message component for page
 - Add messages to “FacesContext” during processing
 - Support for informational, warning and error messages
 - Messages automatically displayed with next page

Input Validation

Development time -
in Page Designer



Runtime - when
validation fails



Development time –
setting validation
rules for component

Easy Database Integration

- JSF includes special components for displaying data on a web page
 - Single record (Relational Record component)
 - Table of records (Relational Record List component)
- Drag n Drop component onto page
 - Wizard guides you through creating SQL statement
 - JSF UI components automatically added to page for displaying data
 - Add row actions to table of records
 - Automatically created Delete, Update and Add actions for single record

Database Web Pages

DatabaseExample.jsp - DatabaseExample.jsp

Place content here.

Add Relational Record List

Relational Record List
Enter a reference name for record list.

Name:

Create a name to refer to this record list within the page.

Retrieve an existing record or record list from scope

Scope:

Key:

Reuse metadata definition from an existing record or record list

Input file:

You can automatically add data controls to your page to display the list of records (configure details on last page of this wizard).

Add data controls

< Back Next > Finish Cancel

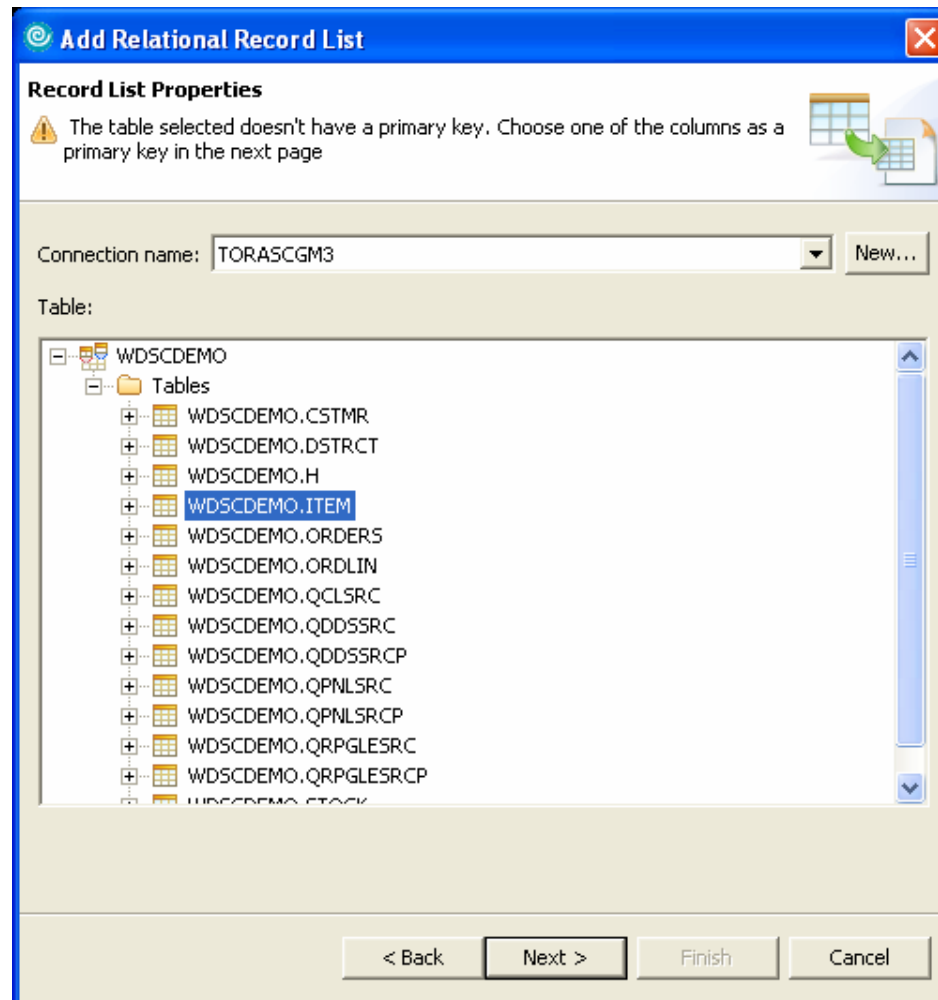
Snippets

- HTML Tags
- JSP Tags
- Crystal Reports Faces Comp...
- Faces Components
- Page Template
- Web Site Navigation
- Data**
- Business Process Message
- PeopleSoft Record
- PeopleSoft Record List
- SAP BAPI
- SAP RFM
- Siebel Record
- Siebel Record List
- Web Service
- EJB Session bean
- Relational Record
- Relational Record List
- ...
- ...

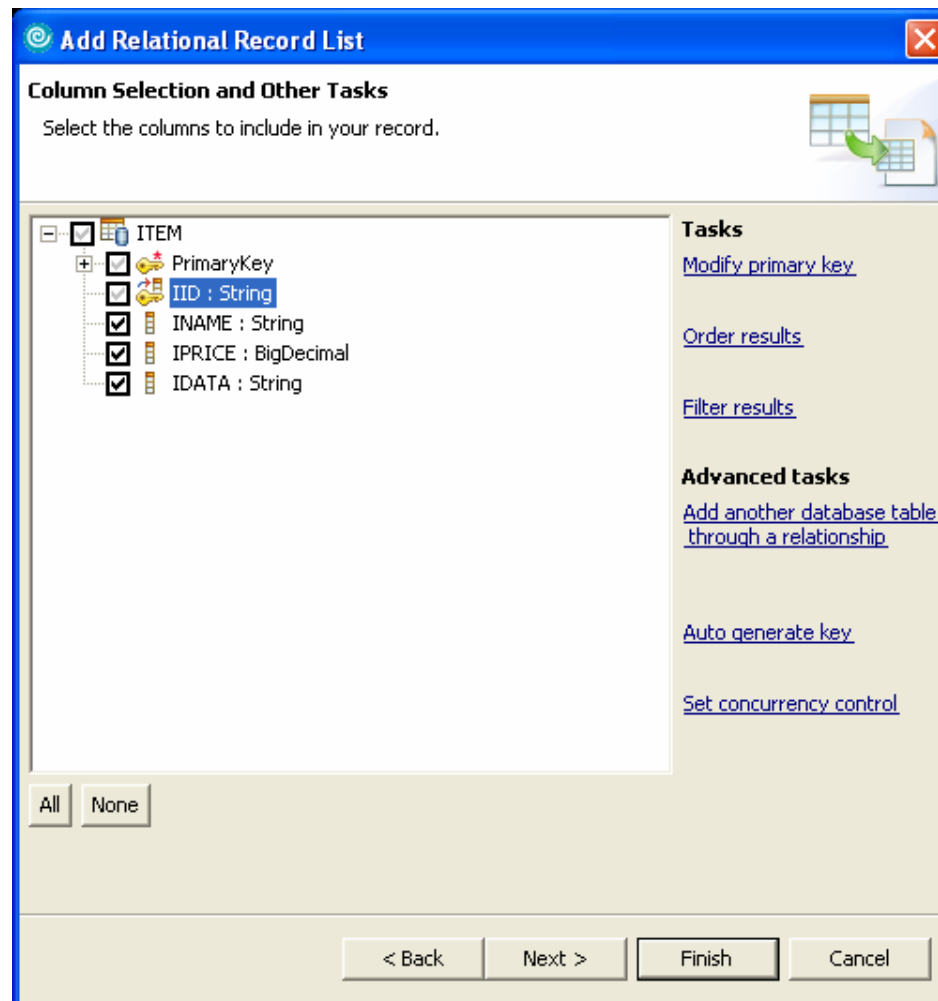
1. Drag n drop Relation Record List part to editor.

2. Add Relational Record List wizard opens

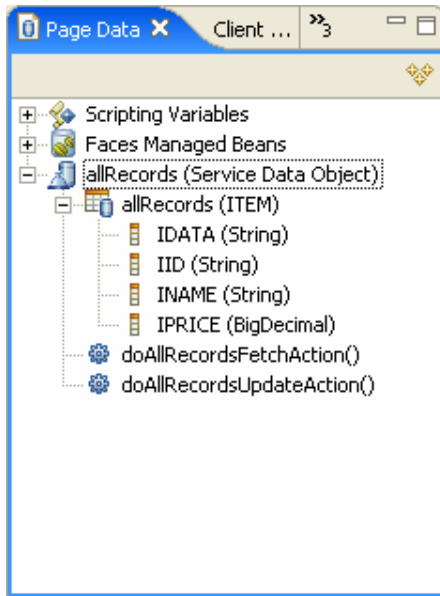
Database Web Pages



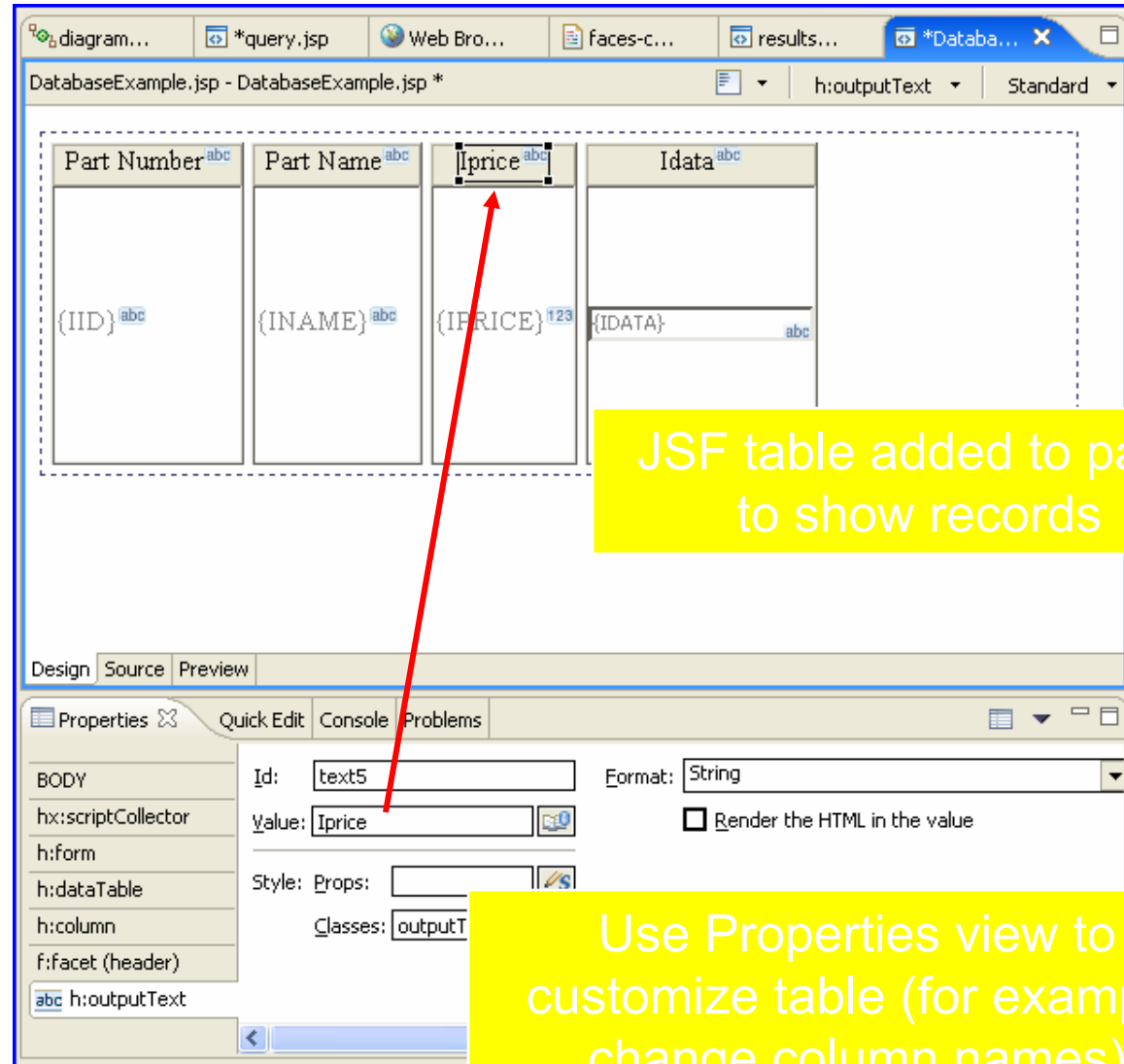
Database Web Pages



Database Web Pages



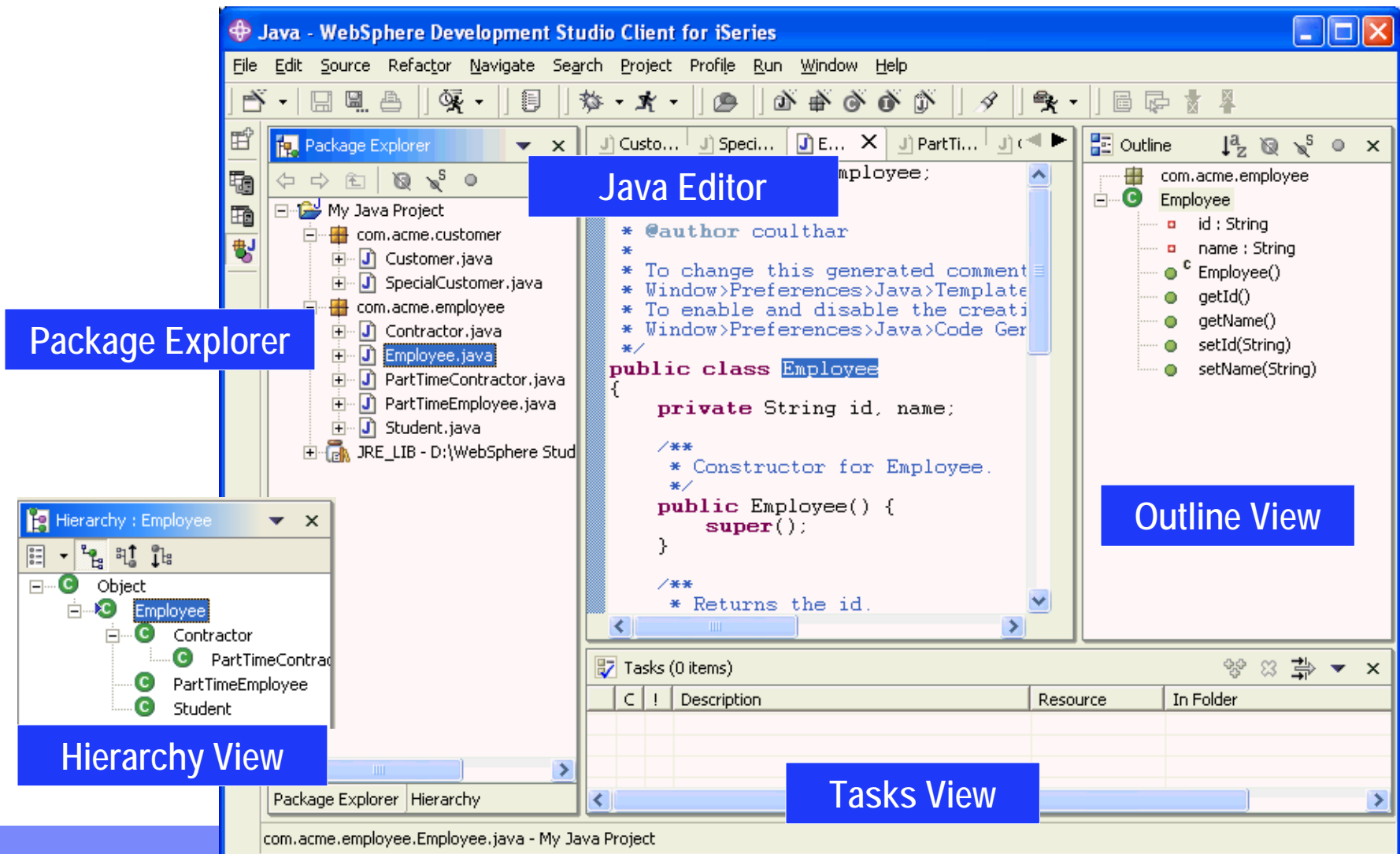
SQL statement shown in Page Data view. Double click to modify.



JSF table added to page to show records

Use Properties view to customize table (for example change column names)

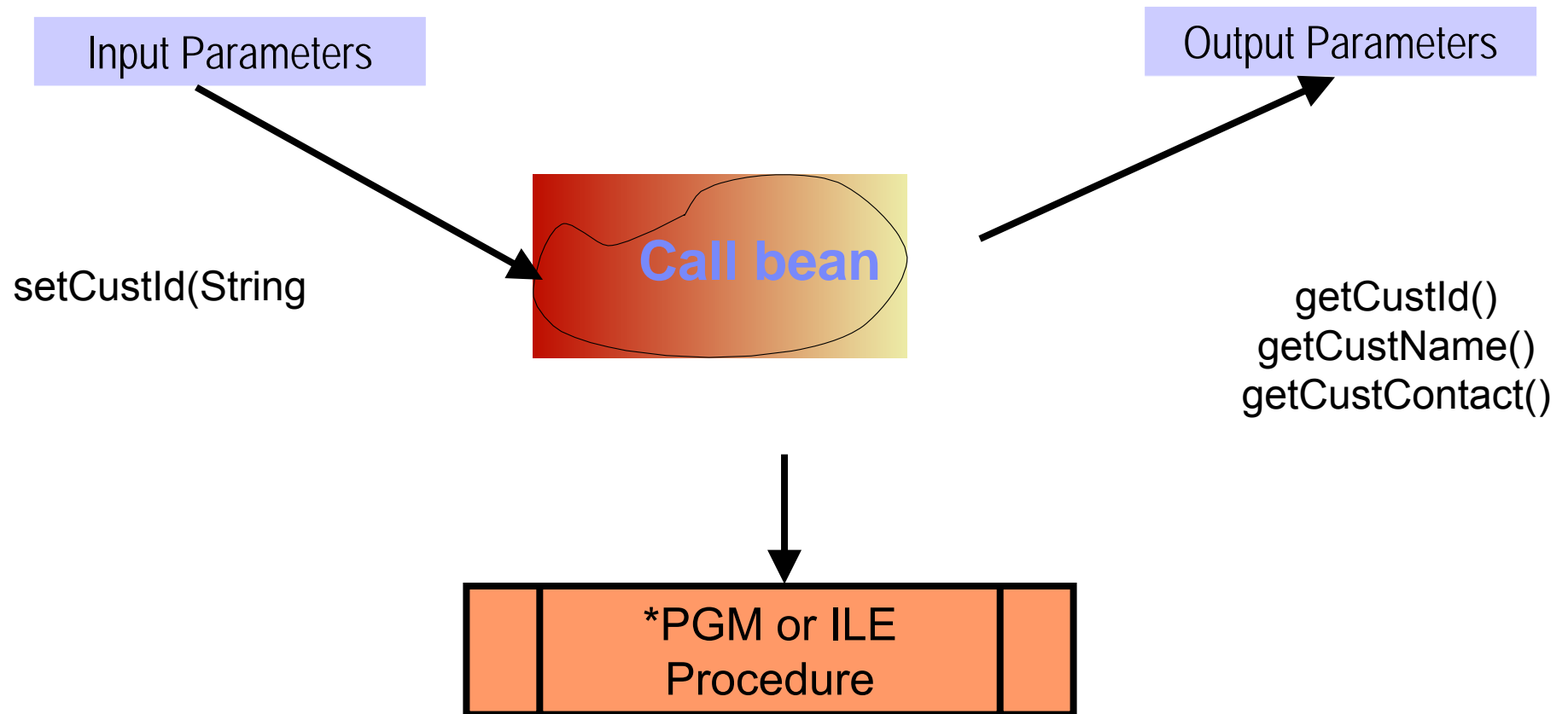
Excellent Java tooling (Java Perspective)



Java Tools iSeries Extensions

- **Remote** support
 - Remote transform, run, debug
- **Programming** support
 - Wizard to generate Java wrapper of *PGM or procedure
 - iSeries Toolbox for Java built-in
 - Java beans for iSeries access
 - Documentation and samples

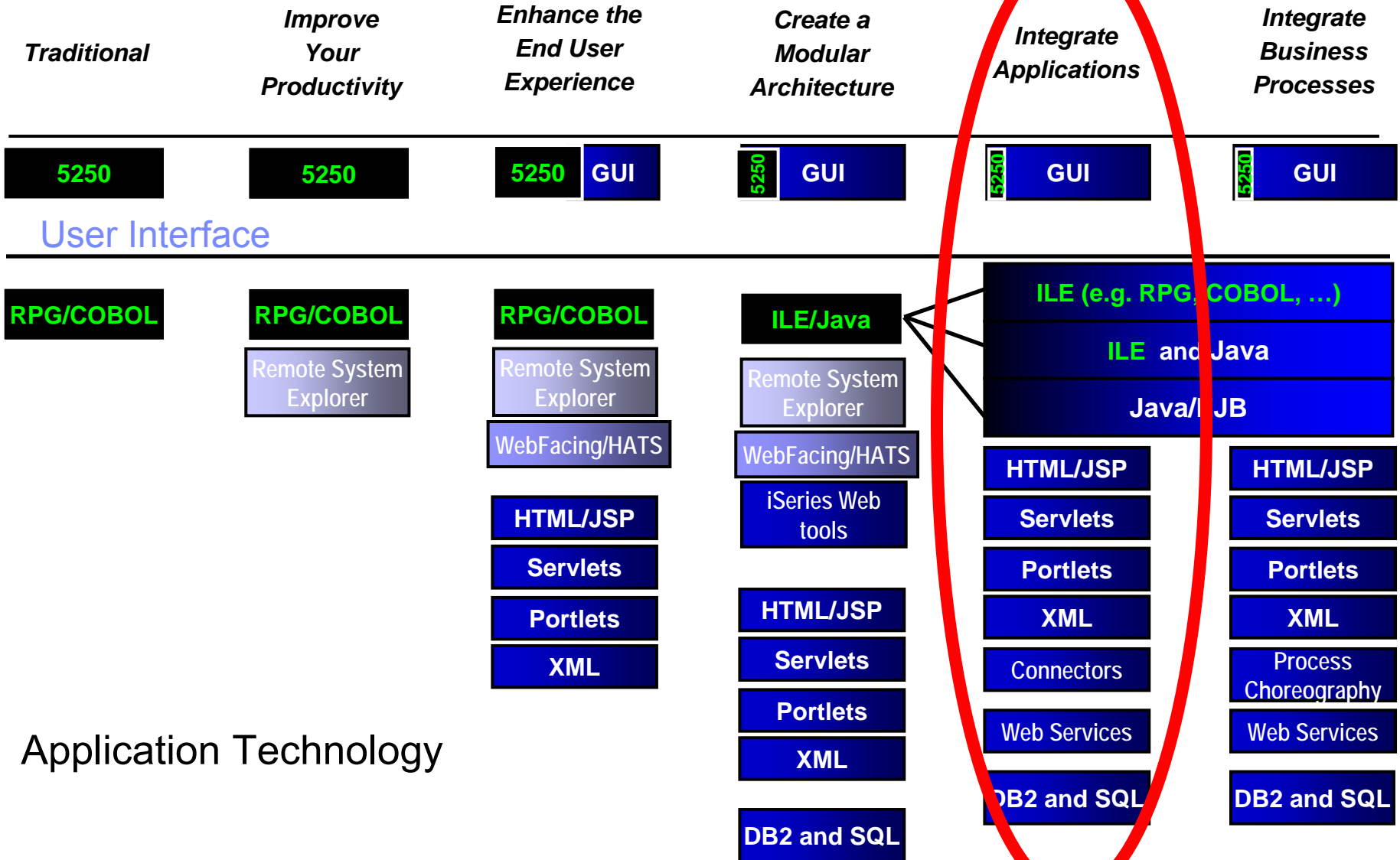
Program Call Wizard – how it works



JavaTools Enhancements version 6.0

- **Toolbox, JFormatted, DFU, and ObjectList beans are now available in the palette of the Visual Editor for Java.**
 - User can now create Java classes to make use of these visual components or Java beans inside the Visual Editor for Java.
- **Enhancements to the Program Call wizard:**
 - Easier to launch the wizard
 - Ability to reuse configuration file for multiple program calls
 - Better entry field validations
 - Better user interface for importing PCML from source
- **Ability to browse for procedures of a service program**

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WebSphere Development Studio Client V6.0.1 based on RWD V6

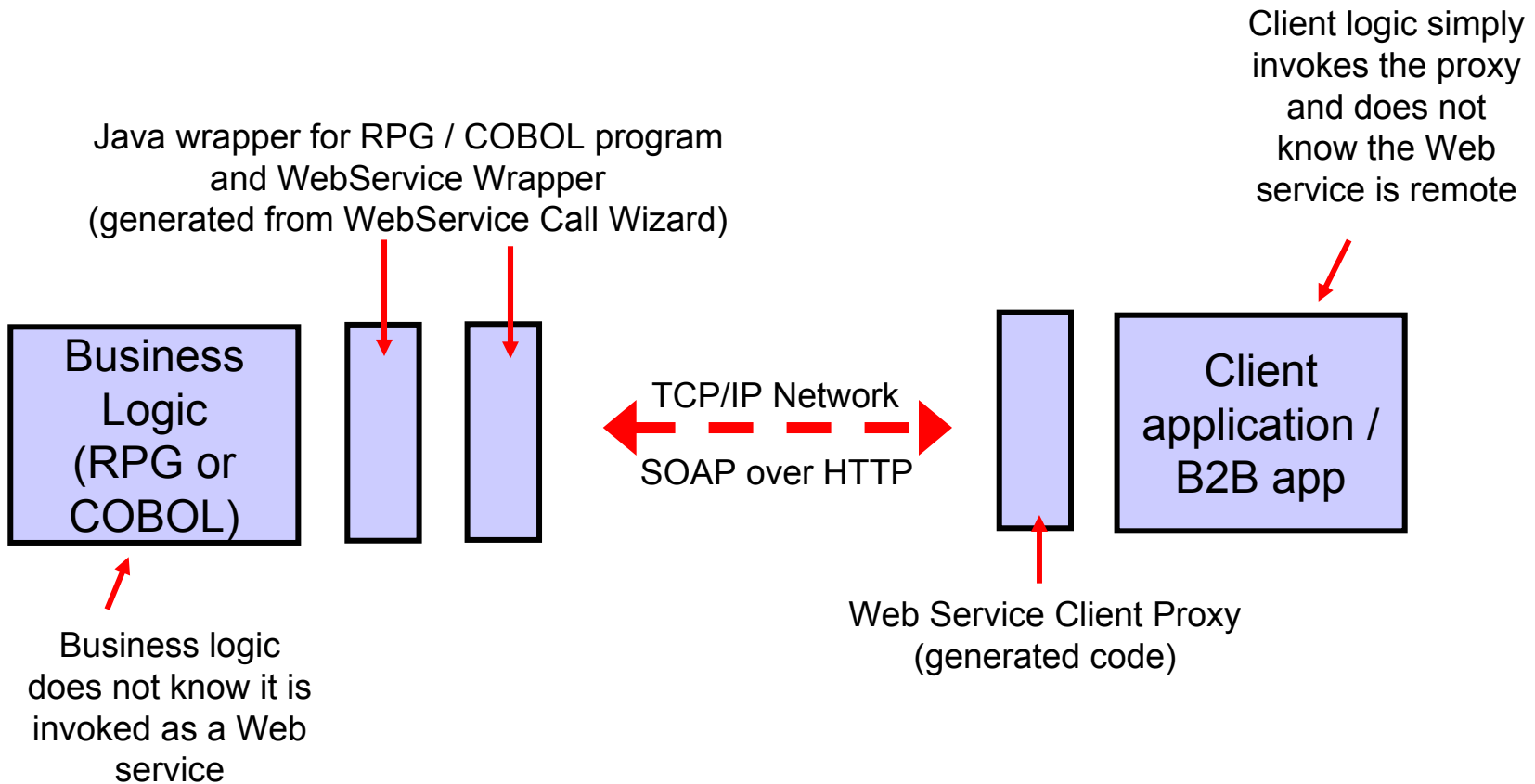
What Are Web Services

- Function that can be programmatically invoked over a network
- Basically remote procedure calls built on open standards and proven technologies
 - Lots of new standards around Web services to ensure interoperability in heterogeneous environments
 - Underlying implementations built on proven technologies like
 - XML
 - HTTP
 - Messaging middleware
 - Security standards

Why use Web Services

- **Because:**
 - They are the latest hype
 - They are hot
 - They are cool
 - They are useful
 - Somebody asks you to provide one for a certain task
 - Somebody provides one and asks you to use it

RPG/COBOL Program as Service Provider



Tools

■ Web Services Tools in WDS*c*

– Create

- Web services from:
 - ILE RPG/COBOL source (new wizard in V6.0.1)
 - Java Beans
 - Enterprise JavaBeans (advanced edition only)
 - SQL Queries
 - DB2 Stored Procedures
 - DB2 XML Extender calls
- Web service client proxy given a WSDL document

– Test

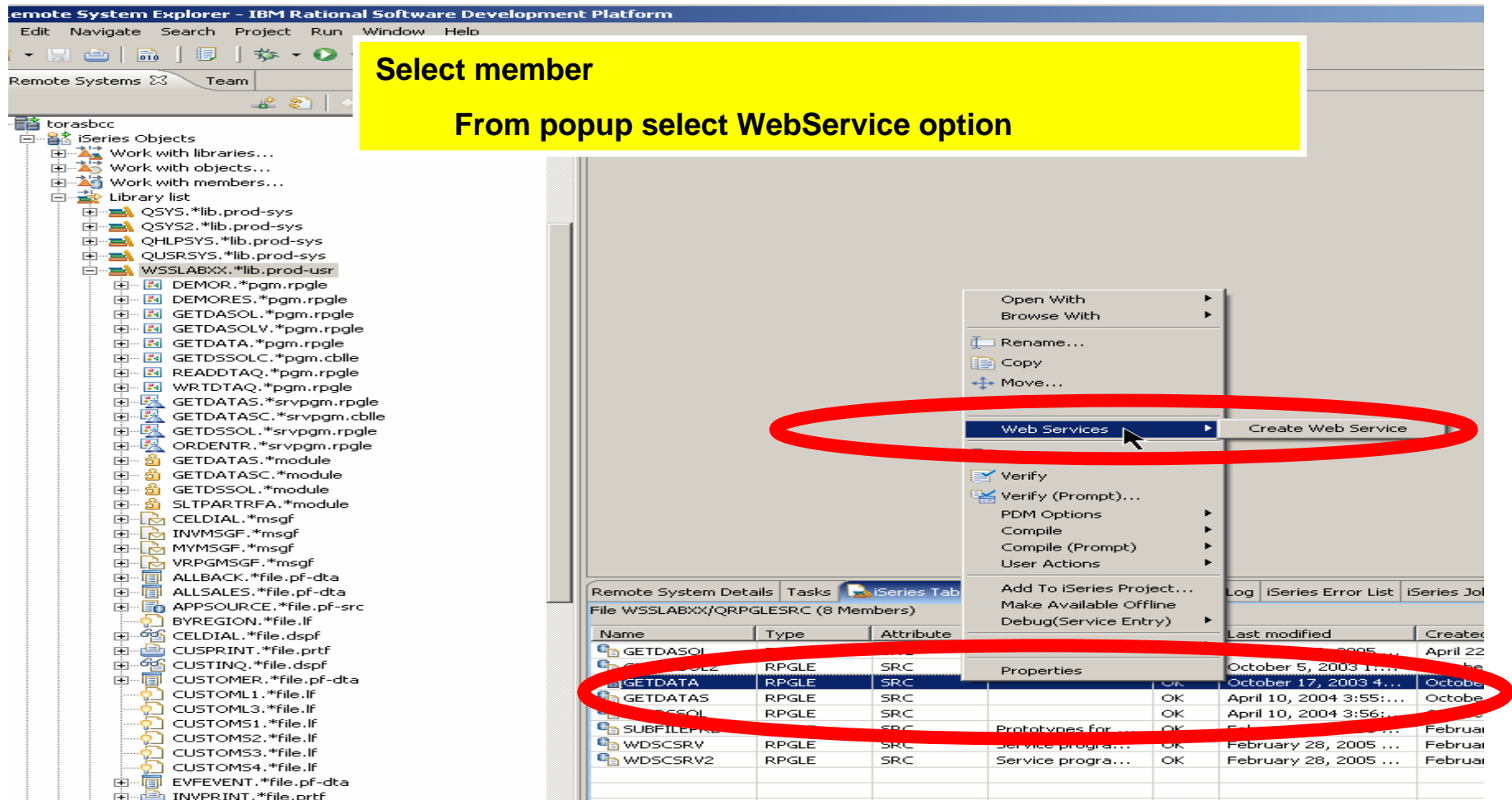
- Test your Web services in the WebSphere test environment
- Generate test code to test generated Web service client proxies

– TCP/IP Monitor

- Useful for debugging SOAP messages between provider and consumer

WebService Wizard

Use Remote Systems Explorer to select member



Web Service Wizard

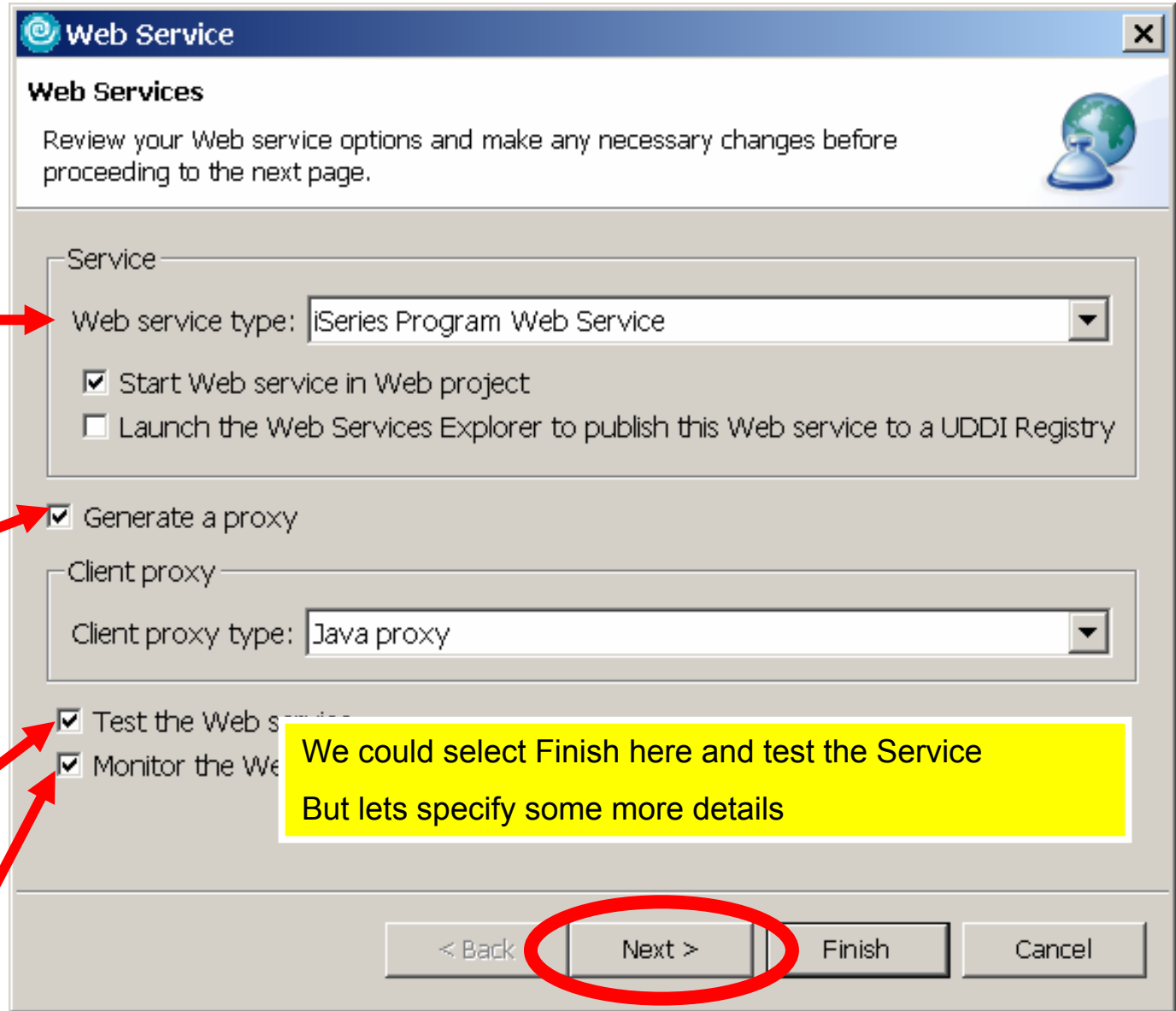
- Click Finish & Done!
- Drop-Dead Simple!

Default is iSeries Web Service type

The Java bean proxy will provide a remote procedure call interface to the Web service

We will test the Web service after it is created

We will monitor the SOAP traffic for this Web service



We could select Finish here and test the Service But lets specify some more details

Configuring the Web Service- Edit Program/Parameters

-File name shows the Program source file the wizard was launched from (valid types incl. ILE RPG, COBOL, PCML)

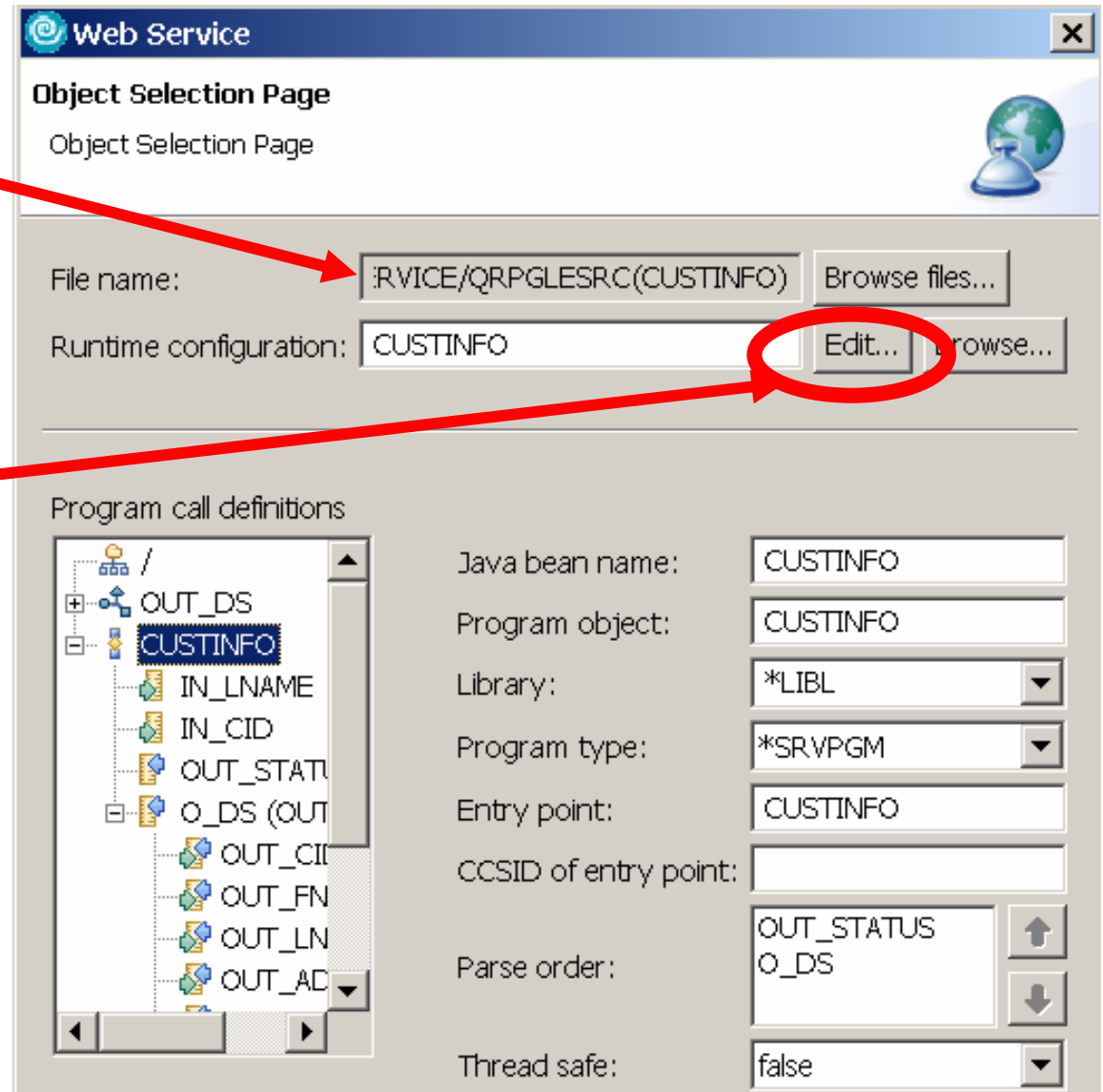
-**Browse files** to select a different file

-The default Runtime configuration is taken from the System i5 connection

-**Edit** to change the configuration

-**Browse** to choose an existing configuration (.config file)

- Selecting the Program (**CUSTINFO**), you can change the Library, Program type, Program Object etc. (in most cases the defaults are sufficient)
- Expand the program to see program parameters
- Selecting a parameter (e.g. **IN_CID**), you can change Usage type, CCSID



Web Service

Object Selection Page

Object Selection Page

File name: :R.VICE/QRPGLESRC(CUSTINFO) Browse files...

Runtime configuration: CUSTINFO Edit... Browse...

Program call definitions

Java bean name: CUSTINFO

Program object: CUSTINFO

Library: *LIBL

Program type: *SRVPGM

Entry point: CUSTINFO

CCSID of entry point:

Parse order: OUT_STATUS
O_DS

Thread safe: false

Configuring the Web Service- Runtime Configuration

Signon information is defaulted from System i5 connection

Alternatively, can use the Program Call Java Connection Architecture connector for signon and connection management (advanced product only)

iSeries Web Service Runtime Configuration

Configure Authentication

Specify how the program call runtime should connect and authenticate

Specify signon values

Host name: TORASCGM

User ID: ERICDP

Password: *****

Enable password encoding

Use program call JCA connector

JNDI name:

< Back Next > Finish Cancel

Testing the Web Service

After wizard completes, the generated Test Client JSPs are run on the server (selected option "Test the Web service" in the wizard)

Select one of the methods to test, then enter the input data, Customer ID "0001"

Click "Invoke" and the results of the Web service are displayed, Customer ID "0001" is associated with Annie O!

- As you will see shortly, there are many different ways to test the Web service

Web Browser x

http://CUSTOMERServicePort/TestClient.jsp

Methods

- [custinfo \(iseries.wsbeans.c\)](#)
- [custinfo_XML \(iseries.wsbeans.c\)](#)

Inputs

inputData:

iN_LNAME:

iN_CID:

Invoke Clear

returnp:

oUT_STATUS:

o_DS:

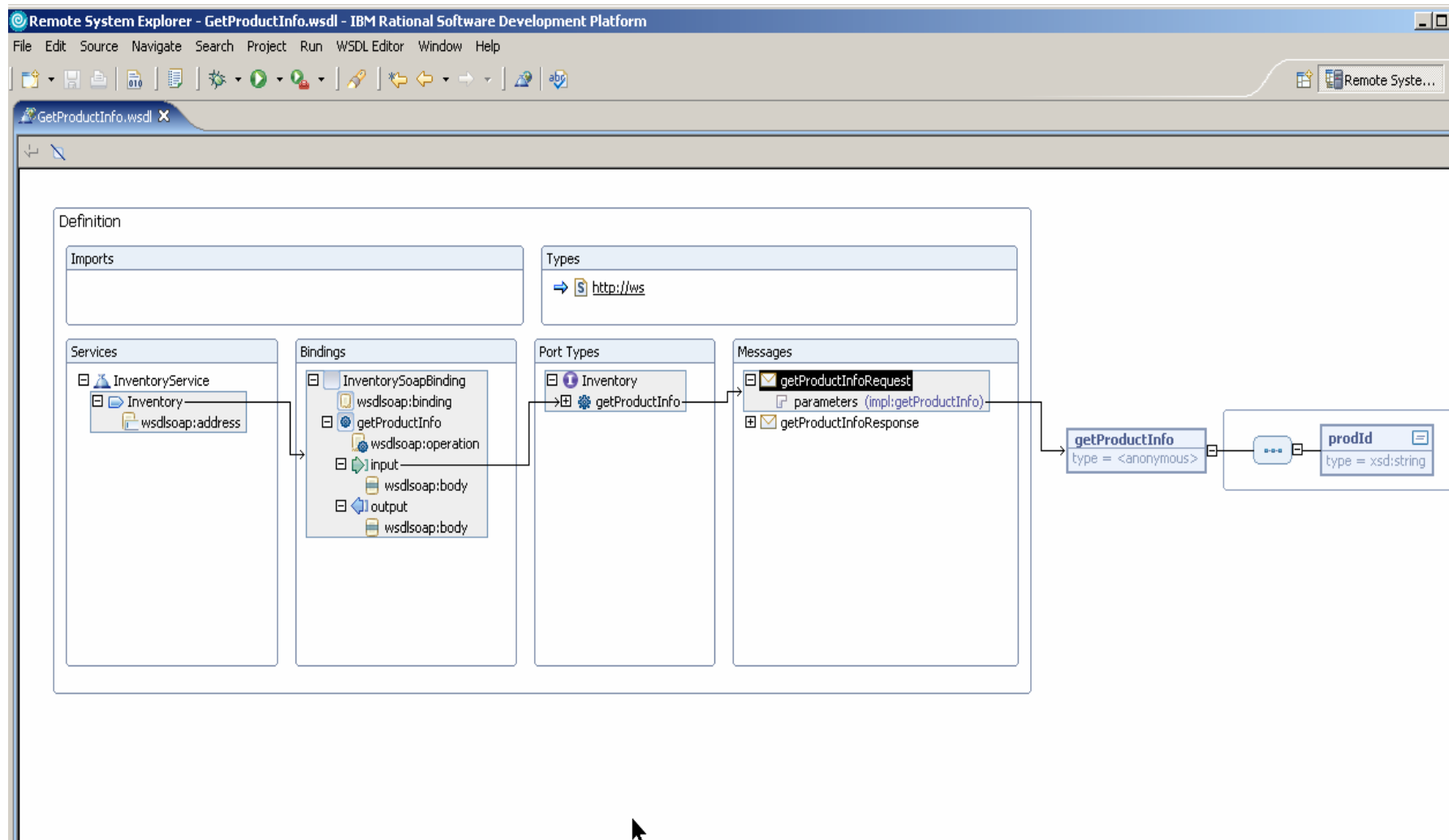
rEC_FOUND: 1

oUT_STATE: IO

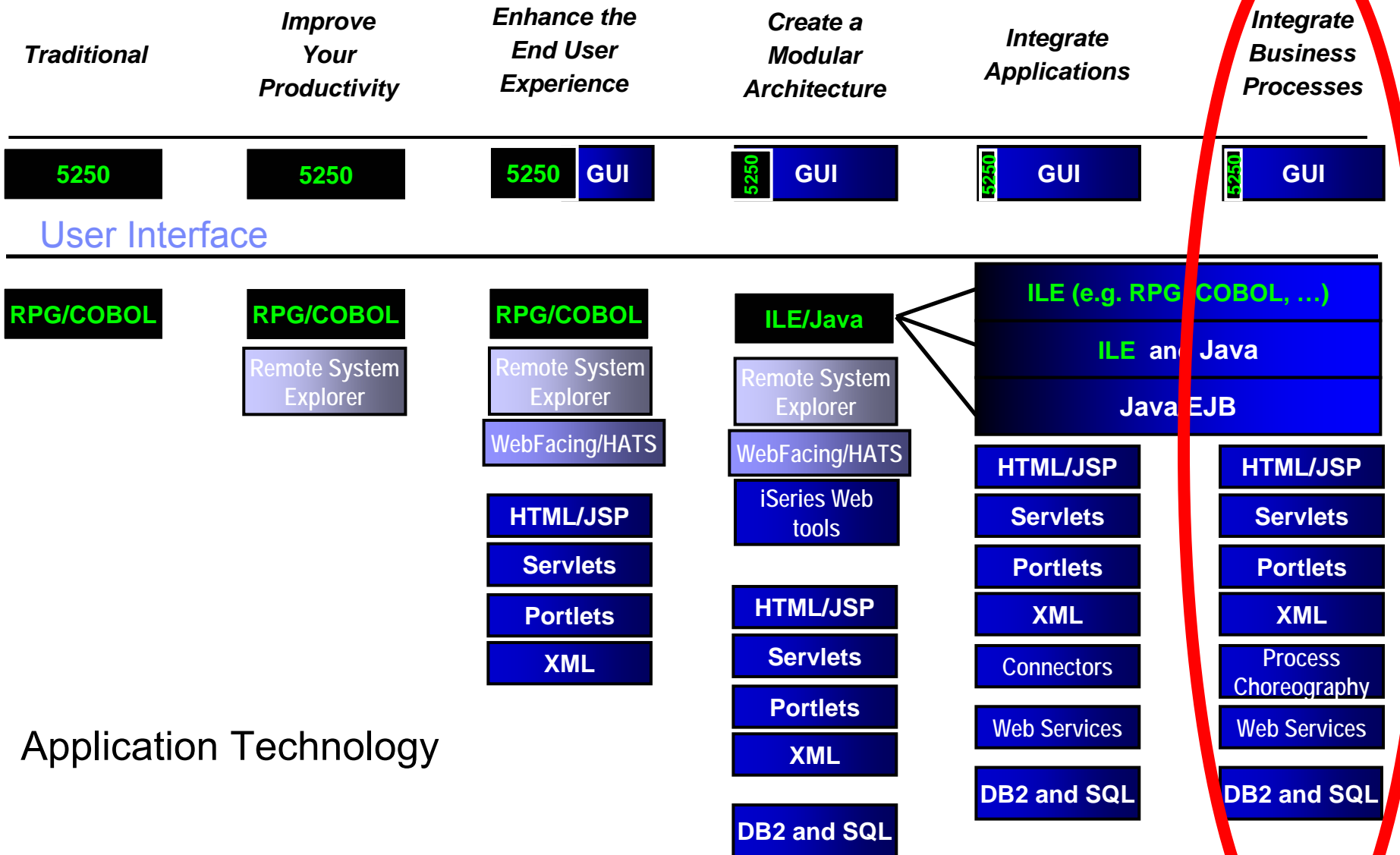
oUT_FNAME: Annie O

oUT_COMMENTS: 00001

WSDL editor in WDS Sc (graphical view)



iSeries Developer Roadmap



WebSphere Development Studio Client Advanced Edition 6.0.1

*Workstation License
order through Passport Advantage*

**Upgrade from WDS 6.0 to 6.0.1 using Rational
Product updater**

http://www.lotus.com/services/passport.nsf/WebDocs/Passport_Advantage_Home

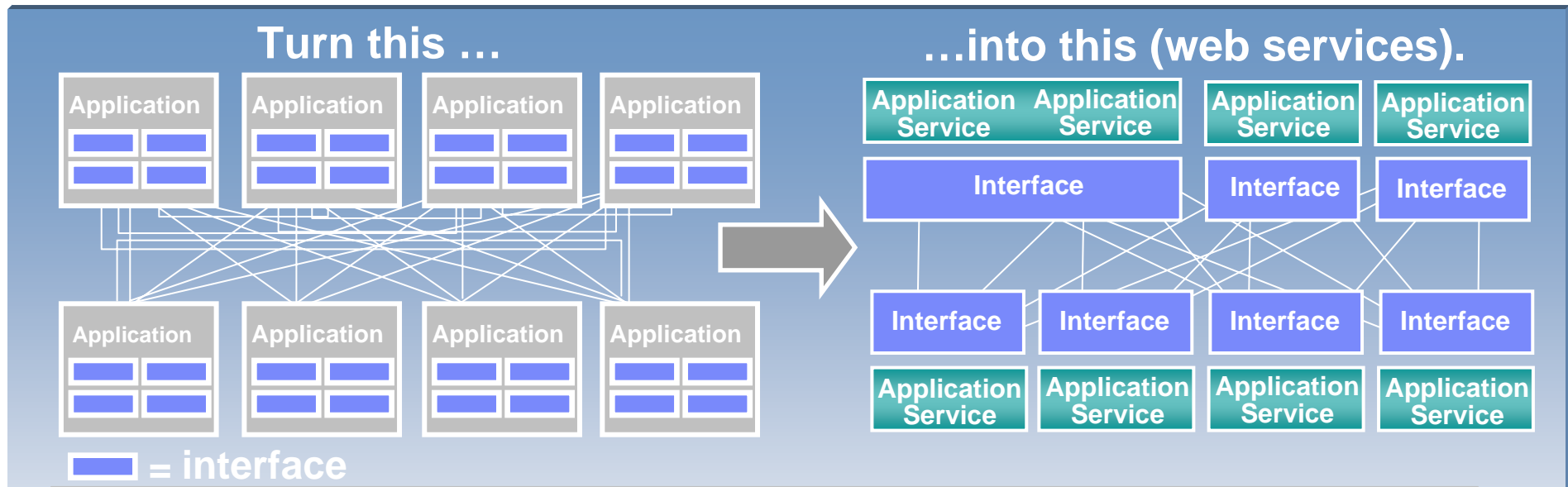
iSeries	iSeries	iSeries *	iSeries	Web Facing * WDHT support	iSeries Projects RSE	+CODE +VisualAge RPG	
Java	Debug	Struts Web	Web Service				
JSF	EGL Java generation	Trace	Profiling	DB	XML	App Server	HATS Toolkit
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					New WDS Lite Technology preview		

WebSphere Integration Developer

www.ibm.com/software/awdtools/iseries

WebSphere Development Studio Client V6.0.1 based on RAD V6

Web Services are a good start...

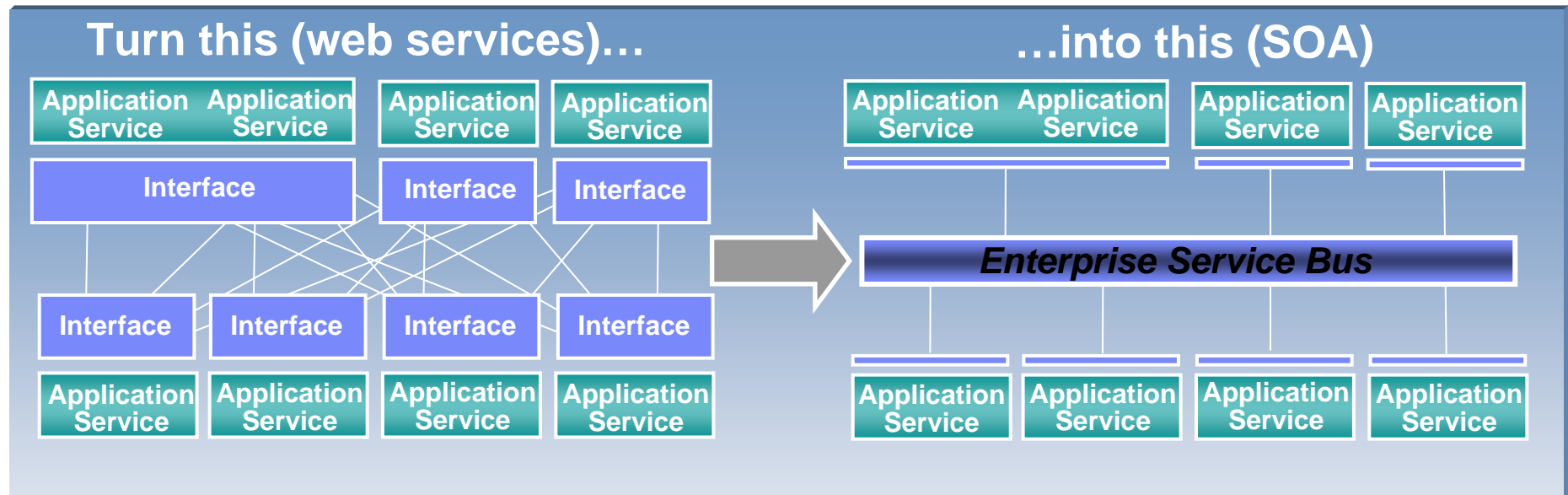


- ✓ Rich business abstractions describe the application interface
- ✓ Decouples the interfaces from the business applications
- ✓ The number and complexity of the interfaces is reduced
- ✓ Business applications and their interfaces become reusable

But separate connection points still leaving bloated interfaces



The Enterprise Service Bus shrinks those interfaces further



- ✓ Decouples the point-to-point connections from the interfaces
- ✓ Allows for dynamic selection, substitution, and matching
- ✓ Enables more flexible coupling and decoupling of the applications
- ✓ Enables you to find both the applications and the interfaces for re-use

Connect services with WebSphere Integration Developer

Conclusion

- There is an ordered roadmap from 5250 to J2EE
- Enter where you want. Stop where you want.
- ILE RPG and COBOL are alive and well and part of the story
- You can move to new language and development paradigms—while protecting IT assets.
- There are many ways to gain needed expertise to accomplish this move to the Web.
- There are many Business Partners with plug-in tools and services to help with the transition!

- It's time to get started! Step 1 - > Better Tools!

WDSC-L Dist list

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