

Approaches to Application Development for z/VSE

Wilhelm Mild
IBM Boeblingen Laboratory

GSE

October 15-17, 2007
Boeblingen, Germany



Trademarks

The following are trademarks of the International Business Machines Corporation in the United States and / or other counties.

CICS*	IBM*	Virtual Image Facility
DB2*	IBM logo*	VM/ESA*
DB2 Connect	IMS	VSE/ESA
DB2 Universal Database	Intelligent Miner	z/VSE
e-business logo*	Multiprise*	VisualAge*
Enterprise Storage Server	MQSeries*	VTAM*
HiperSockets	OS/390*	WebSphere*
	S/390*	xSeries
	SNAP/SHOT*	z/Architecture
		z/VM
		zSeries
		System z

* Registered trademarks of IBM Corporation

The following are trademarks or registered trademarks of other companies.

LINUX is a registered trademark of Linus Torvalds

Tivoli is a trademark of Tivoli Systems Inc.

Java and all Java-related trademarks and logos are trademarks of Sun Microsystems, Inc., in the United States and other countries

UNIX is a registered trademark of The Open Group in the United States and other countries.

Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation.

SET and Secure Electronic Transaction are trademarks owned by SET Secure Electronic Transaction LLC.

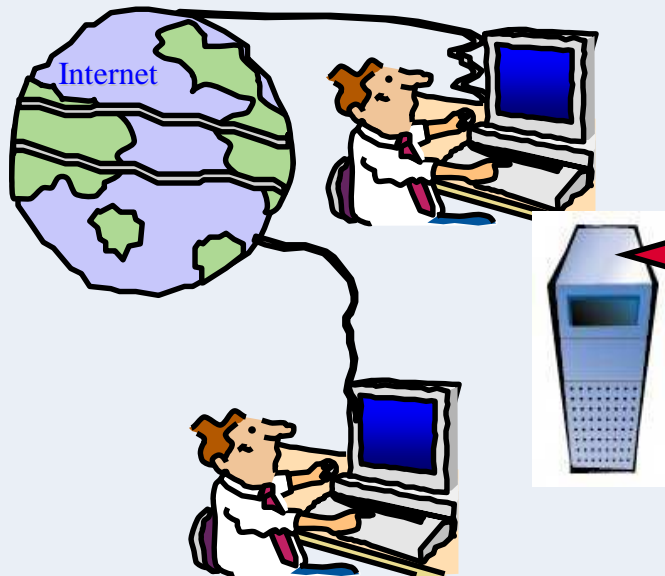
Intel is a registered trademark of Intel Corporation.

ACUCORP is a registered Trademark of ACUCORP Corporation

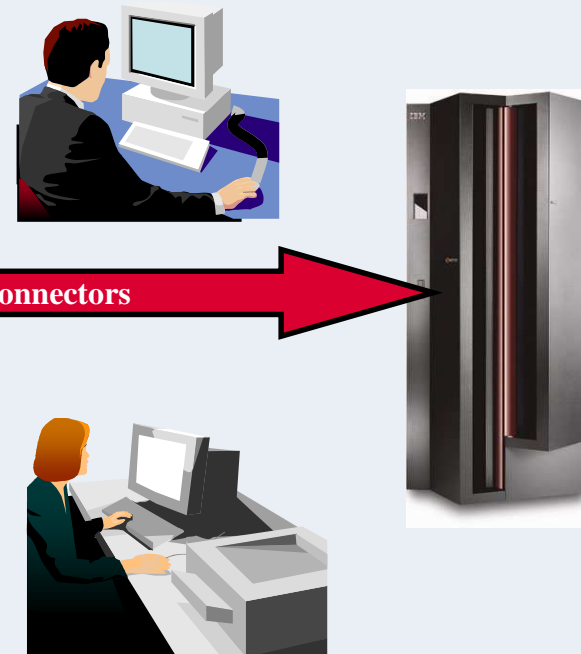
IT environments and their challenge

f Two IT worlds want a common solution

Distr. Application Developer



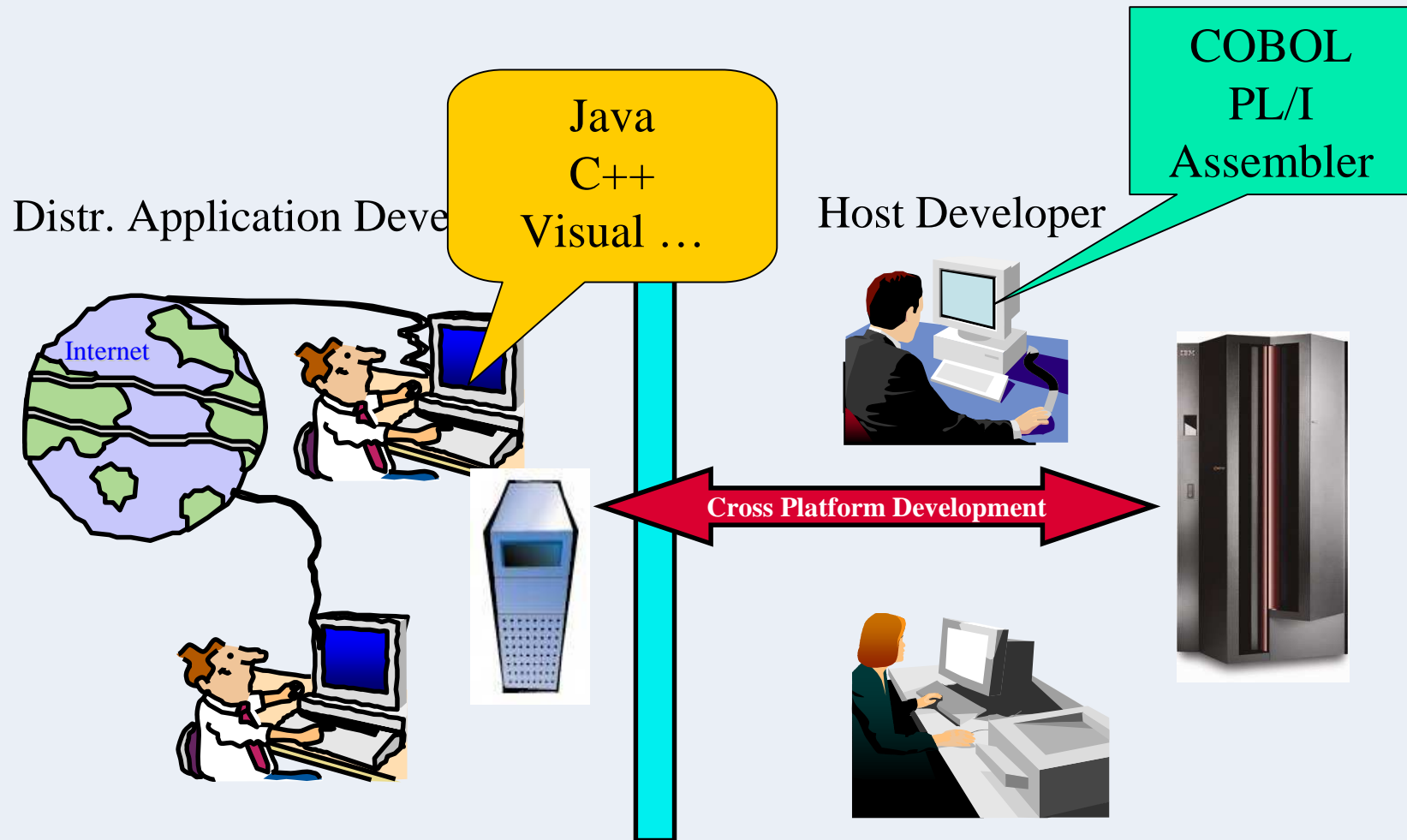
Host Developer



Connectors



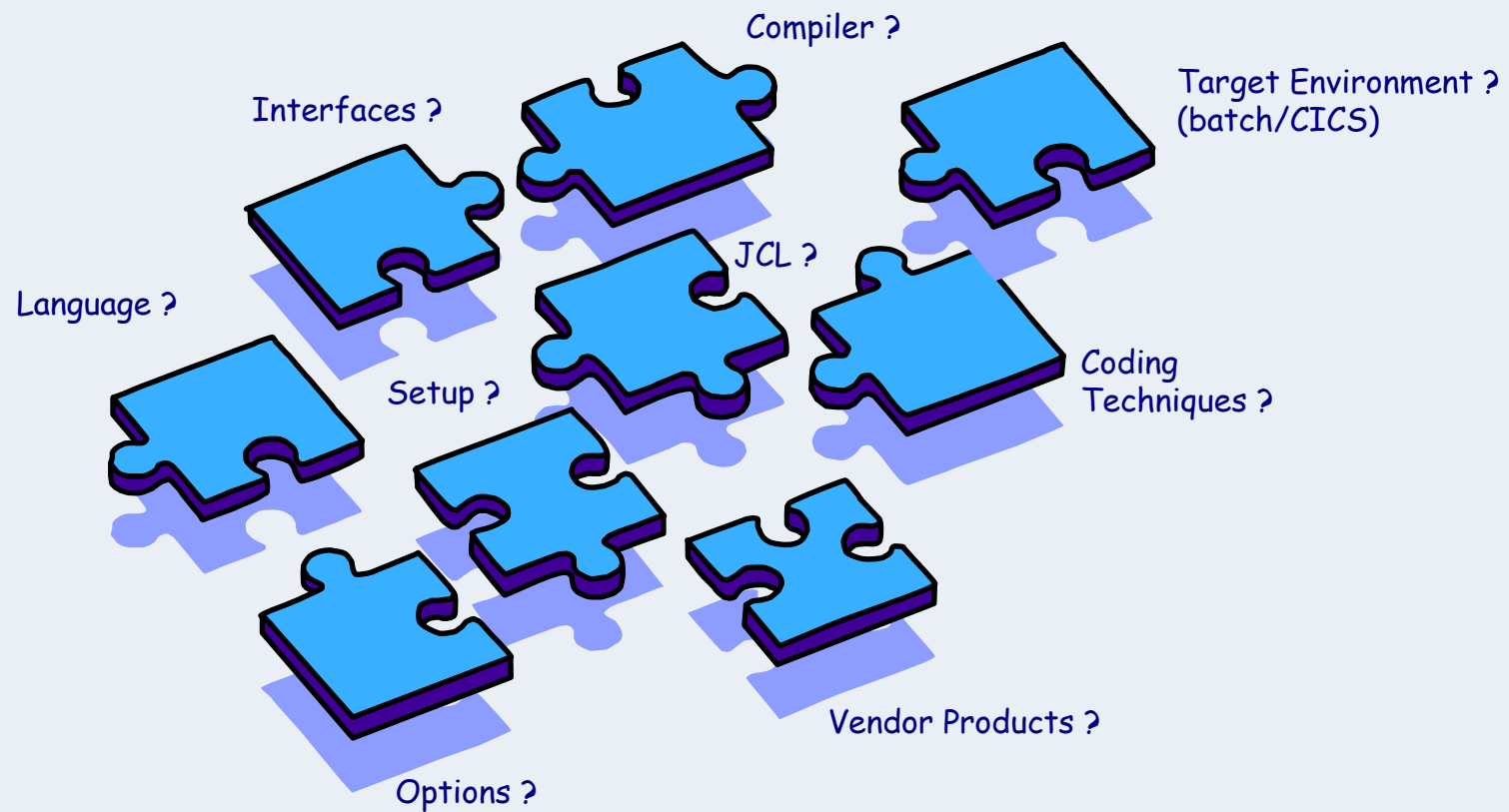
'Distributed' Development Landscape...



Native VSE Application

- Typical interdependencies ...

VSE Application



VSE existing application considerations

- **Interactive Interface Support to build your applications**
 - Primary Library, OPTION 8, in order to build your applications

- **JCL Skeletons for various application languages and call structures**
 - Batch main/subroutines, CICS or DB2 target environments etc.
 - Considerations for suitable translate and compile steps
 - Language independent stubs such as CICS DFHELII ...
 - Appropriate compile and pre-processor options etc.

- **Security Issues**
 - Every CICS TS transaction needs to be "security-enabled" prior to first execution
 - The IUI provides associated support via selection path "Resource Definition" --> "Define Transaction Security"

- **Program Maintenance from outside-VSE environment**
 - needs to ensure use of current compile skeletons, related options, stubs etc.

Goals of today's IT

- **Optimization of Development**
 - performant, less resources
- **Omit redundancies**
 - optimize processes
- **Reduce IT complexity**
 - efficient data flows and data stores

VSE Development options

- **Existing applications**

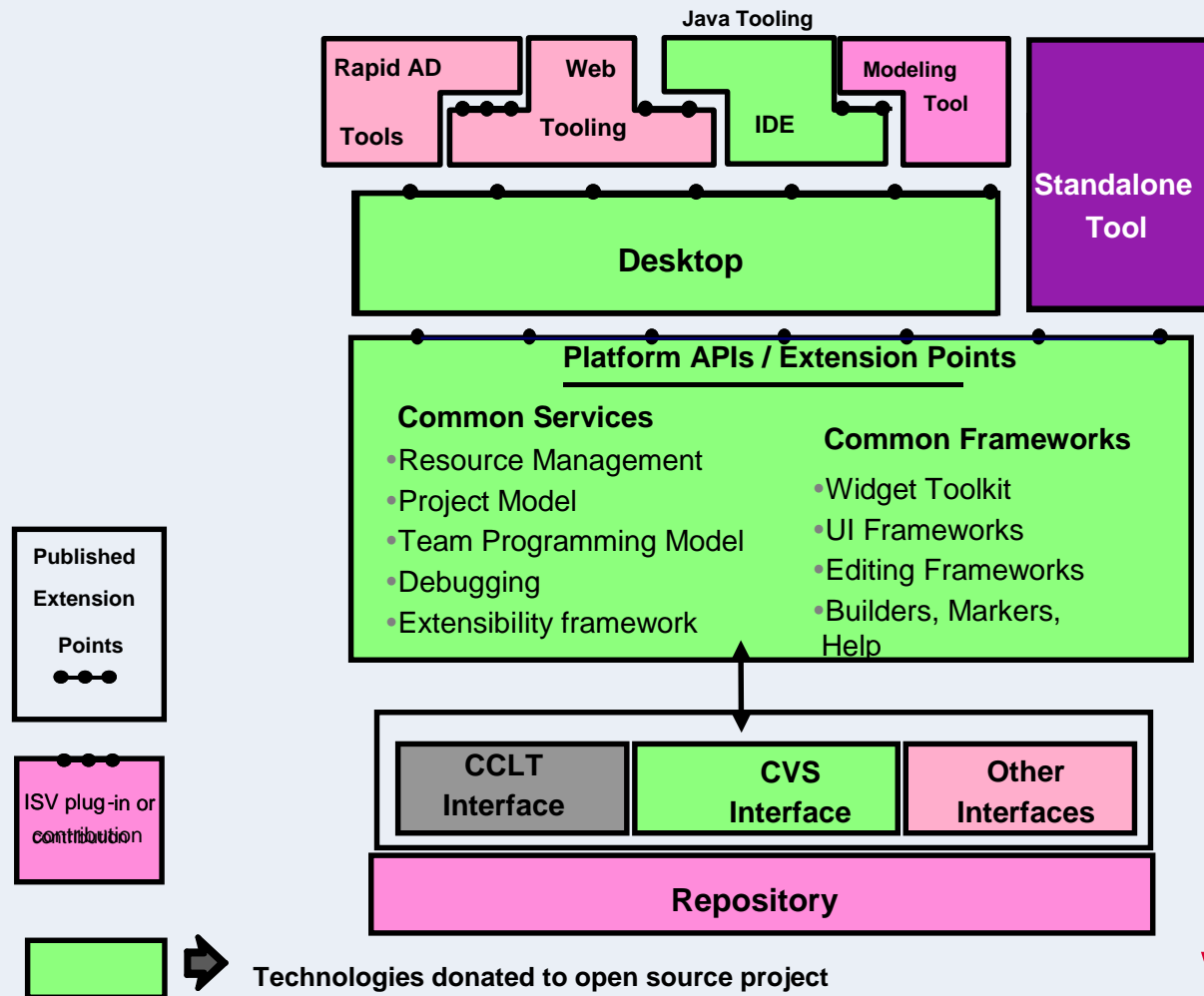
- 1) **New Interface – develop graphical interfaces (in Java)**
- 2) **Modern access - modern applications access z/VSE via Connectors.**

- **New Applications for VSE**

- 1) **Cross-Platform solution development environments (i.e. 4GL Methods)**
- 2) **Modern development tools for existing code (i.e COBOL, PL/I, ASM)**

Open source – Eclipse - is the base

Modern development environment !

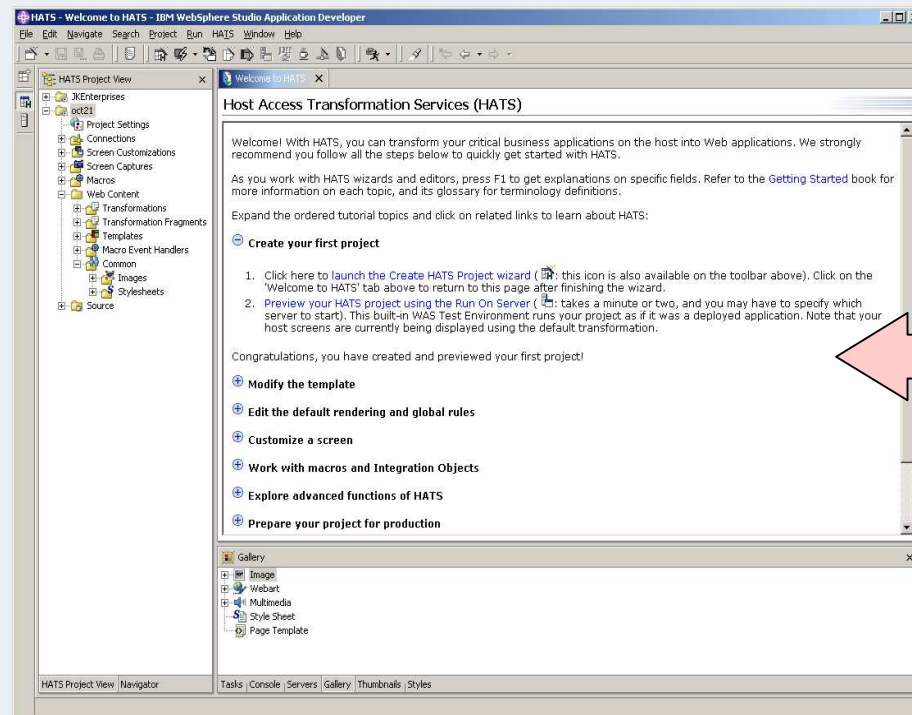


www.eclipse.org

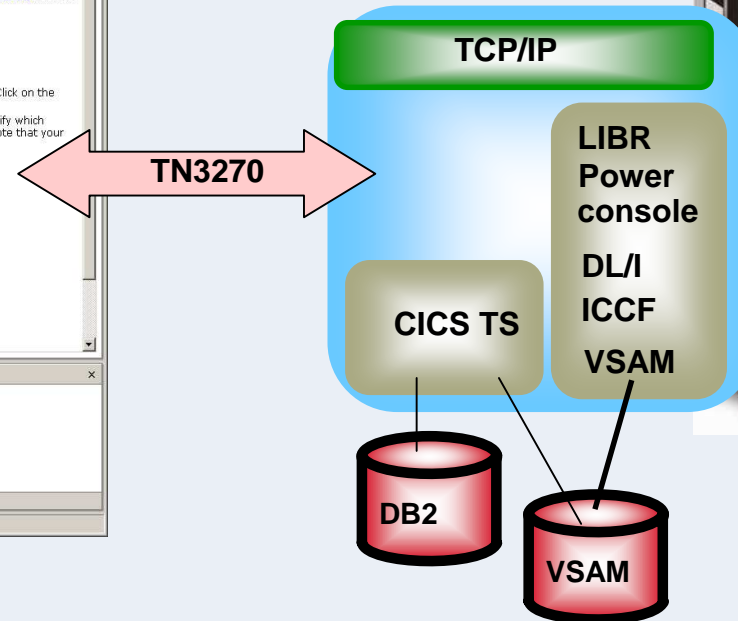
Existing and new Applications

(1) Modernize – Develop graphical interfaces – in Java

PC/Workstation Front-End Development



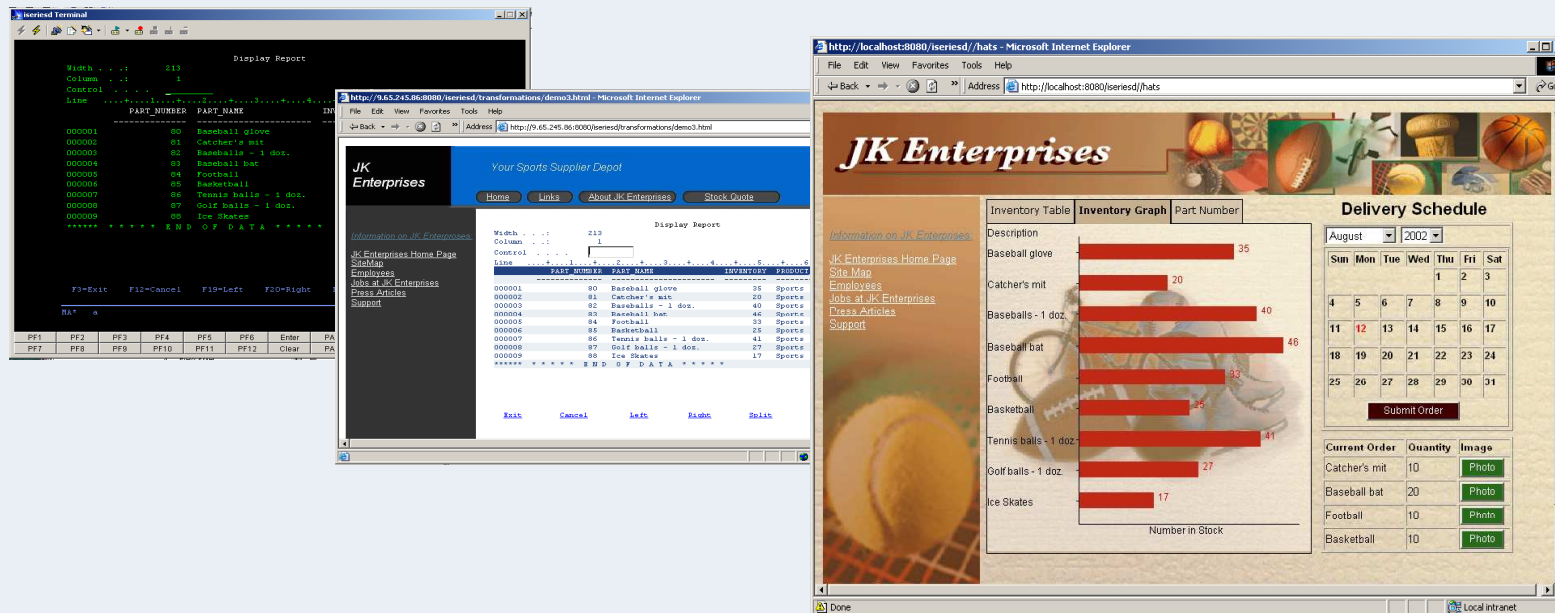
z/VSE Server



- **Application-Development – in Java** (i.e. HATS Studio or Eclipse)
- The new application accesses unchanged VSE application and data
- the new application is a web application using internet technologies

Host Access Transformation Server (HATS)

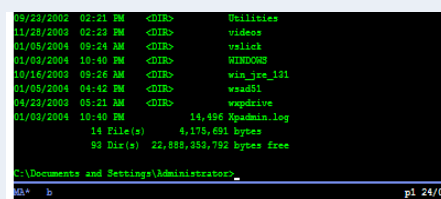
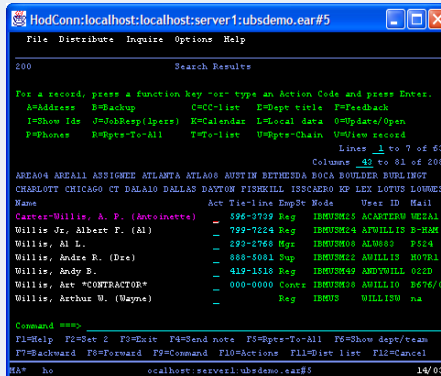
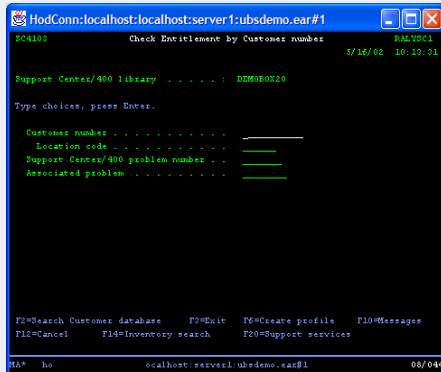
- A Web-to-host integrator, HTML emulator ...
- rules-based transformation engine, application integration ...
- converts green screens to graphical user interfaces in web applications
- improves ease-of-use of host applications.



Benefit: Easily extend existing applications to the web

HATS Advantages:

■ Combine / Integrate



ubsdemo - Microsoft Internet Explorer
Address: http://localhost:9083/

JK Funds
Homepage > About Wealth Management in the US > Home

Market Update

Dow Jones	9959.71	37.85
NASDAQ	1918.26	13.61
S&P 500	1062.24	3.19
30 Yr Bond	5.191	0.04

Data from 5250 Source

SC4103 Check Entitlement by Customer number RALYSC1
5/16/02 10:13:31

Support Center/400 library DEMOBOX20

Type choices, press Enter.

Customer number
Location code
Support Center/400 problem number
Associated problem

Login

UserName
Password
Go

→ First Time
→ Enroll
→ Tour

Highlights

→ Think Year-End Planning
→ JK Funds reports third quarter net profit of \$2,243 million
→ Read the NASD's June 25, 2003 Investor Alert Regarding Class B Mutual Fund Shares
→ Read the NASD's Investor Alert Regarding Mutual Fund Breakpoint Discounts
→ View Current CD Rates

Career Opportunities

→ Financial Advisor Careers
→ Career Opportunities

Our Perspective

- Municipal Market Commentary-12/01/03
- Basis Points -12/11/03
- On the Run- 12/08/03
- As We See It -12/08/03
- Mary Farrell's Market View - 11/11/03
- Municipal Market in Perspective-11/03/03
- Credit Market Relative Value (Summary Note) - 11/10/03

Data from 3270 Host

Name	Phone	Type	Node	User	Mail
Carter-Willis, A. P. (Antoinette)	596-3739	Reg	IBMUSM25	ACARTERU	WEZA1
Willis Jr, Albert F. (Al)	799-7224	Reg	IBMUSM24	AFWILLIS	B-HAM
Willis, Al L.	293-2768	Mgr	IBMUSM08	ALW883	P524
Willis, Andre R. (Dre)	888-5081	Sup	IBMUSM22	AWILLIS	H07R1
Willis, Andy B.	419-1518	Reg	IBMUSM49	ANDYWILL	022D
Willis, Art *CONTRACTOR*	000-0000	Contr	IBMUSM38	AWILLIO	B676/C
Willis, Arthur W. (Wayne)		Reg	IBMUS	WILLISW	na

Results from VT Data Source

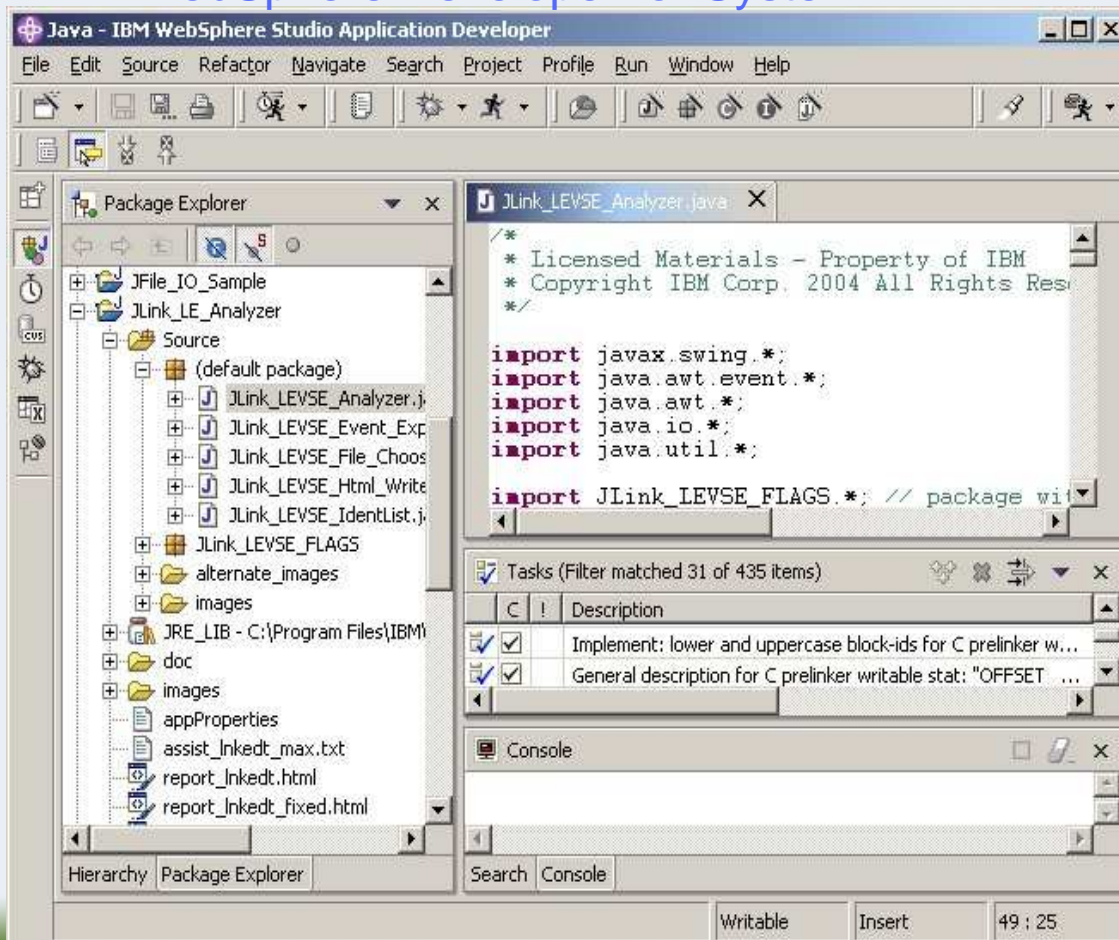
Query Directory: c:\
93 Dir(s) 22,888,353,792 bytes free
14 File(s) 4,175,691 bytes

Local intranet

Existing and new Applications

(1) Access – Modern applications access z/VSE – in Java

Rational Application Developer (RAD)
WebSphere Developer for System z



Based on the eclipse platform

<http://www.eclipse.org>

Open architecture for integrated Web- & application development.
Supports the plug-in model

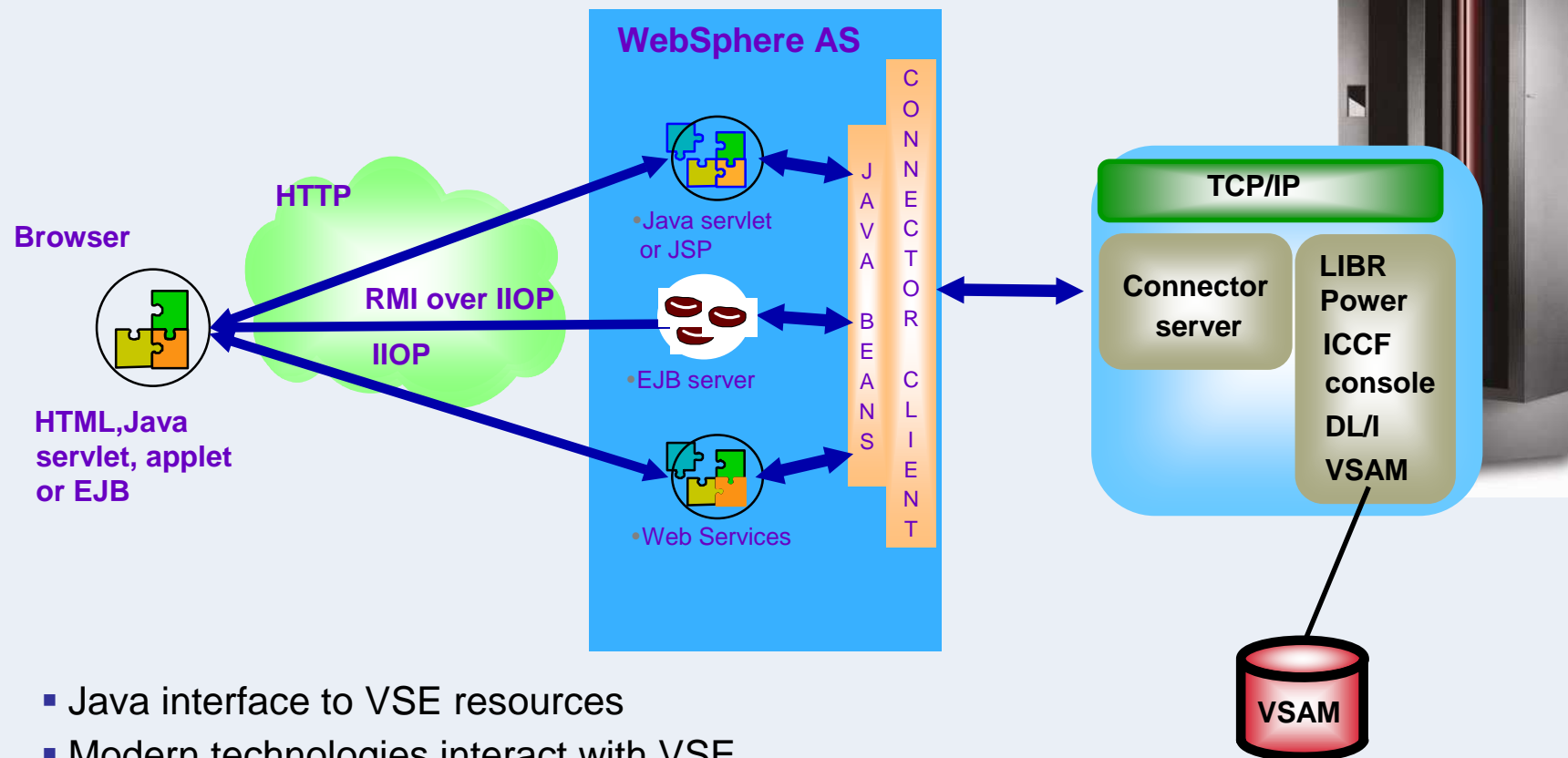


- **Different Perspectives**
Java-, Profiling-, Debugging-,
CVS Repository-, J2EE-, XML ...
- **Basic Functions** like:
Project-, class-, interface-
generation, code-formatting
- **Control Windows**
Source code, tasks, console-
messages, package explorer ...
- **Developer Tools** like:
Profile-agents for analysis,
javadoc generator
- **Tools for execution, test**

Real time access to VSE data and subsystems with Java-Based Connector

Web Client

z/VSE Server



- Java interface to VSE resources
- Modern technologies interact with VSE

VSE Development options

- **Existing applications**

- 1) **New Interface – develop graphical interfaces (in Java)**
- 2) **Modern access - modern applications access z/VSE via Connectors.**

- **New Applications for VSE**

- 1) **Cross-Platform solution development environments (i.e. 4GL Methods)**
- 2) **Modern development tools for existing code (i.e COBOL, PL/I, ASM)**

Open source – Eclipse - is the base

IBM Developer tools based on Eclipse technology

- BPEL
- Business Process Modelling & Integration
- Human Workflow support
- Service Aggregation
- Business Rule Beans

WebSphere
Integration
Developer

WebSphere
Developer
for System z

- z/OS Application Development
- XML Services for the Enterprise
- Service Flow Modeler
- BMS Map Editor
- COBOL and PL/I



- + (1)VSE Develop. Plug-In
- + (2)VSE EGL Plug-In for COBOL Generation

Rational Application
Developer

Rational Web
Developer

Eclipse

- Web Development
- Web Services Development
- Rich Client Development
- XML & Database Tools
- 4GL Development

- J2EE/EJB & Portal Development
- Component Testing
- Code Review & Runtime Analysis
- UML Visual Editors
- Configuration Management

- + VSE EGL Plug-In for COBOL Generation



(2) Cross Platform development Approach with VisualAge Generator

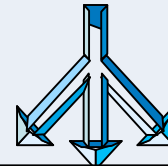
Rapid
Development



IBM 4GL history:
CSP (~1981) -> VAGen (~ 1994) -> EGL/ WSED (~2003)
Migration-Options available ...

Generation

Generate



GUI, Java, HTML, C++, COBOL, PL/I

z/VSE(CICS, Batch)

Execution

Execute



AIX



NT



HP/UX



Solaris



Linux



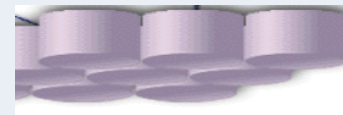
OS/400



z/VM

z/OS, (CICS, IMS, Batch)

- Multiple platforms
- Client /Server Applications
- Java applets/servlets or standalone
- Multiple database/file support apps



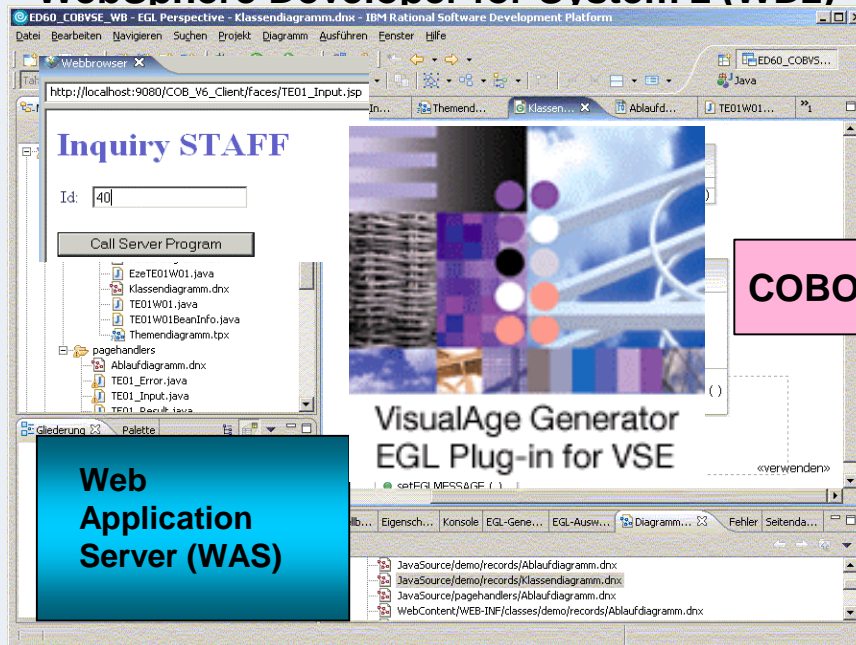
DB2 UDB VSAM ODBC
Oracle DLI, IMS/DB

(1) Cross Plattform Solution development Approach with VisualAge Generator

* **New:** VisualAge Generator EGL Plug-in for VSE *

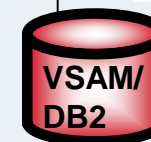
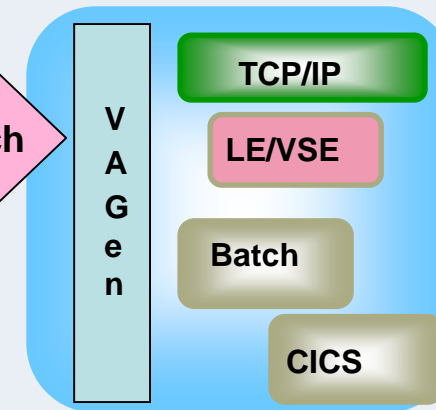
Rational Application Developer (RAD) or
WebSphere Developer for System z (WDz)

z/VSE



„Generate“

COBOL/CICS/batch

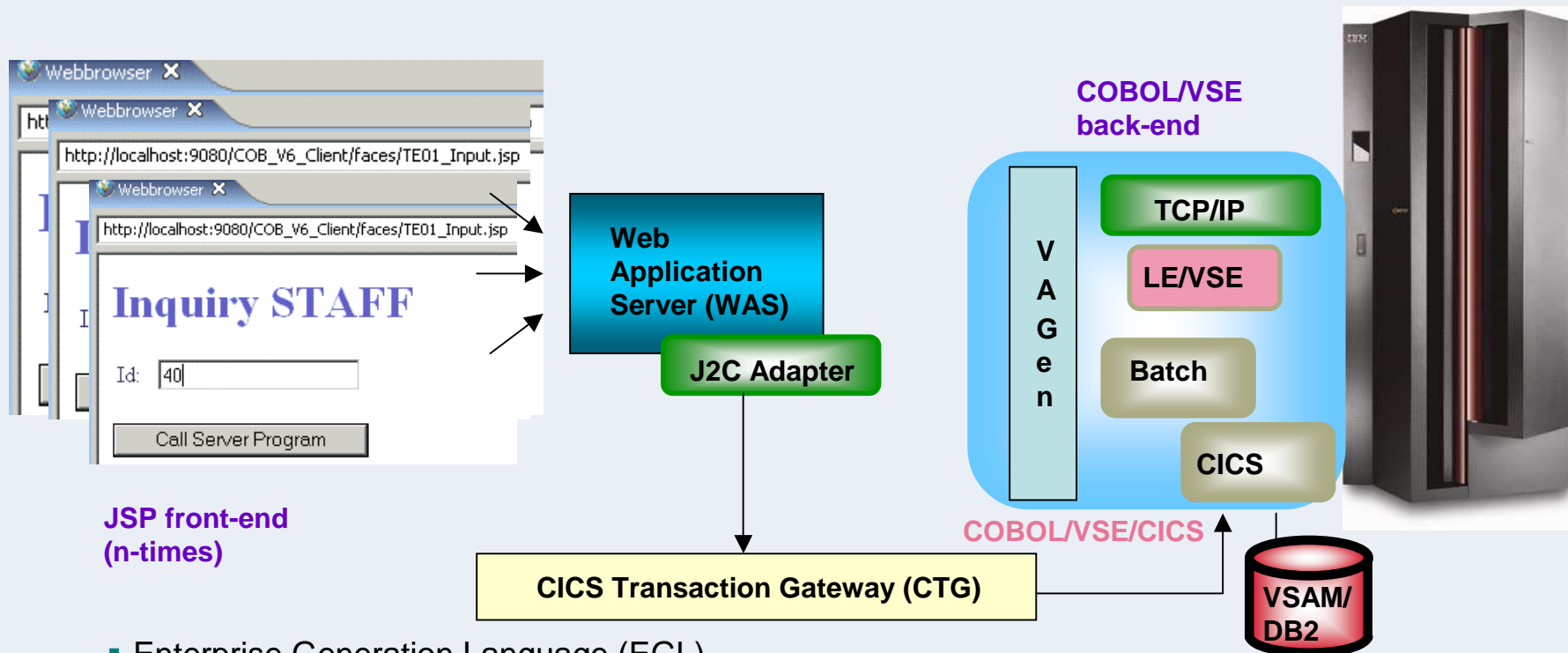


- Enterprise Generation Language (EGL), Visual Age Generator
- Java™ 2 Platform, Enterprise Edition (J2EE) connection Architecture (J2C/JCA)
- Java Server Pages (JSP), dynamic result page known by the Web Application Server (WAS)

Components for the 4GL runtime

Web Browser

z/VSE Server



- Enterprise Generation Language (EGL)
- Java™ 2 Platform, Enterprise Edition (J2EE) connection Architecture (J2C/JCA)
- Java Server Pages (JSP), dynamic result pages in Web Application Server (WAS)

Types of generated Programs via EGL

- **VSE applications**
 - CICS applications,
 - including the Compile/Link Jobs and CICS definitions
 - batch applications
 - including Compile/Link Jobs
- **It's very easy to switch the data access method (i.e from VSAM to SQL)**

- **Web applications:**
 - Standalone (without access to VSE)
 - With access to Core applications (Core existing CICS, or EGL generated)

- **Distributed Applications**
 - Mixed applications with a client part and a VSE part in COBOL

(1) Cross Platform Integrated Development Environment

Approach with WDz - WebSphere Developer for System z
and the z/VSE Plug-In

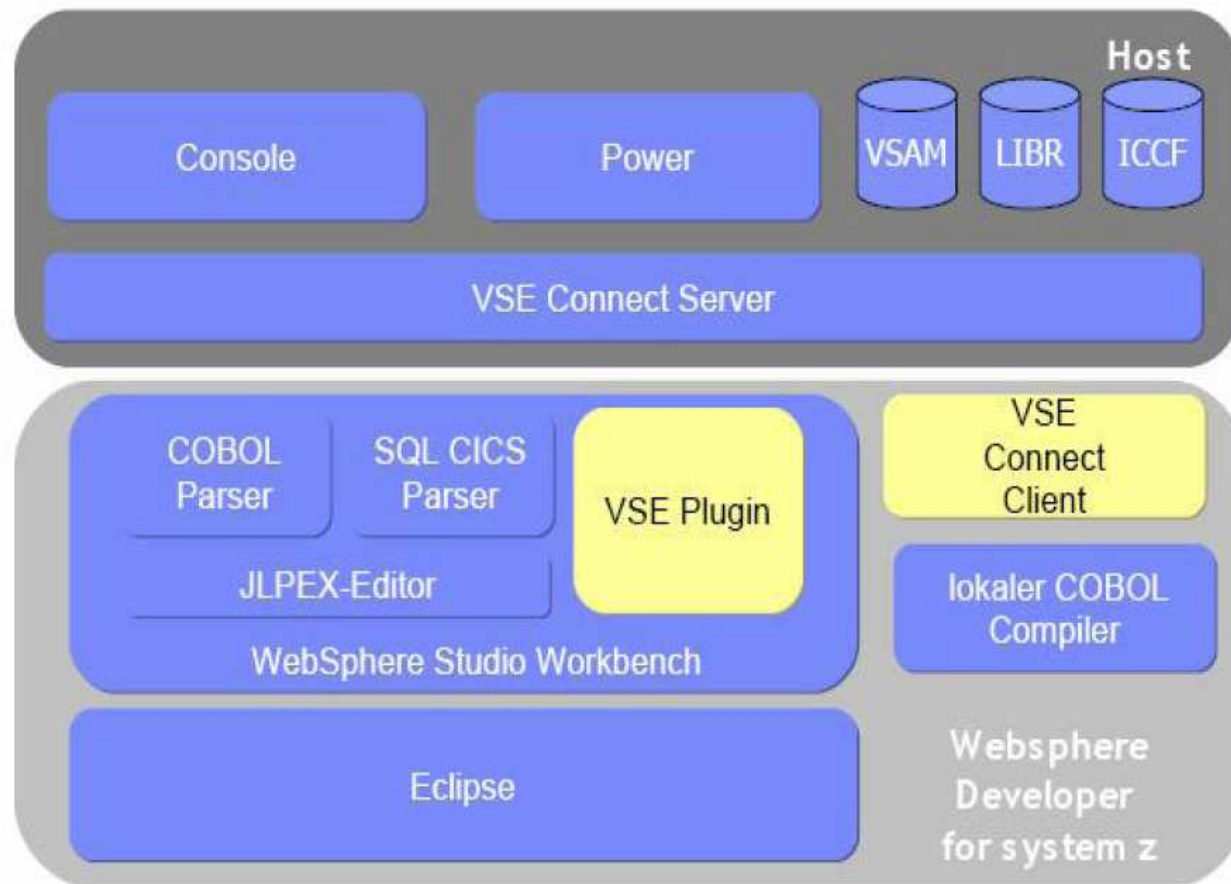


from Q-Group



(2) Modern Development tools for existing Code

z/VSE Plug-in for WDz (Overview)



■ Develop a z/VSE project

The screenshot displays the VSE Development Environment (VSE - DEMOVSE.hce) interface. The main window shows a terminal session with the following text:

```

IPSAIM901          VSE/ESA ONLINE
5609-2US and Other Materials (C) Copyright IBM Corp. 2004 and other dates

          ++
          ++  WV  WV  SSSSS  EEEEEEE
          ++  WV  WV  SSSSSS  EEEEEEE
          *****  ++  WV  WV  SS  EE
          *****  ++  WV  WV  SSSSSS  EEEEEEE
          **  ++  WV  WV  SSSSSS  EEEEEEE
          **  ++  WV  WV  SS  EE
          *****  ++  WV  WV  SSSSSS  EEEEEEE
          *****  ++  WV  WV  SSSSS  EEEEEEE

Your terminal is 2001 and its name in the network is D1080001
Today is 01/26/2007 To sign on to IPDCCICS -- enter your:

USER-ID..... The name by which the system knows you.
PASSWORD..... Your personal access code.

PF1=HELP      2=TUTORIAL      4=REMOTE APPLICATIONS
              10=NEW PASSWORD

USE ONLY THE ENTER KEY OR ONE OF THE KEYS LISTED ABOVE.
  
```

The interface includes a menu bar (File, Edit, Navigate, Search, Project, Editor, Menu, Run, Window, Help), a toolbar, and a sidebar with a project tree. The project tree shows the following structure:

- VSE SYSTEM
 - DEMOVSE
 - Librarian
 - All
 - Cobol
 - Power
 - Reader
 - List
 - Punch
 - Transmit
 - VSAM
 - VSAM.MASTE
 - DB2.USER.CA
 - VSESP.USER.
 - #VSAM.#CIC
 - ICCF
 - 1 Demo
 - 2
 - 10
 - 11
 - 12
 - 14
 - 20
 - 21
 - 22

The bottom of the window shows a Windows taskbar with the Start button, system tray (98% battery, 4:29 PM Friday 1/26/2007), and open applications (Command Prompt, Plug-in Development..., VSE - DEMOVSE.hce, ViewICCFLabel.JPG).

▪ z/VSE local and remote Compile

The screenshot displays the VSE IDE interface. The main editor window shows the source code for `IGZTMATH.cbl`. A context menu is open over the file, with the `VSE` option selected and expanded to show `RemoteCompile`, `Info`, and `Upload`. The `Problems` window at the bottom shows a message: "S2106-S 'DIVI' was found in the 'VALUE' stat...".

The code in the editor includes the following sections:

```

Line 40      Column 81      Insert
--*A-1-B-----2-----3-----4-----5-----6-----7--|-8
02 Condition-Token-Value.          00027000
   COPY CEEIGZCT.                  00028000
03 Case-1-Condition-ID.            00029000
   04 Severity      PIC S9(4) BINARY. 00030000
   04 Msg-No        PIC S9(4) BINARY. 00031000
03 Case-2-Condition-ID.            00032000
   REDEFINES Case-1-Condition-ID.    00033000
   04 Class-Code    PIC S9(4) BINARY. 00034000
   04 Cause-Code    PIC S9(4) BINARY. 00035000
   Case-Sev-Ctl     PIC X.            00036000
   Facility-ID      PIC XXX.          00037000
   Info             PIC S9(9) BINARY. 00038000
   00039000
VI SION.                          00040000
.                                  00041000
.                                  00042000
.                                  00043000
5 TO ARG1RS.                       00044000
ESSLOG' USING ARG1RS, FC, RESLTRS.  00045000
*****                             00046000

```

The `Problems` window contains the following table:

Page	Se...	Line	Location	Host Name	Date
1		2	/DEMOVSE/IGZTMATH...	Local	Jan 26, 2007 4:39:27 PM

z/VSE Syntax checking and highlighting

The screenshot displays the z/VSE IDE interface for editing the file `IGZTMATH.cbl`. The main editor window shows COBOL code with syntax highlighting and error markers. A red 'X' icon is visible next to the `PROCEDURE DIVISION.` line, indicating a syntax error. The code includes several data declarations and a `CALL` statement.

```

Line 40      Column 81      Insert
-----*A-1-B-----2-----3-----4-----5-----6-----7--|-----8
02 Condition-Token-Value.          00027000
COPY CEEIGZCT.                    00028000
03 Case-1-Condition-ID.            00029000
04 Severity      PIC S9(4) BINARY. 00030000
04 Msg-No        PIC S9(4) BINARY. 00031000
03 Case-2-Condition-ID            00032000
      REDEFINES Case-1-Condition-ID. 00033000
04 Class-Code    PIC S9(4) BINARY. 00034000
04 Cause-Code    PIC S9(4) BINARY. 00035000
03 Case-Sev-Ctl  PIC X.             00036000
03 Facility-ID   PIC XXX.           00037000
02 I-S-Info      PIC S9(9) BINARY.  00038000
00039000
PROCEDURE DIVISION.                00040000
00041000
PARA-MTHSLOG.                      00042000
00043000
MOVE 5.65 TO ARG1RS.               00044000
CALL 'CEECSLOG' USING ARG1RS, FC,  00045000
RESLTRS.                            00046000
*****
  
```

The Remote Error List at the bottom shows three messages:

ID	Message	Se...	Line	Location	Host Name	Date
IGYPS2106	IGYPS2106-S "DIVI" was found in the "VALUE" stat...	2	40	/DEMOVSE/IGZTMATH...	Local	Jan 26, 2007 4:39:27 PM
IGYOS4027	THE SYSTEM OPTION "SYM" IS INTERPRETED AS "...	0	-1	IGZTMATH.C	DEMOVSE	Jan 26, 2007 4:41:09 PM
IGYPS2106	"DIVI" WAS FOUND IN THE "VALUE" STATEMENT. ...	2	40	IGZTMATH.C	DEMOVSE	Jan 26, 2007 4:41:09 PM

The Windows taskbar at the bottom shows the system tray with the time 4:44 PM on Friday, 1/26/2007, and a battery level of 98%. The active window is `z/VSE - IGZTMATH.cbl`.

A 'Common' Development environment !



Eclipse is the base !

Rational Application Developer (RAD)

- **Overview RAD for WebSphere Software**
<http://www.ibm.com/software/awdtools/developer/application/index.html>
- **Download RAD V6001**
<http://www.ibm.com/support/docview.wss?uid=swg24009346>
 - <http://www.ibm.com/developerworks/downloads/r/rad>
- **Rational Software downloads**
 - <http://www.ibm.com/developerworks/websphere/downloads/plugin/>
- **Rational Technical Library**
 - <http://www.ibm.com/developerworks/rational/library/>
- **Rational Technical Resources + Best Practices**
 - <http://www.ibm.com/developerworks/rational/>
- **IBM Software Products**
 - <http://www.ibm.com/software/sw-bycategory/subcategory/SW740.html>

Enterprise Generation Language (EGL)

- **Visual Age Generator**
<http://www.ibm.com/software/awdtools/visgen>
- **Program Directory (includes setup prerequisites ...)**
<http://www.ibm.com/software/awdtools/visgen/library/v45docs.html>
- **Overall EGL**
 - <http://www.ibm.com/developerworks/rational/products/egl/>
- **EGL Language Resources (check for latest references - V6 level)**
 - <http://www.ibm.com/developerworks/rational/library/egldoc.html>
- **Samples / Practice**
 - EGL integration with Java using Rational Application Developer V6
http://www.ibm.com/developerworks/rational/library/05/510_java/#download
 - **Generating COBOL using EGL and JSF with WebSphere Studio Enterprise Developer**
http://www.ibm.com/developerworks/websphere/library/techarticles/0502_barosa/0502_barosa.html
**Note: target system in this sample is not z/VSE 3.1 but can be customized !
It is recommended to use RAD V6 instead WSED !**
 - **Generating Java using EGL and JSF with WebSphere Studio Site Developer V5.1.2**
http://www.ibm.com/developerworks/websphere/library/techarticles/0408_barosa/0408_barosa.html

z/VSE Additional Information

- z/VSE Home Page
<http://www.ibm.com/servers/eserver/zseries/zvse/>
- z/VSE Solutions and Utilities
<http://www-1.ibm.com/servers/eserver/zseries/zvse/solutions/>



- e-business Solutions for VSE/ESA SG24-5662
- e-business Connectivity for VSE/ESA SG24-5950
- CICS Transaction Server for VSE/ESA
CICS Web Support *SG24-5997-00*
- Handbook For WebSphere 5
(Connectors to z/OS and VSE) SG24-7042

We appreciate your comments on z/VSE: zvse@de.ibm.com