

WebSphere software



 e-business software

# ***IBM WebSphere Studio Enterprise Developer V5.0***

***Developing z/OS Solutions***

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IBM Software Group

# Agenda

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- z/OS Application Development
- Benefits
- A look at the z/OS Application Development environment
- Summary

# z/OS Application Development Tools

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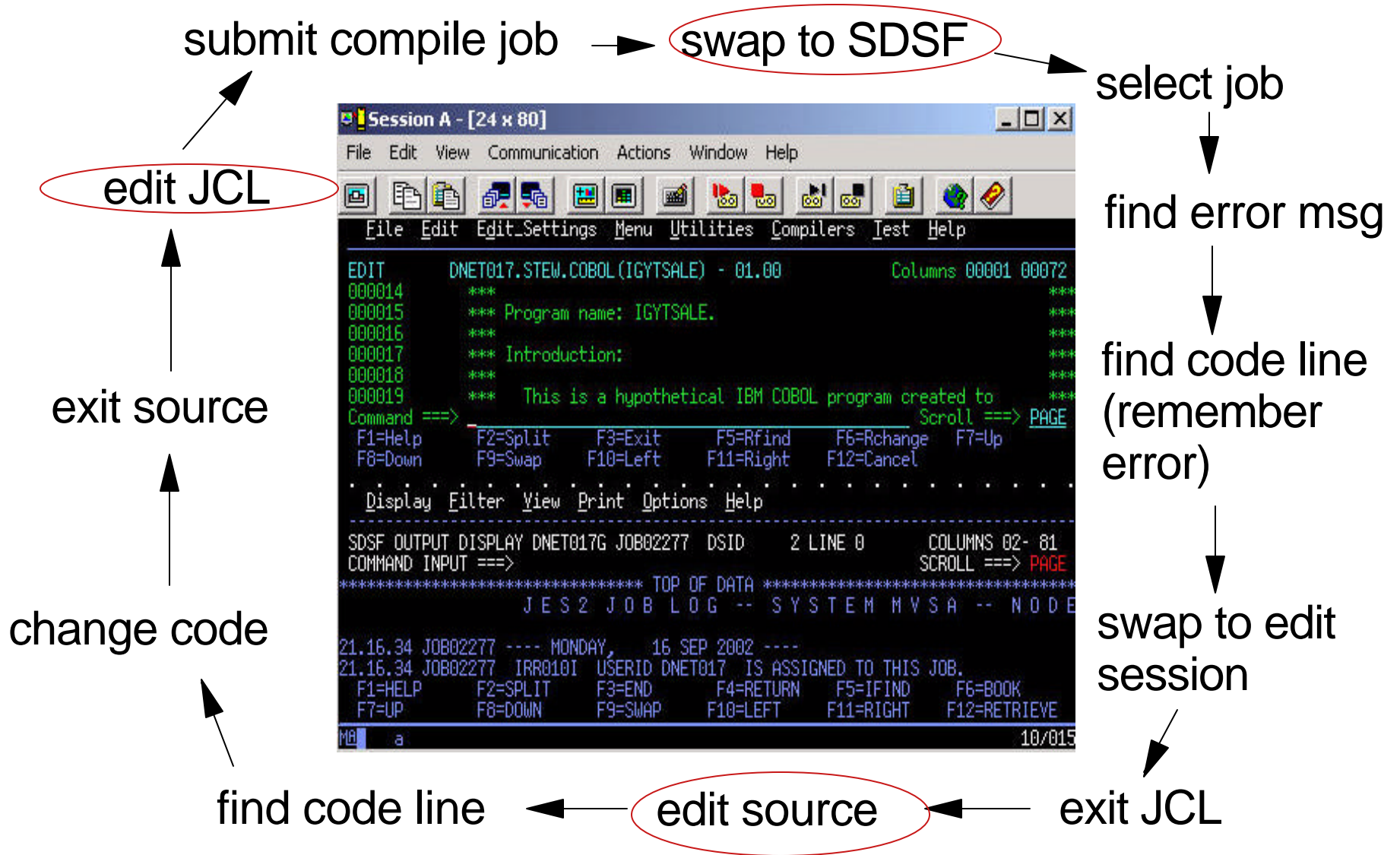
- Interactive, workstation-based environment
  - ▶ Faster development with less errors
  - ▶ Host offload of development CPU cycles
  
- Local edit/compile/debug on the workstation
  - ▶ Language sensitive
    - ASM, COBOL, or PL/I applications
  
- Remote edit/compile/debug on the mainframe
  - ▶ CICS and IMS
  
- Prepare output on the mainframe
  - ▶ JCL generation, editing, submission
  - ▶ TSO command execution
  - ▶ Job Monitoring

# Benefits of z/OS Application Development

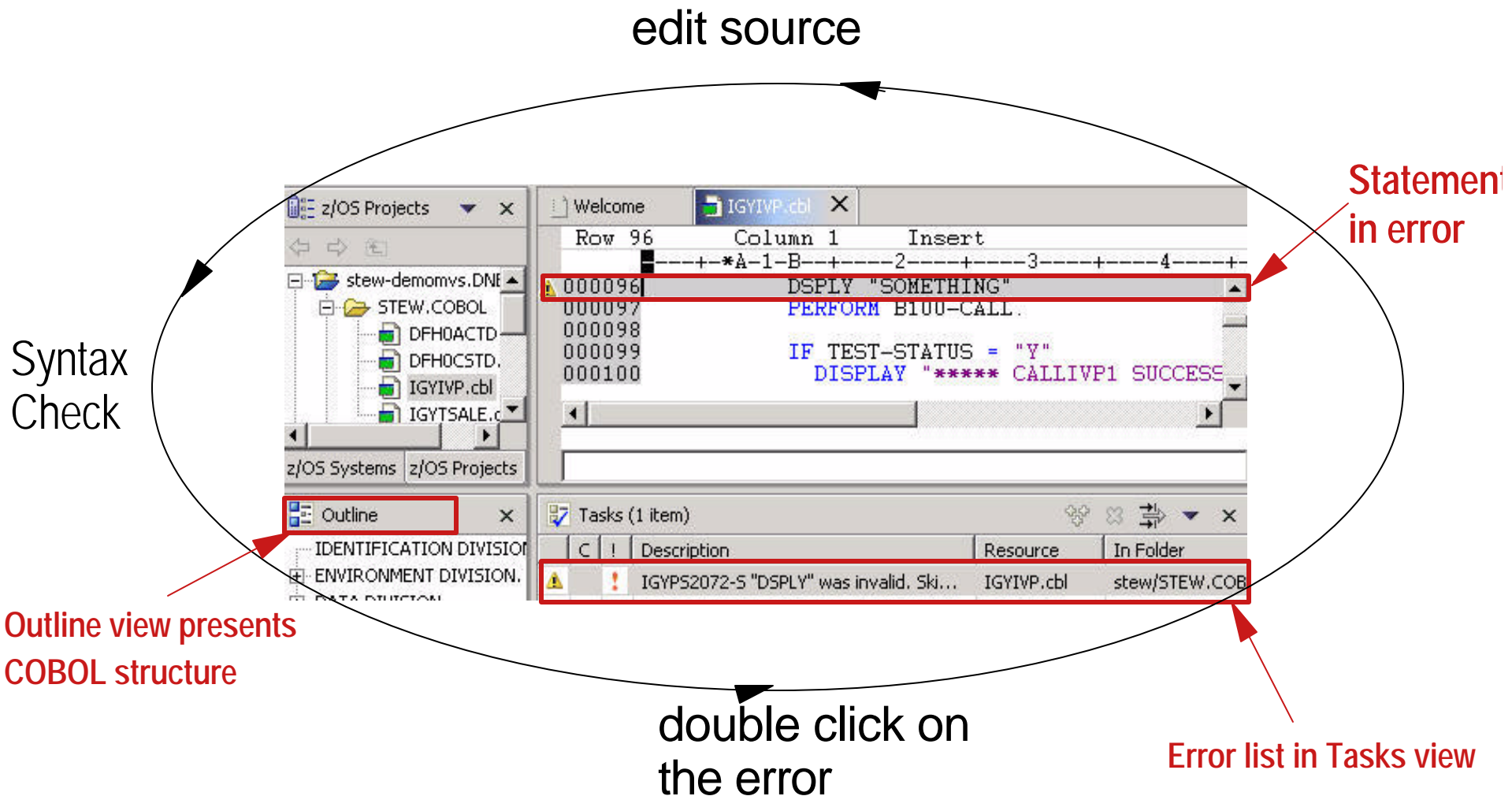
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- Utilizes Workbench features/tools to support COBOL, PL/I, Assembler development for the z/OS platform
  - ▶ Simplifies development process
  - ▶ Provides consistent development environment
- Provides development support for traditional runtimes
  - ▶ CICS, IMS, DB2, batch

# ISPF based development - Old



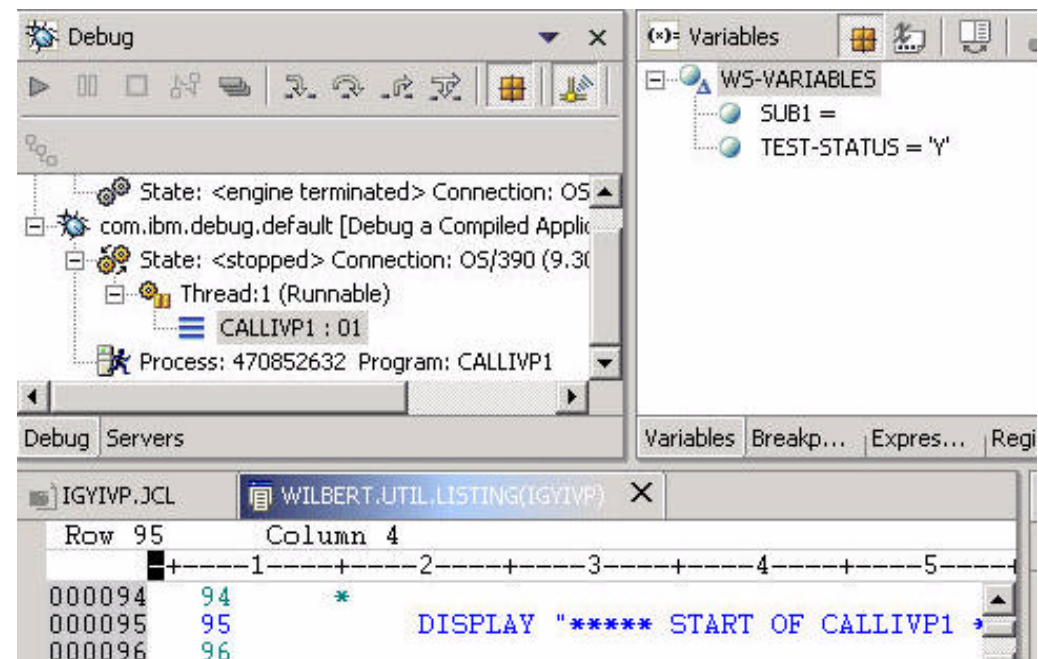
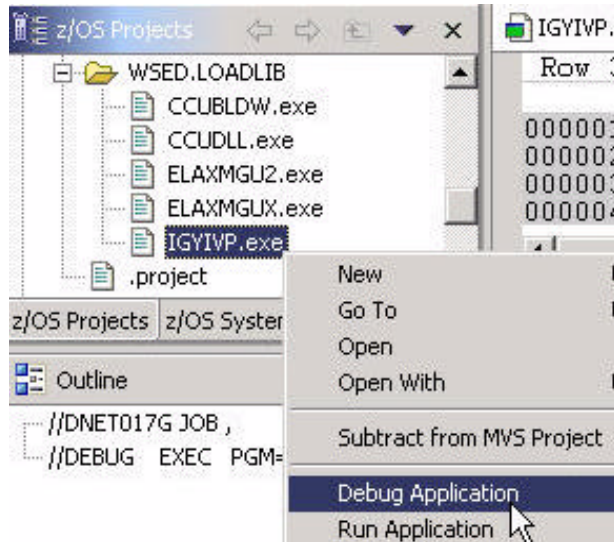
# WebSphere Studio Workbench - New



**Benefit: Simplified development for COBOL and PL/I on a common development environment**

# WebSphere Studio Workbench - New ...

Same Debug Perspective



**Benefit: Consistent debugging environment for COBOL, PL/I, Java**



# z/OS Systems Perspective

The screenshot displays the IBM WebSphere Studio Enterprise Developer interface in the z/OS Systems perspective. The interface is divided into several panes:

- Left Pane (z/OS Systems):** Shows a tree view of remote systems. A red box highlights the **Remote Systems** folder, and another red box highlights the **dnet017** directory. A red arrow points to the **dnet017** directory with the label "Directories available".
- Top Pane (z/OS Directories):** A table showing the configuration for the selected directory. A red box highlights this pane with the label "Directory definitions".
- Right Pane (z/OS File Extension Mappings):** A table showing the mapping of local file extensions to host file extensions and their transfer types. A red box highlights this pane with the label "Mapping of z/OS datasets".

Annotations on the left side of the image include:

- z/OS Systems:** Points to the overall interface.
- Directories available:** Points to the **dnet017** directory in the tree view.

Directory	Transfer Type
dnet017	text

Local Files	Host Files	Transfer Type
.cbl	**cobol	text
.cpy	**cobcopy	text
.pli	**pli	text
.obj	**obj	binary
.exe	**load	binary
.cmd	**clist	text
.jcl	**jcl	text
.cmd	**sigyclst	text
.jcl	**cntl	text
.lst	**listing	text
.out	**outlist	text
.jcl	**jcllib	text



# Organizing Source - Projects

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- **MVS Project**

- ▶ Collection of z/OS PDS[E]s, Member Files and Sequential Files
- ▶ Mapped to Workstation as "Local" Folders and Files
- ▶ MVS Project resides on System.Directory
- ▶ Add to Project
- ▶ Subtract from Project

- **Local Project**

- ▶ Collection of Workstation Folders and Files

# Editors

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- **JLPEX (default)**

- ▶ Embedded
- ▶ z/OS Systems and z/OS Projects
- ▶ Language sensitive Highlighting
- ▶ Outline View (COBOL, PL/I, JCL, ASM)
- ▶ Extensible

- **LPEX**

- ▶ Launched
- ▶ z/OS Systems and z/OS Projects (Navigators)
- ▶ Language sensitive Highlighting
- ▶ Outline View (COBOL, PL/I, JCL, ASM)
- ▶ Macro Support

- **Syntax checking**

WebSphere software



# z/OS Projects Perspective

MVS Project

MVS Directory

Outline view

The screenshot shows the IBM WebSphere Studio Enterprise Developer interface for z/OS. The main window is titled "z/OS Projects - IBM WebSphere Studio Enterprise Developer". The interface is divided into several panes:

- Project Browser (Left):** Shows a project named "stew-demonmvs.dnet01" with a sub-directory "STEW.COBOLE". Under "STEW.COBOLE", there is a list of COBOL source files including "DFH0ACTD.cbl", "DFH0CSTD.cbl", "IGYIVP.cbl", "IGYIVP2.cbl", "IGYIVP3A.cbl", "IGYIVP3B.cbl", "IGYTABLE.cbl", "IGYTCARA.cbl", "IGYTCARB.cbl", "LEGFRNT.cbl", "TESTXML.cbl", "XML1.cbl", and "XMLSAMP.cbl". A sub-directory "STEW.JCLLIB" is also visible.
- Code Editor (Center):** Displays the source code for "XMLSAMP.cbl". The code includes COBOL headers and an XML document structure. The XML document is defined as follows:

```
1 xml-document.  
  2 pic x(39) value '<?xml version="1.0" enc  
  2 pic x(19) value ' standalone="yes"?'>'.  
  2 pic x(39) value '<!--This document is ju  
  2 pic x(10) value '<sandwich>'.  
  2 pic x(35) value ' <bread type="baker&apo  
  2 pic x(41) value ' <?spread please use re  
  2 pic x(31) value ' <meat>Ham &amp; turke  
  2 pic x(40) value ' <filling>Cheese, lettu
```
- Outline View (Bottom Left):** Shows a hierarchical view of the code structure, including sections like "Identification division.", "Data Division.", "Working-storage section.", "Procedure division.", "mainline section.", and "xml-handler section.".
- z/OS Job Monitor (Bottom Right):** A table showing the status of various jobs. The table has columns for Job ID, Job Name, Owner, Hold Status, and Exec Node.

Job ID	Job Name	Owner	Hold Status	Exec Node
demomvs.f1	*	DNET017	*	*
demomvs.f2	XML*	DNET017	*	*
stplex4b.f1	*	WILBERT	*	*
- z/OS Commands View (Bottom):** A panel at the bottom of the interface for entering and executing z/OS commands. It includes tabs for "Tasks", "z/OS Commands", "Navigator", "z/OS Job Monitor", and "z/OS Output Console".

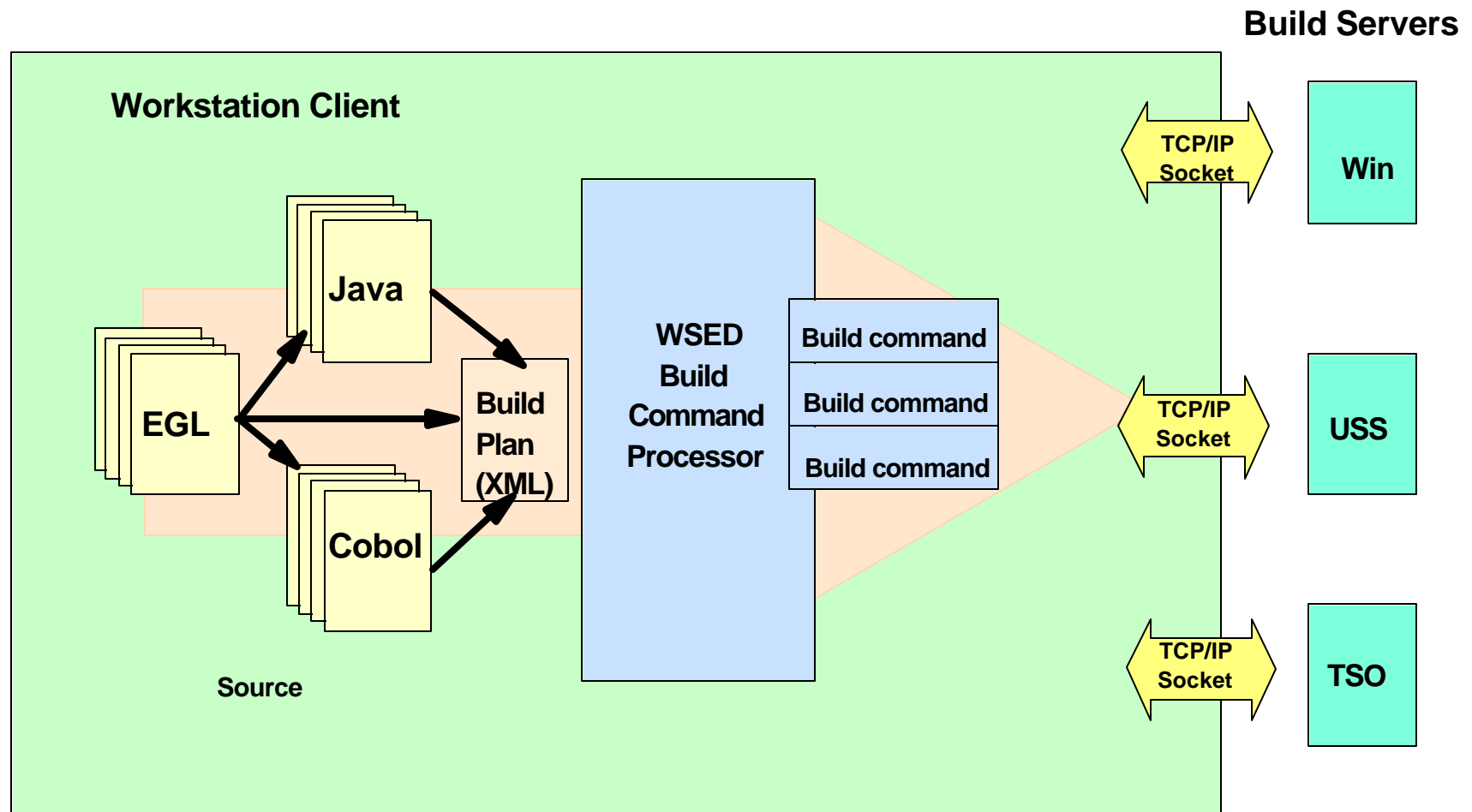
JLPEX editor

z/OS Job Monitor view

z/OS Commands view

# Build Support

- Automated build based on build plans (XML)
- Automatic transfer to target machine
- Run build commands on target machine



# Build Support

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- **Local Compile for local projects**
  - ▶ Project Level
  - ▶ File/Program Level
  
- **Remote Compile**
  - ▶ Project level
  - ▶ JCL Generation
    - File/Program level
    - Folder Level
  
- **Compile/link parameters set with preferences/properties**
  - ▶ Workspace
  - ▶ Folder
  - ▶ Program

# JCL Generation and Submission

The screenshot displays the z/OS Projects IDE interface. On the left, a project tree shows a folder named 'demonvvs.JCL' containing a file 'IGYIVP.JCL', which is circled in red. A red arrow points from the text 'JCL generated' to this file. The main editor window shows the content of 'IGYIVP.JCL' with a grid overlay. The code includes job definitions, dataset specifications, and execution parameters. A context menu is open over the 'IGYIVP.JCL' file in the project tree, with the 'Submit' option highlighted.

```
Row 1      Column 1
000001// GEN001 JOB
000002//  MSGCLASS=H, TIME=(, 4), REGION=28M, COND=(16, LT)
000003// DELIST EXEC PGM=IDCAMS
000004// SYSPRINT DD SYSOUT=*
000005// DELETE DNET017.STEW.LISTING(IGYIVP)
000006// IF LASTCC = 8 THEN SET MAXCC = 4
000007// DELETE DNET017.STEW.OBJS(IGYIVP)
000008// IF LASTCC = 8 THEN SET MAXCC = 4
000009// DELETE DNET017.IDEPLI.XML
000010// IF LASTCC = 8 THEN SET MAXCC = 4
000011// STP0000 EXEC PGM=IGYCRCTL, REGION=2
000012//      PARM=( 'EXIT(ADEXIT(ELAXMGUX))
000013//      'ADATA',
000014//      'LIB',
000015//      'TEST')
000016// STEPLIB DD DSN=COBOL.V3R1.SIGYCOMB
000017//      DISP=SHR
000018//      DD DSN=DNET017.STEW.LOAD,
000019//      DISP=SHR
000020// SYSPRINT DD DSN=DNET017.STEW.LIST
000021// SYSADATA DD SYSOUT=*
```

**Benefit: Developers focused on business logic and not on writing JCL**



# Monitoring Job Output / Issuing Commands

Job ID	Job Name	Owner	Hold Status	Exec Node	Priority	Job ID	Job Name
demomvs.dne...	DNET017*	DNET017	*	*	*	demomvs.dne...	DNET017*
JOB00333	DNET017D	DNET017	1	DEMOMVS	1	JOB00333	DNET017D
JOB00331	DNET017D	DNET017	1	DEMOMVS	1	JOB00331	DNET017D
JOB09815	DNET017D	DNET017	1	DEMOMVS	1	JOB09815	DNET017D
JOB09814	DNET017S	DNET017	1	DEMOMVS	1	JOB09814	DNET017S

z/OS Commands

Command Input on:

netstat

Send  TSO  USS  Copy command

Command Output

```

*** TSO commands require an MVS System that is
EZZ2350I MVS TCP/IP NETSTAT CS V1R2 TCPI
EZZ2585I User Id Conn Local Socket Fore
EZZ2586I -----
EZZ2587I AESTCPIP 00010692 9.39.64.151..5050
sh
EZZ2587I AESTCPIP 00000066 0.0.0.0..5050
EZZ2587I BBOASR2A 0002A914 0.0.0.0..63217
EZZ2587I BBOASR2A 0002A92B 9.39.64.151..402
ch
    
```

JOB00331.out

```

1      JES2 JOB LOG -- SYSTEM MVS A
0
11.41.22 JOB00331 ----- TUESDAY, 10 SEP 2002 -----
11.41.22 JOB00331 IRR010I USERID DNET017 IS ASSIGNED TO THIS JOB
11.41.22 JOB00331 ICH70001I DNET017 LAST ACCESS AT 11:32:38 ON TUE
11.41.22 JOB00331 $HASP373 DNET017D STARTED - INIT 3 - CLASS A -
11.41.22 JOB00331 IEF403I DNET017D - STARTED - TIME=11.41.22
11.41.22 JOB00331 -
11.41.22 JOB00331 - - - - -TIMI
11.41.22 JOB00331 -JOBNAME STEPNAME PROCSTEP RC EXCP CPU
11.41.22 JOB00331 -DNET017D DELIST 04 68 .00
11.41.32 JOB00331 -DNET017D STP0000 00 8745 .00
11.41.33 JOB00331 -DNET017D LKED 00 336 .00
11.41.33 JOB00331 IEF450I DNET017D GO - ABEND=S000 U4093 REASON=00
11.41.33 JOB00331 -DNET017D GO U4093 48 .00
11.41.33 JOB00331 IEF404I DNET017D - ENDED - TIME=11.41.33
11.41.33 JOB00331 -DNET017D ENDED. NAME- TOTAL
11.41.33 JOB00331 $HASP395 DNET017D FINDED
    
```

Job ID	Job Name	Owner	Hold Status	Exec Node	Priority
demomvs.dne...	DNET017*	DNET017	*	*	*
JOB00333	DNET017D	DNET017	1	DEMOMVS	1
JOB00331	DNET017D	DNET017	1	DEMOMVS	1

**Benefit: Developers do not have to continually switch between systems**

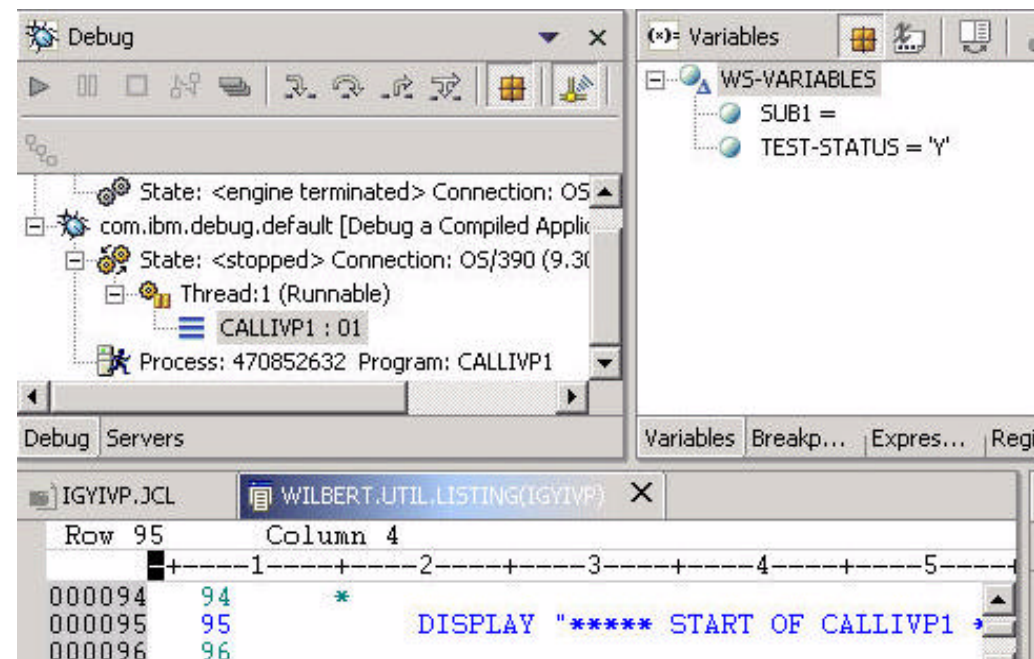
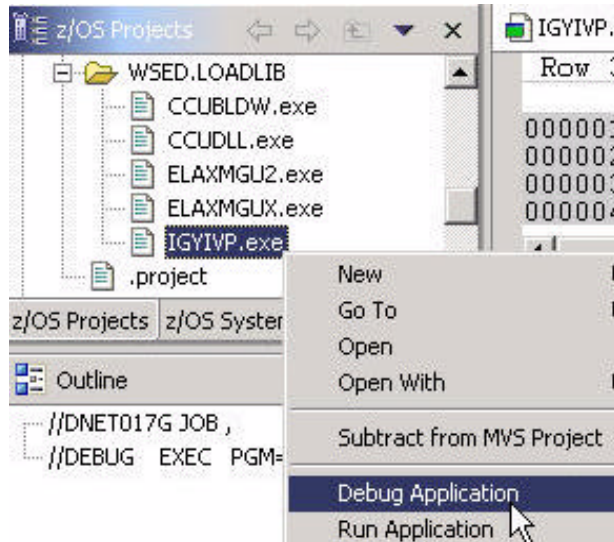
# Debug Support

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- Local Debug
  - ▶ TSO type
  - ▶ Batch
  - ▶ CICS (using VA CICS)
- Remote Debug
  - ▶ CICS
  - ▶ IMS
  - ▶ Batch
  - ▶ TSO

# WebSphere Studio Workbench - New ...

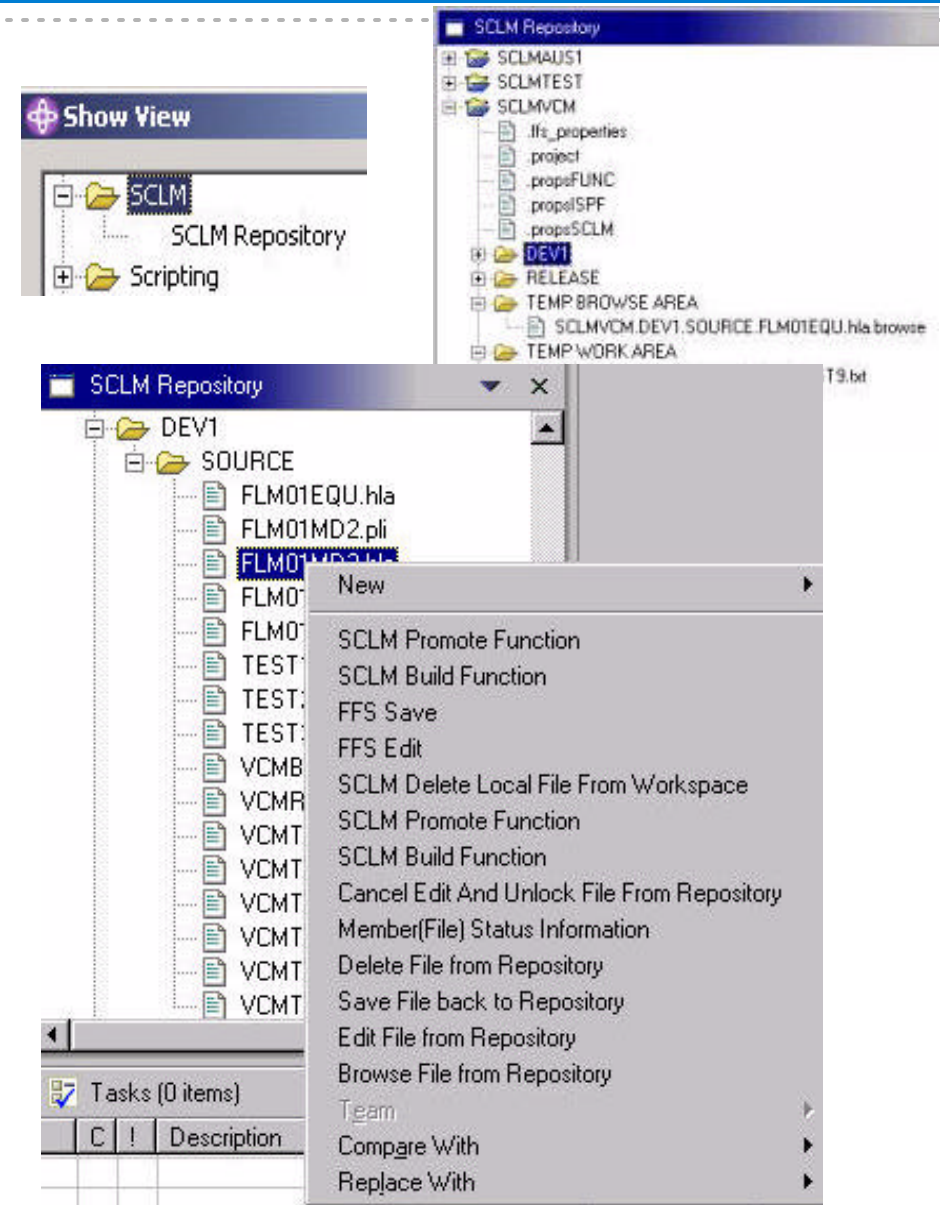
Same Debug Perspective



**Benefit: Consistent debugging environment for COBOL, PL/I, Java**

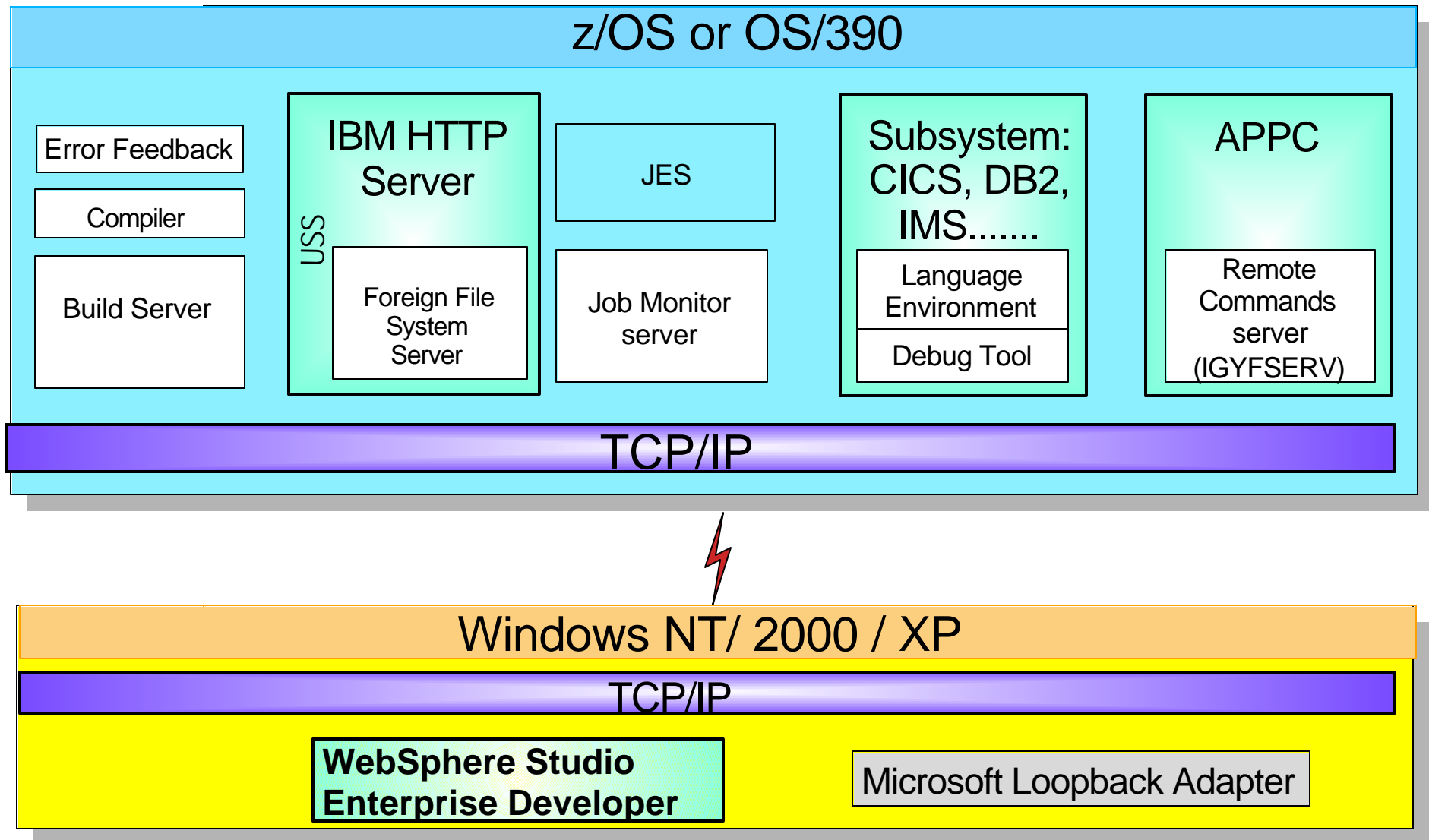
# SCLM Support

- Uses VCM adapter
- Access to SCLM services on z/OS
  - ▶ Connect to SCLM repository
  - ▶ View a list of projects
  - ▶ List project members
  - ▶ Execute SCLM actions
- Check-in/check-out support
  - ▶ TEMP WORK AREA
- No SCLM administrative functions
  - ▶ Create SCLM project
  - ▶ Delete SCLM project
- No automatic synchronization
  - ▶ Manual refresh





# Development environment architecture



# Summary

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- Increases programmer productivity
  - ▶ Simplified development process
  - ▶ Unified development environment
- Reduces Total Cost of Ownership (TCO) by adopting a consistent development environment for the enterprise
  - ▶ Single development environment to manage and deploy vs. multiple
  - ▶ Simplified training requirements
- Facilitates the building and testing of z/OS applications by providing development support for traditional runtimes like CICS, IMS, DB2, and batch





# ***z/OS Application Development***

***Backup charts***



# ***z/OS Application Development***

## ***Software prerequisites***

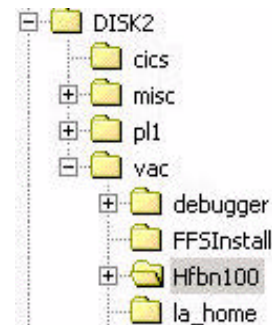
# Workstation Prerequisites

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- Install and configure Microsoft Loopback Adapter
- Install the z/OS Application Development Tools on disk 2 of WebSphere Studio Enterprise Developer
- Modify HOSTS file (Windows 2000 only)

# z/OS Prereq. Software List

- IBM HTTP Server
- JES PTF to enable job monitor support
- Language Environment PTFs to enable z/OS IDE support
- IBM Enterprise COBOL for z/OS and OS/390
- IBM Enterprise PL/I for z/OS and OS/390
- IBM Debug Tool for z/OS and OS/390
- IBM Foreign File System Server
- IBM Job Monitor Server



# Host Software Install Steps

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- Make sure required software and service updates installed
  - ▶ TCP/IP
  - ▶ Language Environment
  - ▶ IBM HTTP Server
  - ▶ RACF or equivalent
  - ▶ IBM Enterprise COBOL
  - ▶ IBM Debug Tool
- Install foreign file system server and job monitor server
- Configure the IBM HTTP Server
- Configure the software that comes with WebSphere Studio Enterprise Developer for the host to support remote edit-compile-debug
  - ▶ Foreign file system server
  - ▶ Job monitor server

# Host Software Install Steps ...

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- Install and configure the TSO command server to support issuing TSO commands from the workstation
- Configure Debug Tool for remote debugging under CICS
- Test the connections



# Troubleshooting

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- Ensure connectivity to host systems
  - ▶ Can you ping the host?
  - ▶ Can you access the web server?
    - `http://hostsys:port/`
  - ▶ Can you open the web page for the host FFS system?
    - `http://hostsys:port/FFDS`
  - ▶ Are you using the right ports for the web and job monitor?
    - default is 80 and 6715 respectively