

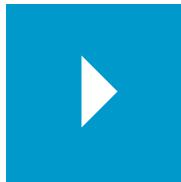
DevOps

IBM Developer for z Systems

- IDz
- ADFz
- RDz

UNIT

ADFz – IDz – Introduction



Topics:

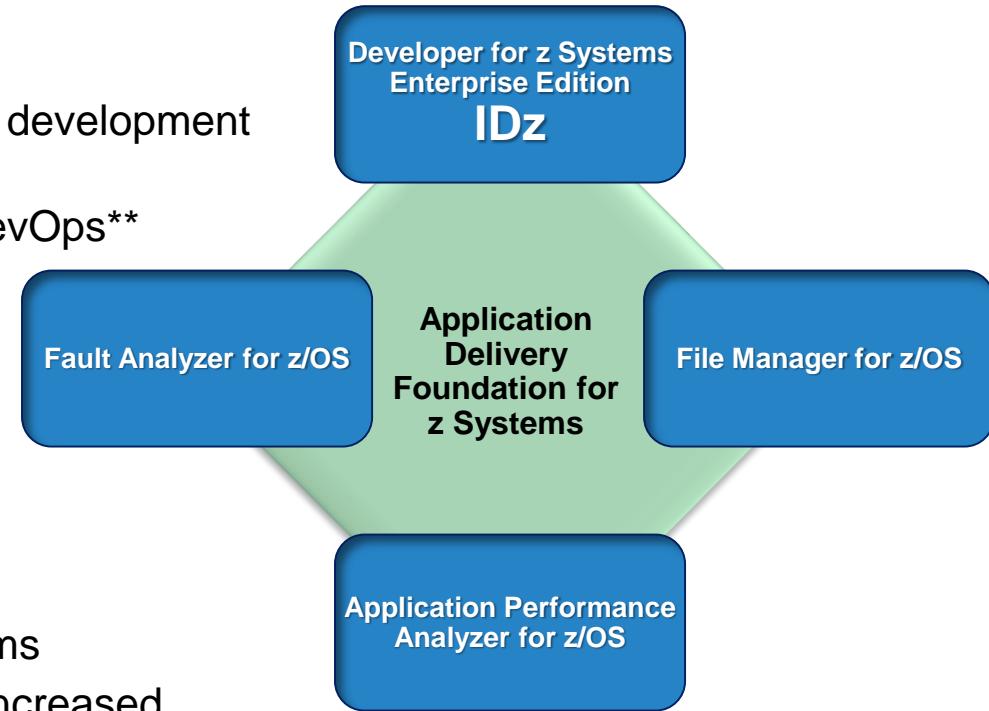
- **Product Components and Environments**
 - Benefits – What's in it for me?
 - DevOps and ADFz
 - IDz Deep Dive
 - ADFz – File Editing and Management Tools
 - ADFz – ABEND Resolution Tools
 - ADFz – Application Performance Analysis Tools
 - Application Discovery (AD) integration with ADFz
 - IMS-specific Tooling
 - CICS-specific Tooling

IDz v14, ADFz v3.0 and RDz -

for Enterprise z/OS Development, Maintenance and Problem Analysis

Highlights:

- Comprehensive solution for z/OS application development and problem analysis
- Designed for Enterprises embarking on a DevOps** transformation
- Exploit the latest advancements in the z Systems platform

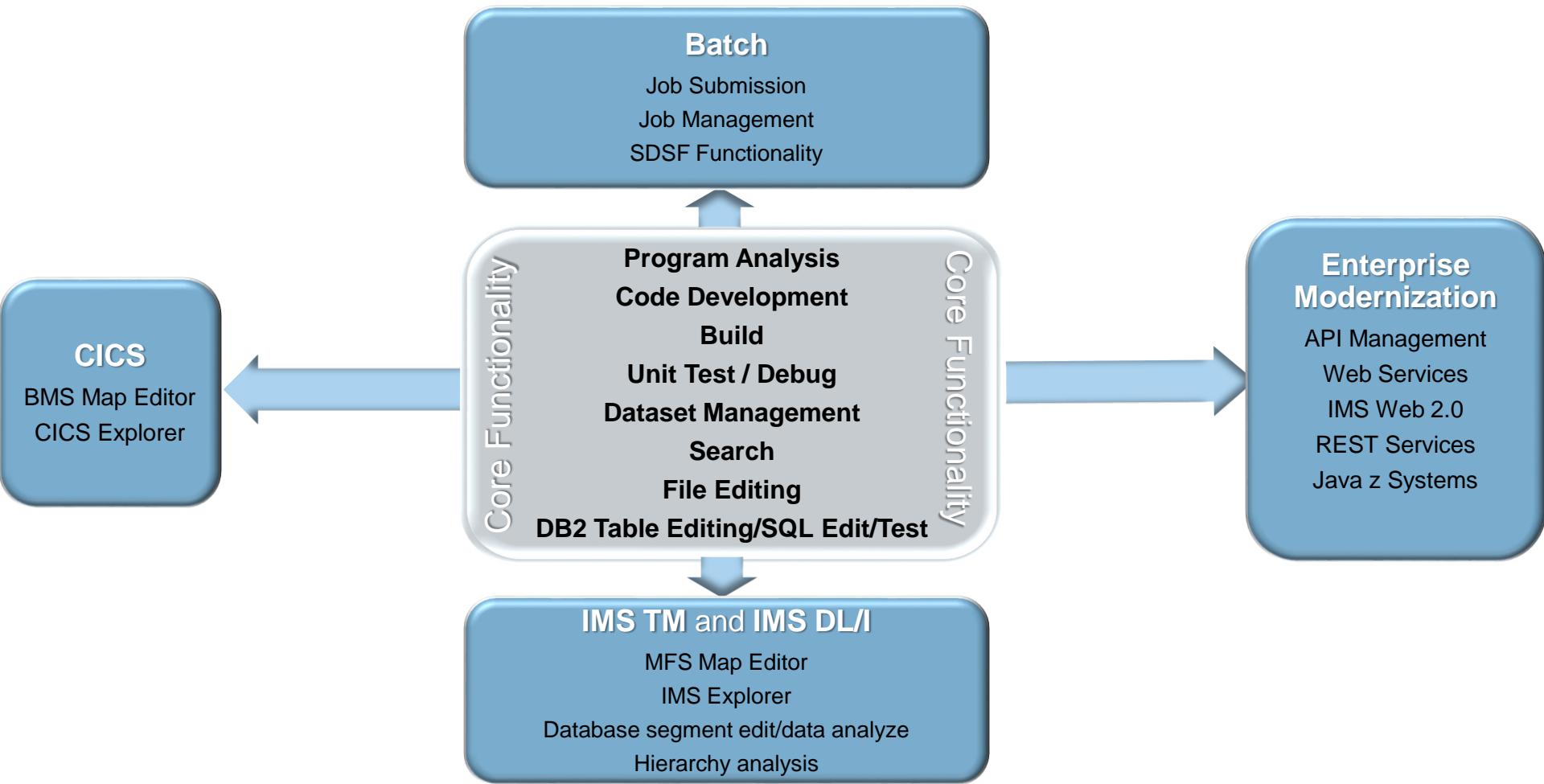


Problems solved:

- Slow development/maintenance cycles
- Time consuming analysis of complex programs
- Improve operational cost while dealing with increased workload and new requirements
- Millennials drawn to advanced tooling – on par with Java/C++

**For more about DevOps, please visit:
<https://www.ibm.com/cloud-computing/learn-more/what-is-devops/>

z/OS Applications Environments



Platform + Plug-ins

Specialized functionality complementing ADFz



Deployment Assistant



Performance Analyzer



Configuration Manager



Application Performance Analyzer



Fault Analyzer



File Manager



Rational Team Concert



Data Studio



Transaction Gateway



Interdependency Analyzer



z/OS Connect EE



IBM Application Discovery



MQ Explorer



IMS Explorer

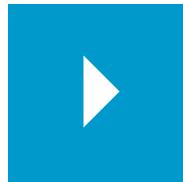
Other plug-ins available to Open Source tools
available: Sonar, Jenkins, Git, etc.

Installable into ADFz/IDz/RDz**

****Note:** ADFz and IDz are IBM upgrades/product replacements for RDz

UNIT

ADFz – IDz – Introduction



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Top Six Value Propositions (Cited by Customers)

1. Productivity

- Customers state achieving productivity gains between **5% and 47%** – with an average increase of 20%

2. DevOps Transformation:

- Specific DevOps Tooling
- Automation of development tasks/stages/steps
- Integration with other DevOps Solutions

3. Attract/Retain the next generation of z/Developers

- Easily attained – using ADFz

4. Application/Software Enterprise Modernization

- IDz's mature SOA tools, wizards and generators make this aspect of the product a "no-brainer"

5. Cross-platform development using one tool

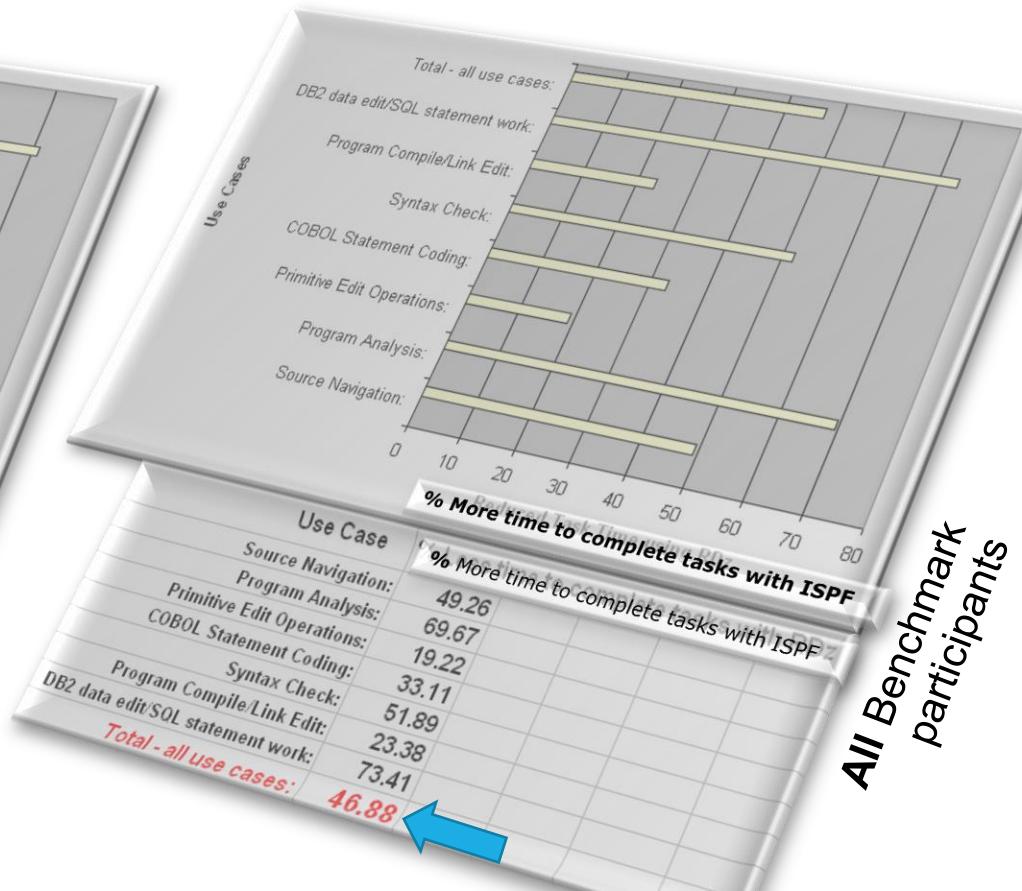
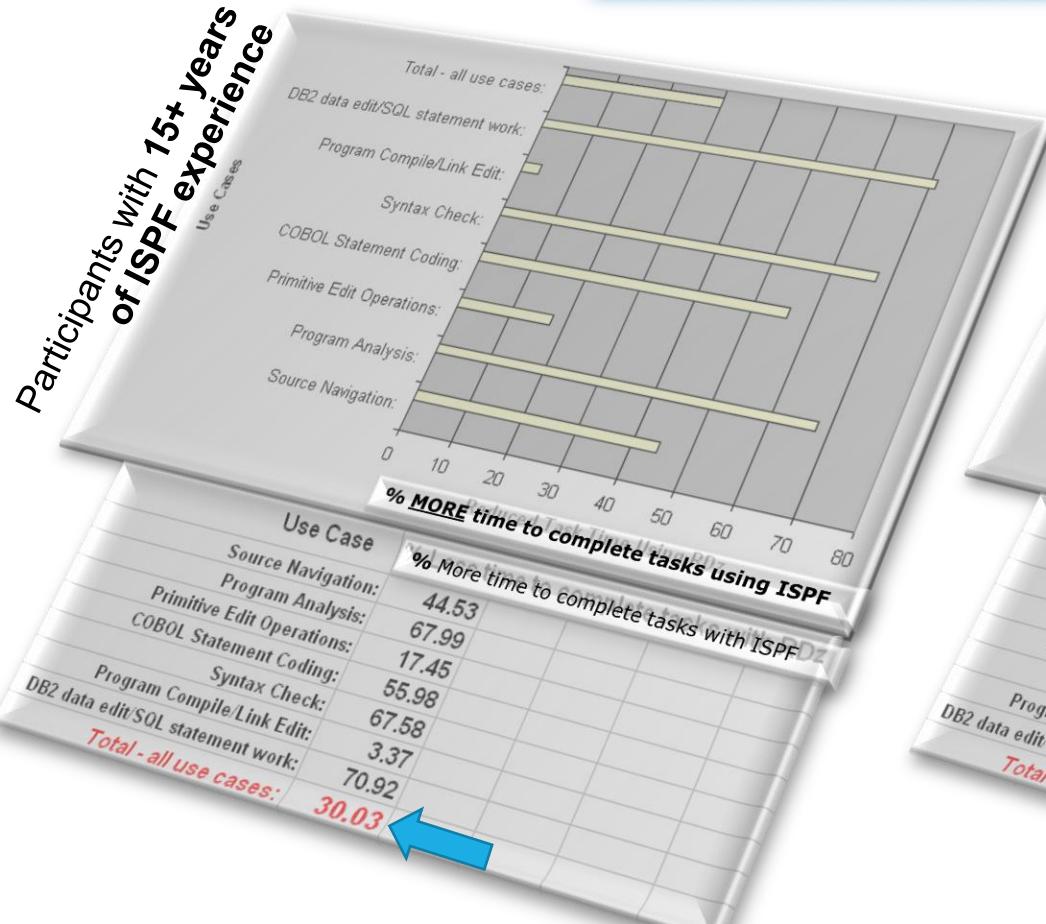
- IDz can provide developers doing both Java and Distributed application work and z/OS development and maintenance a single integrated workbench

6. Code Quality

- Static application scanners and formatting tools available to improve code performance and maintainability – Code Coverage reports measure the effectiveness of your testing

Productivity Benchmarks – RDz vs. ISPF Results

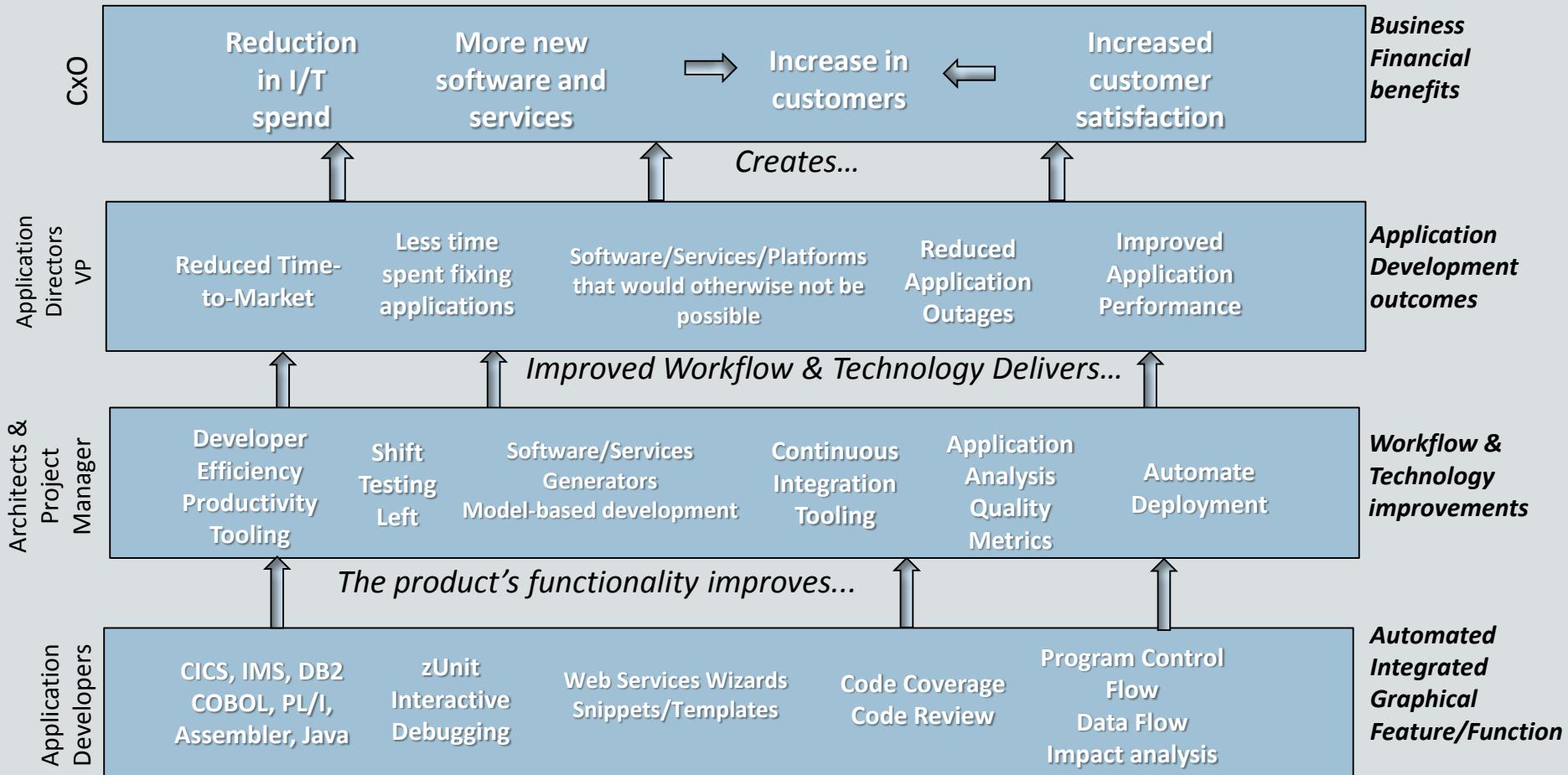
In 2010 RDz v7.6 was Benchmarked against ISPF v6 for productivity



What's in it for z/OS Developers and Programmers?

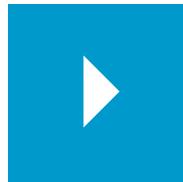
- ▶ **z/OS work/tasks and projects made easier**
 - ▶ Graphical analytics (**clearly**) reveal program semantics
 - ▶ Hyper-linked access to exact source and data locations within a file and programs
 - ▶ Generated (automation of) SOA application components
 - ▶ Superfluous tasks reduced/fewer development “Mulligans”
 - ▶ Manual tasks turned into graphical work and “*Declarative Development*”
- **Career “future-proofing”**
 - ▶ None of the z/OS vendors are investing in green-screen functionality – but they're **all** investing in Eclipse-based solutions
 - ▶ Eclipse is a Java-based open-source platform that underpins and powers modern IDEs
 - ▶ Unless a developer is planning to retire in the next 6-12 months they will more than likely run into Eclipse tooling – as part of some future project
 - ▶ Get a jump on tomorrow's Eclipse/Product assignments by doing z/OS work projects today

How IDz/ADFz DevOps Tooling Benefits your Business



UNIT

ADFz – IDz – Introduction

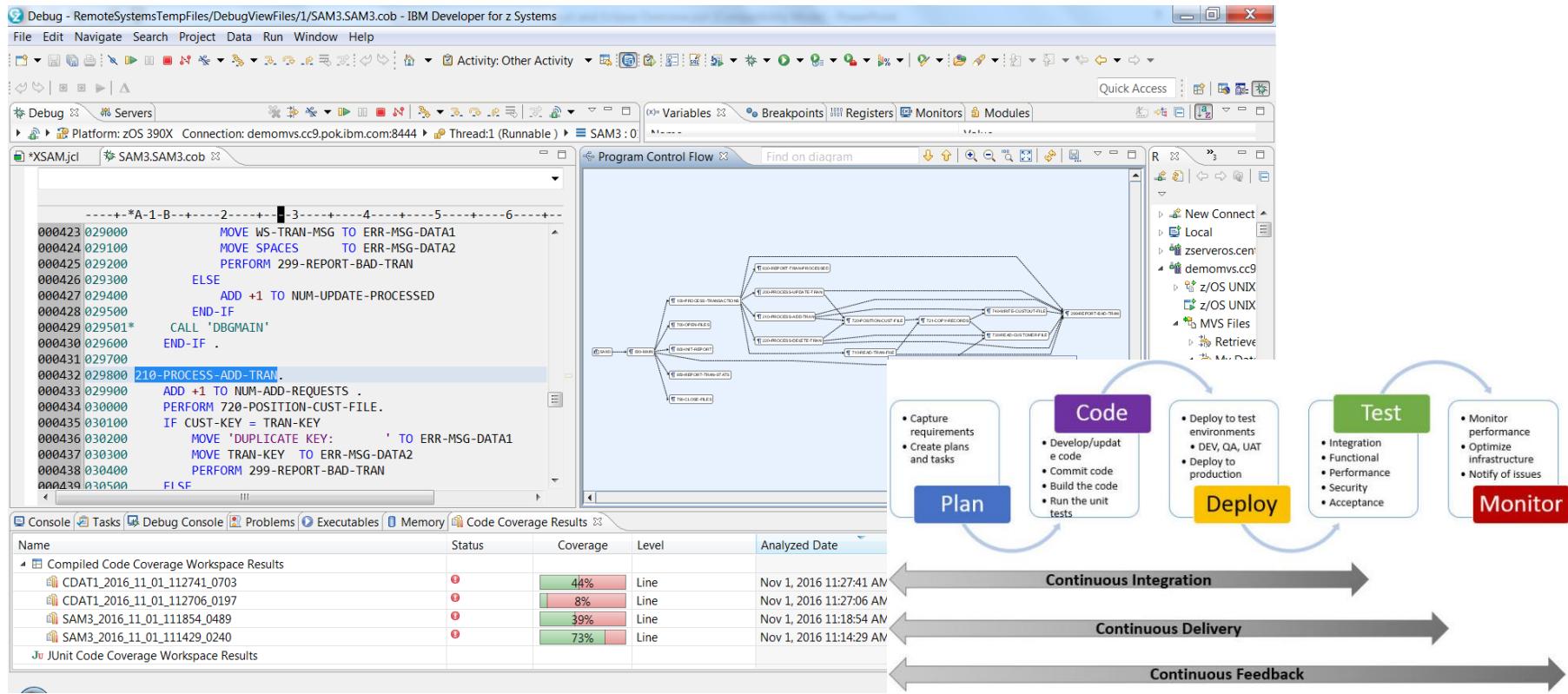


Topics:

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DevOps efficiencies...

- Through modern tools and development environments, development efficiency is improved, aspects of the Lifecycle are automated, steps within the lifecycle shrink and application quality is upgraded



Tools Specific to DevOps

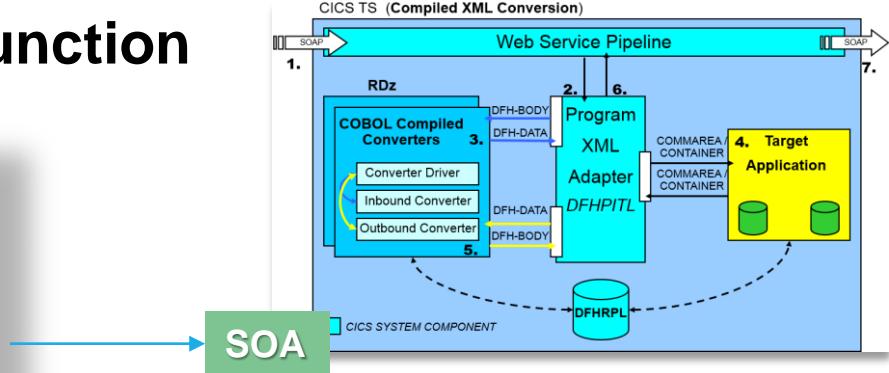
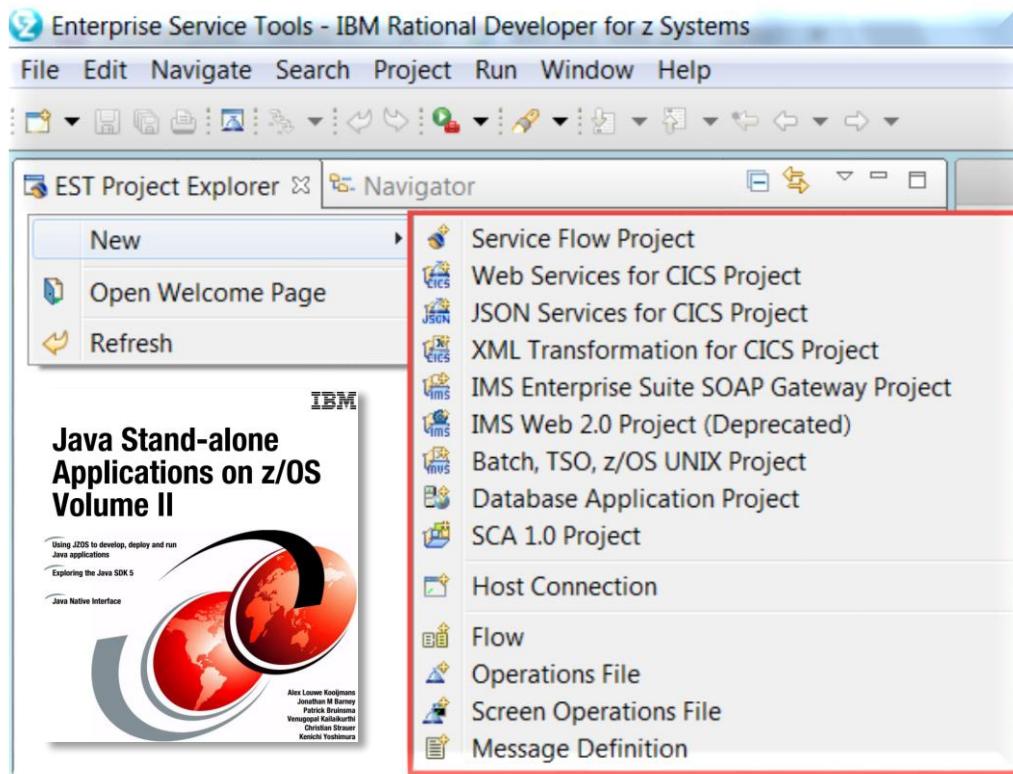
While all of ADFz shrinks development time getting to Deploy/Feedback faster, these four tools provide functionality specific to the DevOps discipline:



- **zUnit:**
 - Automated, Repeat-able Unit Test
- **Code Coverage:**
 - Measures Testing Quality and Application Coverage
 - Integrates with and feeds IBM's ADDI product
- **Code Review:**
 - Validates Code Quality, Consistency, Conformance
- **Fault Analyzer – ADFz:**
 - Used to quickly find/fix ABENDs – in production and test
- **Application Performance Analyzer – ADFz:**
 - Measures and reports how applications/programs use available resources



Enterprise Modernization Feature/Function



SOA

JSON, Web 2.0
XML Transformation

IBM Mobile Integration

Mature, deep and broad palette of tools for
code generation and application modernization

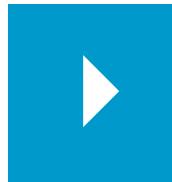


CICS and Liberty
JSON RESTful Services



UNIT

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Developer for z Systems
Enterprise Edition
IDz

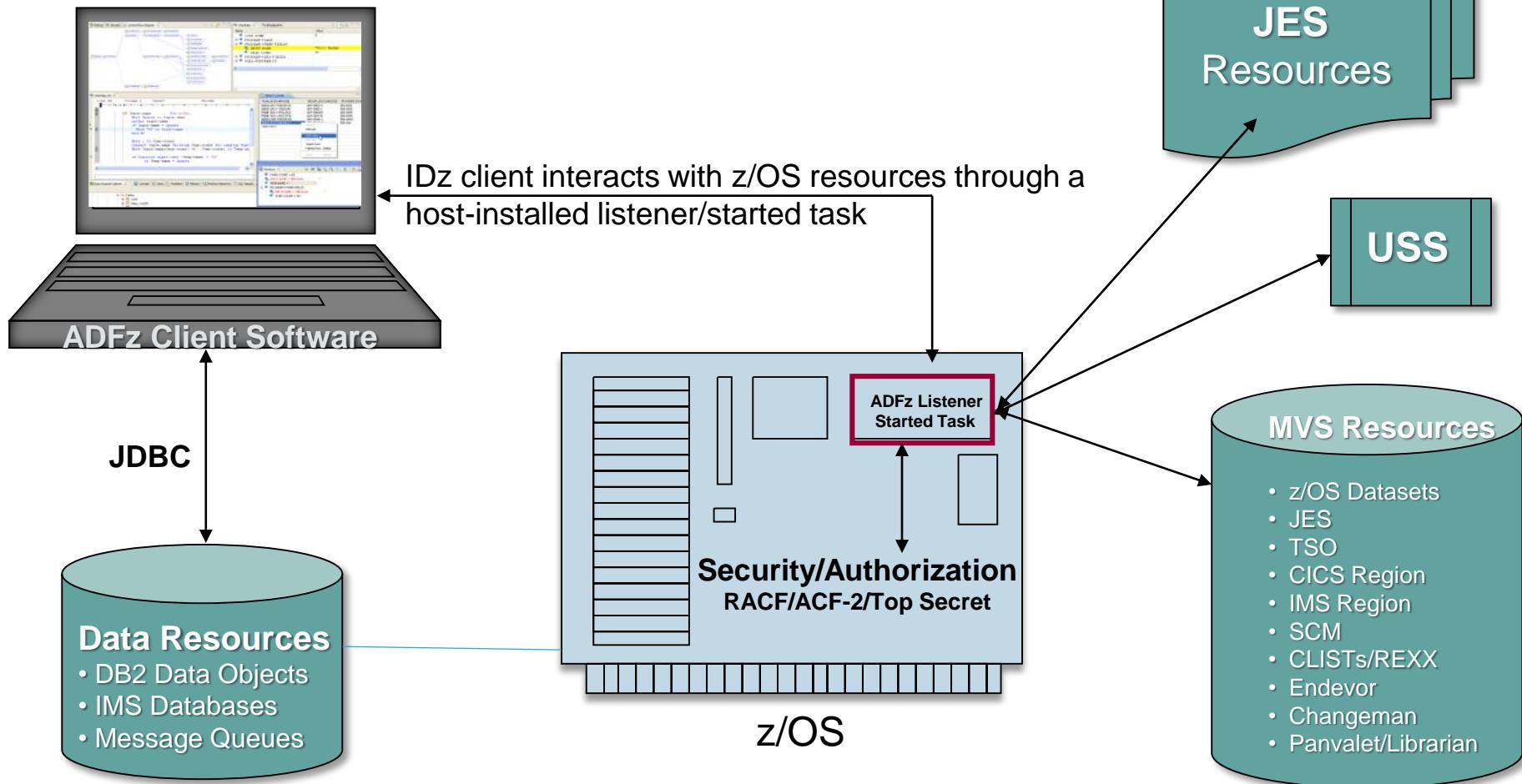
Fault Analyzer for
z/OS

Application
Delivery
Foundation for
z Systems

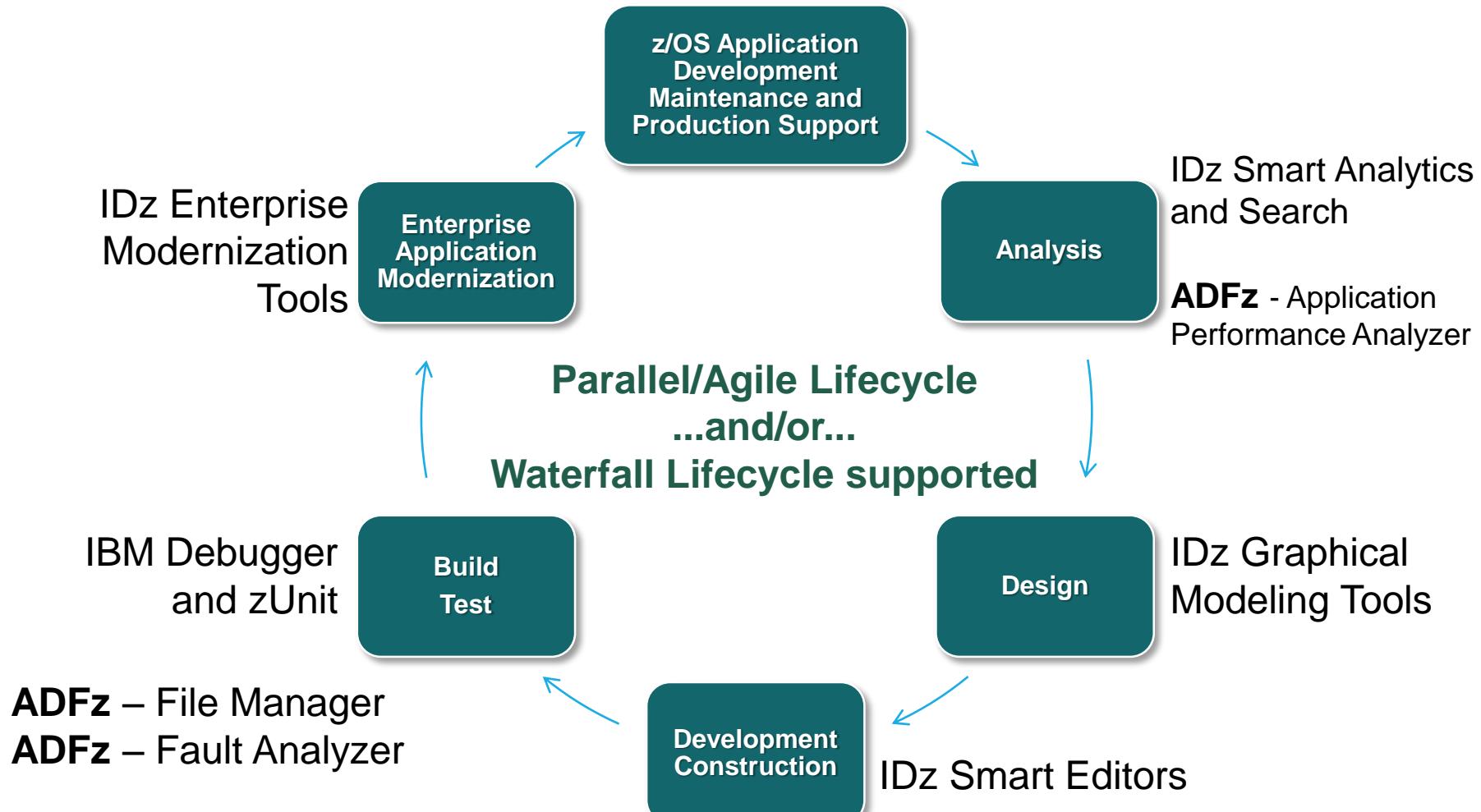
File Manager for
z/OS

Application
Performance
Analyzer for z/OS

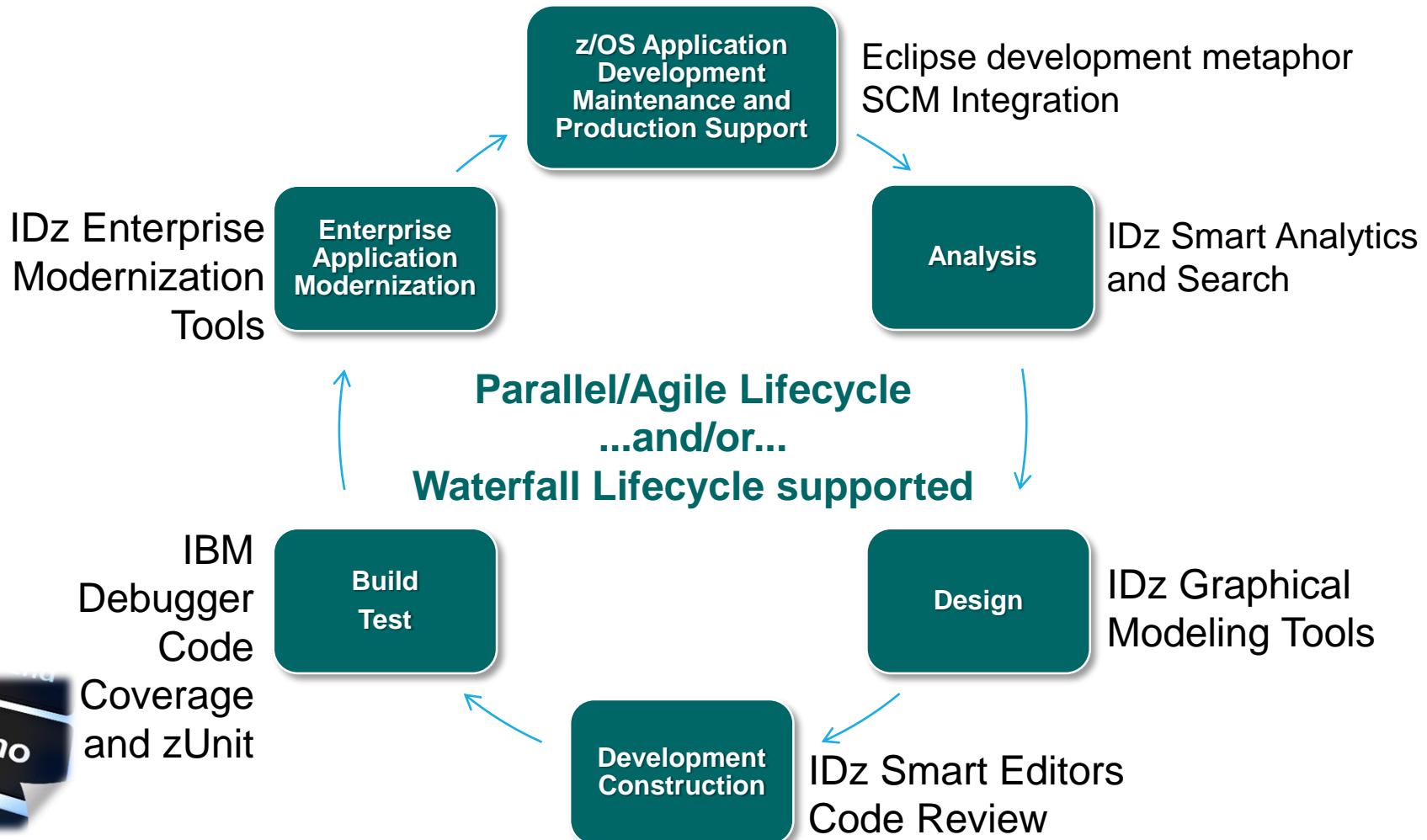
Supported Environments and Architecture



IDz/ADFz - Lifecycle Support



IDz/ADFz - Lifecycle Support (ALTERNATE SLIDE – FOR DEMO)



Supported z System Software Languages and Data Sources

“Smart”
Language-
Sensitive Source
Editors

- COBOL
- PL/I
- Assembler
 - HLASM
 - BAL
- SQL
- JCL
- Java
- C/C++
- HTML

Colorized & Graphic
Design Source Editors

Graphical Tooling Source Editors:

- MFS
- BMS
- SQL
- IMS DBD
- IMS PSB
- WSDL

Colorized (Keyword) Editors:

- REXX
- CLIST
- XML
- JSON

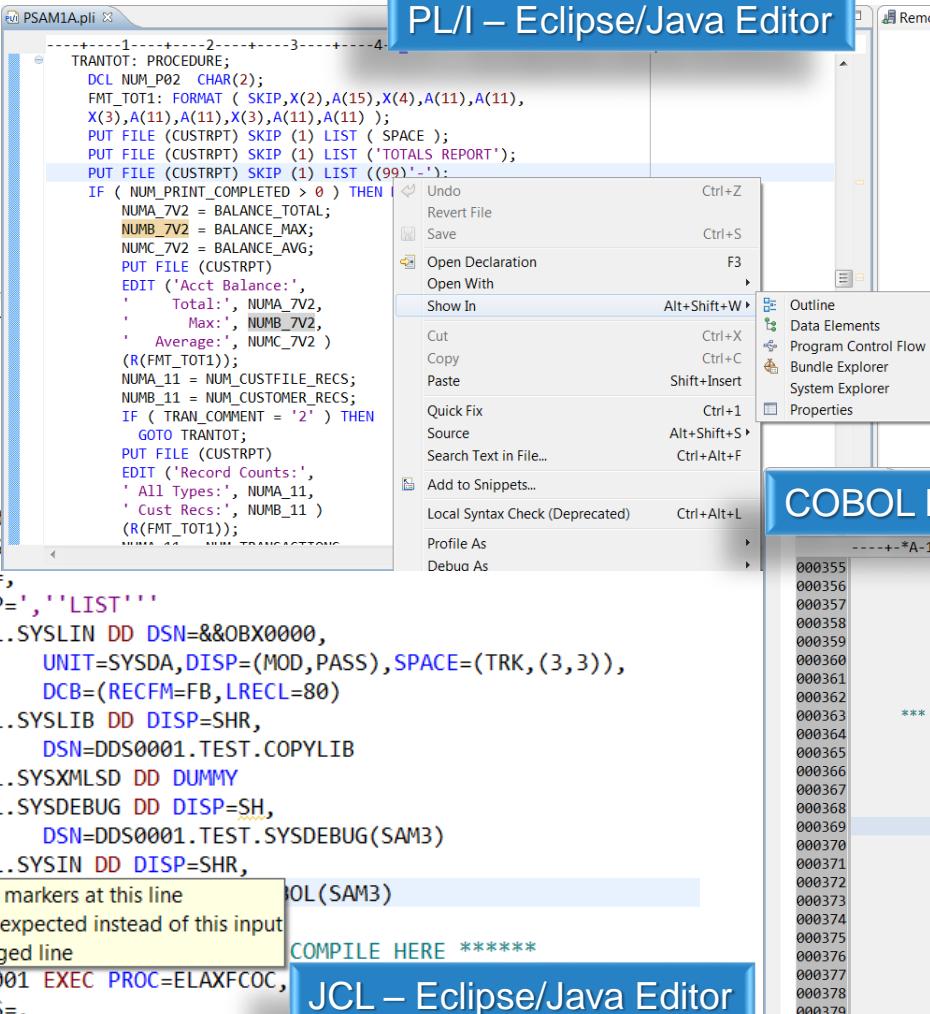
IDz Supported 4GLs

- Report Writer
- IDMS
- TELON
- CA MetaCobol
- Netron
- EGL
- Informix

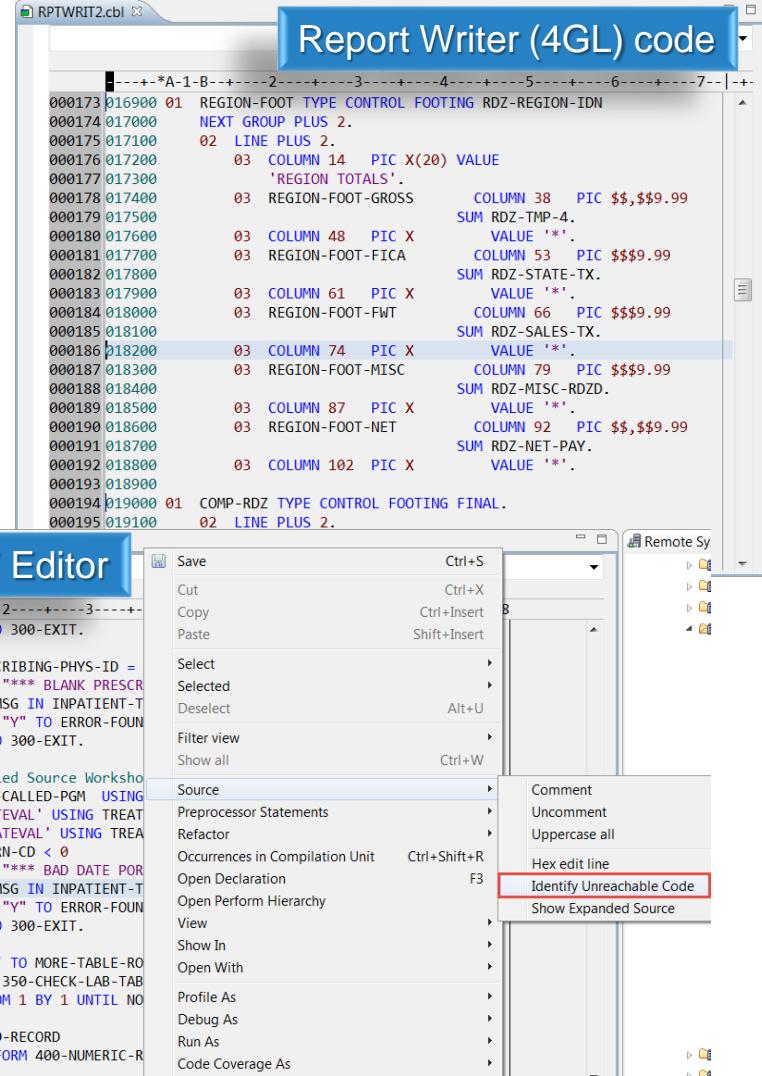
IDz Data Editing

- QSAM
- VSAM
- IMS (DL/I)
- DB2
- Informix
- IDMS
- SQL Server
- Oracle
- CA-IDMS
- Derby, Cloudscape,
MySQL and generic
JDBC drivers are
also installed

Editor Examples



PL/I – Eclipse/Java Editor



SCM Support

Panvalet

Librarian

Home
grown
SCM

Serena
Changeman

Panvalet
CA-
Endevor

Rational
Team
Concert

Git
Subversion

Serena
Plug-ins
(for
Changeman)

CA-Endevor

Other API-
based SCM
Tools and
Products

Menu Manager
or HATS

3rd Party
Frameworks

Eclipse (Plug-ins)

CARMA

IDz

CARMA Repositories: Code Access Options

The screenshot displays a software interface for managing code access options in CARMA Repositories. On the left, a code editor window shows a COBOL program named EPSCMORT.cbl. The program includes comments about demonstrating CICS/DEBUG and calculating days from a current date. A modal dialog titled "Add Element" is open, prompting for parameters to perform an add operation on an ENV: DEV subsystem. The dialog fields include:

- Element name: * TRTMNT1
- Environment name: * DEV
- System name: * MORTGAGE
- Subsystem name: * MORTGAGE
- Type name: * COBOL
- Change control id: JS01
- Comment: NEW VERSION OF PATIENT TREATMENT FILE
- Update if present: checked
- Override signout: unchecked
- Submit as batch job: checked
- Processor group name: Submit on host (dropdown menu)

The dropdown menu for "Submit on host" contains three options: "Submit on host" (selected), "Run in foreground", and "Preview JCL". Below the dropdown, there are two checkboxes: "Remember the entered values for later" (checked) and "Continue to prompt me for the remaining members on this task" (unchecked).

On the right, a navigation pane titled "CARMA Repositories" lists several hosts and their associated CA Endevor packages and SCMs. A context menu is open over the entry for "ENV: DEV - SYS: MORTGAGE - STG: UNITTEST - SID: 1 (*)" under the "CA Endevor SCM" section. The menu options are:

- New
- Delete
- Connect
- Disconnect
- Search
- Refresh
- Add to Project...
- Extract to...
- Custom
- Export Views
- Import Views
- Change view...
- Properties

CARMA Repositories: Packages and Fields Report

The screenshot displays the CARMA Repositories interface with three main windows:

- FLEMS1234.pck**: A package editor showing a table of commands and subjects. It contains entries like "GENERATE FLEMPGM2", "SET STOPRC", "MOVE EOSJCL01", etc., with actions like "Edit...", "Remove", "Move Up", and "Move Down".
- DEFAULT.pck**: Another package editor with a similar structure, showing commands like "MOVE EOSJCL02" and "MOVE EOSJCL03".
- Remote Systems**: A file browser window titled "WTSC47.ITSO.IBM.COM" showing a tree view of CA Endevor Packages. It lists several packages: DEFAULT.pck, END001.txt, EOSPK1.txt, EOSTST2.txt, FLEMS1234.pck, FLEMS1234564.txt, FLEMS7432311.txt, FLEMS99234.txt, FLEMSNO1.txt, and FLEMSYES.pck.

Below the package editors, a navigation bar includes links such as z/OS File Syste, Remote Error L, Property Grou, Snippets, Remote Syste, Remote Consol, Remote z/OS S, ZSERVEROS.CE, Software Analy, CARMA Fields, and CARMA Versio. The bottom section shows a detailed view of the CA Endevor SCM (*), listing various record types, site IDs, environment names, system names, subsystem names, and element names for different packages like COBCOPY, COBOL, JCL, LNK, REXX, and ENV.

Name	Record type	Site id	Environment name	System name	Subsystem name	Element name
COBCOPY						
COBOL (*)						
EPSCMORT.cbl	M	0	DEV	MORTGAGE	MORTGAGE	EPSCMORT
EPSCSMRD.cbl	M	0	DEV	MORTGAGE	MORTGAGE	EPSCSMRD
EPSCSMRT.txt						
EPSMLIS.txt						
EPSMLIST.txt						
EPSMPMT.txt						
EPSNBRLV.txt						
KAPRGC1.txt						
KAPRGM01.txt						
TRTMNT.txt						
JCL (*)			DEV	MORTGAGE		
LNK (*)						
REXX (*)						
BNDPROC.REXX	M	0	DEV	MORTGAGE	MORTGAGE	BNDPROC
REXXBIND.REXX	M	0	DEV	MORTGAGE	MORTGAGE	REXXBIND
SANDBOX						
ENV: DEV - SYS: MORTGAGE - STG: UTC - SI						
SUBSYS: MORTGAGE (*)		0	DEV	MORTGAGE	MORTGAGE	
ENV: DEV - SYS: TD - STG: UNITTEST - SID:						

RTCz – Agile Collaborative Tooling

The screenshot displays the Rational Team Concert interface, specifically the RTCz – Agile Collaborative Tooling version. It features several windows:

- Work Items - Rational Team Concert - Rational Team Concert**: Shows a list of work items, including a detailed view of Defect 19997 titled "Increase the prominence of the 'Find Potential Duplicates' action".
- Project Explorer**: Shows the file structure for MortgageApplication-Common and MortgageApplication-JKECMORT, with a context menu open over a COBOL source file (JKECMORT.cbl).
- Impact Analysis**: A search dialog for files that depend on or are depended on by the selected file.
- Change Sets**: A list of various change sets and their details.
- Task List**: A list of tasks found to potentially depend on the selected file.

A large blue arrow points from the Impact Analysis search results down towards the Task List, indicating a workflow or relationship between the two.

Smart Program Analytics and Search

Control Flow Diagram

Logic/Branch Flow Filter View

Perform and Call Hierarchy

Outline

Data Flow Diagram

Data Elements

Execution Control Flow

Data Flow

IDz

Integration with IBM's AD solution, providing comprehensive application intelligence/analytics

Program Analytics

```
*A-1-B-----2-----3-----4-----5-----6-----7-----8  
000064 EXIT.  
000065 *  
000066 *  
000067 A100-VERIFY-INPUT-DATE SECTION.  
000068 IF L-INPUT-DATE NUMERIC  
000069 MOVE L-INPUT-DATE TO W-INPUT-DATE  
000070 DISPLAY 'WORKING DATE:  
000071 MOVE W-CCYY TO RETURN-CODE  
000072 ELSE  
000073   DISPLAY 'THREE-DIGIT DATE NOT NUMERIC.  
000074   MOVE W-CCYY TO RETURN-CODE  
000075 ENDIF.  
000076 END.
```

z/OS File System Mappi Remote Error List Property Group Manage Snippets Remote System Details Remote Console Remote z/OS Sea

The Data Flow Analysis diagram illustrates the movement of data between various fields and memory areas. Key nodes include:

- 01 W-RET-MM
- 10 W-MM
- 01 W-RET-DD
- 10 W-DD
- 01 W-RET-YYYY
- 10 W-RET-YYYY
- 05 W-INPUT-DATE
- 05 W-RETIRED-DATE-IN
- 01 W-RET-XXXX
- 10 L-00
- 10 MM
- 05 INPUT-DATE
- 01 W-BUD03-LINKAGE-AREA
- 01 W-BUD03-LINKAGE-AREA

Data Flow Analysis

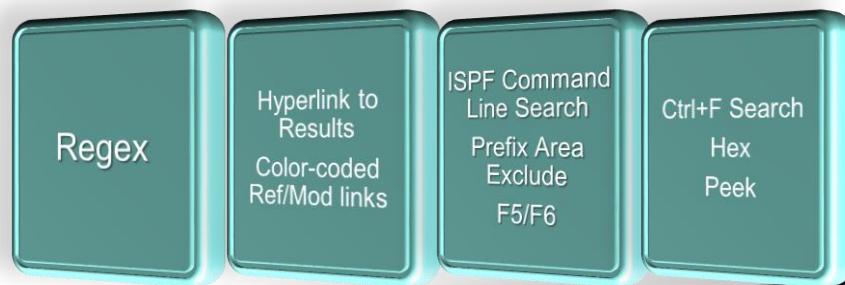
```
*A-1-B-----2-----3-----4-----5-----6-----7-----8  
04980000 DLET-DB-END.  
04990000 EXIT.  
05000000 * PROCEDURE TERM-ROUTINE : TERMINAL ROUTINE  
05010000 TERM-ROUTINE.  
05020000 MOVE SPACES TO MODNAME.  
05030000 PERFORM INSERT-SPA THRU INSERT-SPA-END.  
05040000 IF IN-COMMAND = 'END'  
05050000 MOVE SPACES TO MODNAME.  
05060000 ARTER-00000000
```

z/OS File System Remote Error List Property Group Snippets Remote System Program Control Remote Console Remote z/OS Sea DDS0001.PATINS

The Program Flow Analysis diagram shows a complex control flow graph with many nodes and edges. Key nodes include:

- MAIN RTRN
- DFSIV34
- TO-ADD
- TO-END
- TO-UPD
- TO-DS
- TO-DE
- TO-DEL
- TO-OB
- TO-OB-00
- TO-OB-01
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Smart Analytics and **Search** (Partial List of Options)



Remote Search Options

Search Available from within Edit

IDz

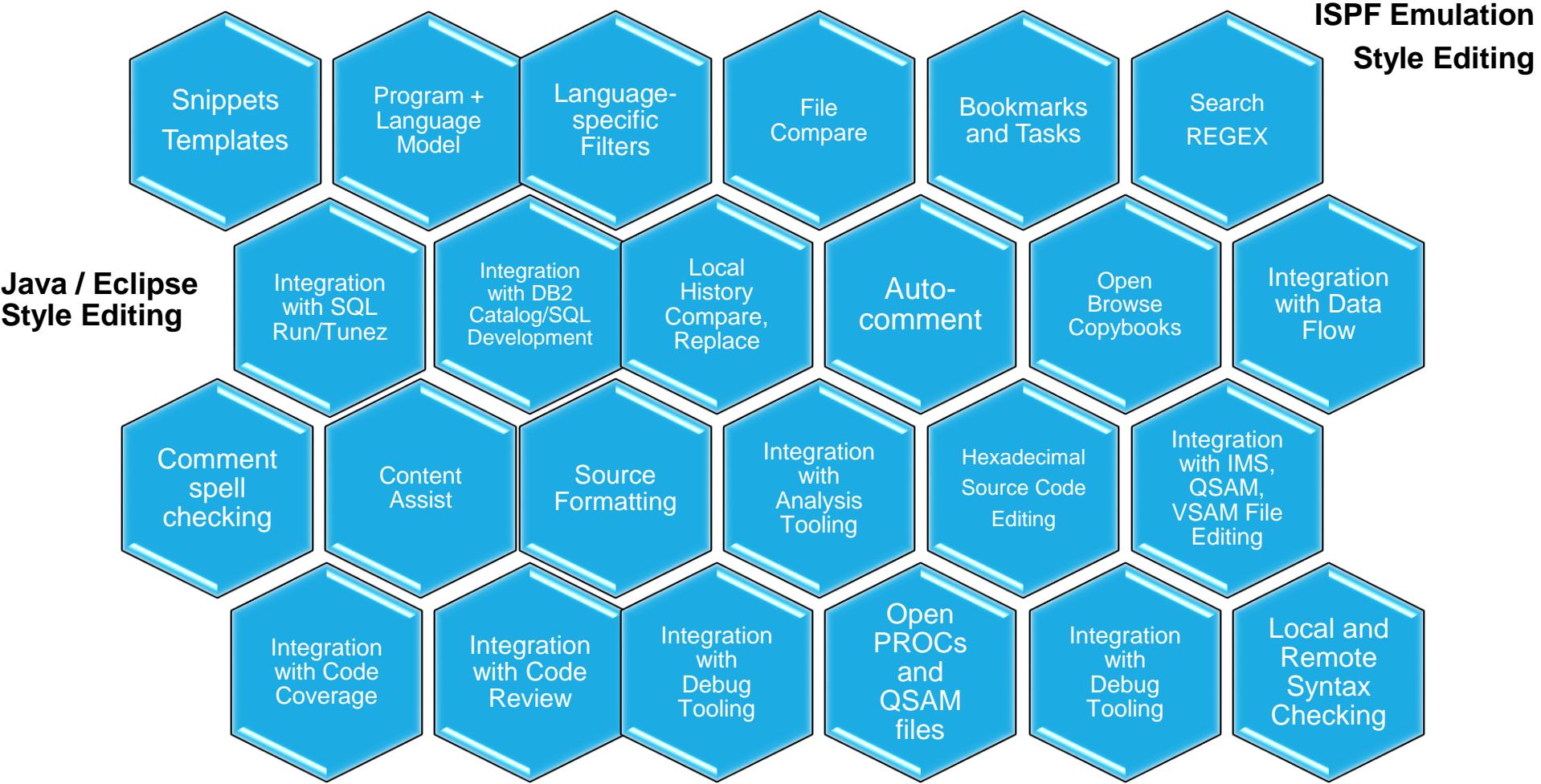
Search

- Hyper-links from search results open program (source) directly to the point-of-interest line
- Can Export search results
- Can Save search query for reuse
- Can utilize Filter to logically “AND” search

The screenshot shows the Rational Developer for z/OS interface with several windows open:

- Code Editor Window:** Displays the COBOL source code for TRTMNTR2.cbl. A blue arrow points to the line containing the IF condition for patient ID zero.
- Search Results Window:** Shows the search results for 'patient-id'. It lists 219 matches across various resources, including DDS0001.TEST.CLIST and DDS0001.TEST.COBOL. The entry for line 031900 is highlighted.
- Search Dialog:** A modal dialog titled 'Search' is open, showing search parameters. Two checkboxes for 'Regular expression' are highlighted with red boxes: one under 'Search for' and another under 'Content strings'.
- File System View:** Shows the directory structure of the remote system demomvs.cc9.pok.ibm.com, including MVS Files and z/OS UNIX Files.

Smart Editors: COBOL, PL/I and Assembler



ISPF-Style Edit

z/OS Projects - w/Bookmark - RDz Tech Portal/RDz Resources/RDz Education/TRTMNT.cbl - IBM Developer for z Systems

File Edit Navigate Search Project Data Run Window Help

ISPF Browse, View, Edit – with all languages Extensible functionality

← Command Line

Prefix Area

ISPF PF-Key Mapping available

Advanced Tooling from ISPF Edit

The screenshot displays the IBM Developer for z Systems interface, specifically the ISPF-Style Edit tool. The main window shows a COBOL program named TRTMNT.cbl with various code segments and comments. A callout box labeled "← Command Line" points to the command line area at the top of the editor. Another callout box labeled "ISPF PF-Key Mapping available" points to the prefix area on the left. A third callout box labeled "Advanced Tooling from ISPF Edit" points to a context menu for a flowchart element. The interface includes multiple toolbars, a navigation bar, and several search panes on the right side showing compilation unit matches for terms like "PATIENT-ID", "WS-MEDICATION-CHARGES", "RECORDS-WRITTEN", and "BED-ID". A large flowchart at the bottom illustrates the program's control flow between various edit and exit points.

Java/Eclipse-Style Edit

z/OS Projects - w/Bookmark - RDz Tech Portal/RDz Resources/RDz Education/RDzClass/cobol/TRTMNT.cbl - IBM Developer for z Systems

File Edit Source Refactor Navigate Search Project Data Run Window Help

Activity: Other Activity

Quick Access

z/OS Projects Bookmarks Search

TREATMNT.cpy TRTMNT.cbl

Collapse Paragraphs

450-EXIT.
 EXIT.

500-CROSS-FILE-EDITS.

500-EXIT.

600-DB2-TABLE-EDITS.
 MOVE "600-DB2-TABLE-EDITS" TO PARA-NAME.
***** EXEC SQL to get info from
 MOVE DIAGNOSTIC-CODE-PRIMARY
 DIAG-CODE IN DCLDIAG-COD

***** CHECK FOR VALID DIAGNOSTIC
 EXEC SQL
 SELECT DIAG_CODE INTO :DIAG-CODE
 FROM DDS0001.DIAG_CODES
 WHERE DIAG_CODE = :DIAG-CODE
 END-EXEC.

 IF SQLCODE = -811 OR 0

01 ABEND-REC.
 05 PARA-NAME PIC X(20).

Open COBOL Declaration

Ref/Mod Variable Marking

20	20	20	20	20	20	20	20	M	0	V	E	"	6	0	0	-	D
20	20	20	20	20	20	20	20	4D	4F	56	45	20	22	36	30	30	2D
!!!																	

z/OS File System Remote Error List Property Group Snippets Remote System Program Control Remote Console

Search

'WS-MEDICATION-CHARGES' - 5 matches in compilation unit of 'TRTMNT.cbl'

TRTMNT.cbl (5 matches)

- 202: 05 WS-MEDICATION-CHARGES PIC S9(9)V99 COMP-3.
- 668: ADD MEDICATION-COST TO WS-MEDICATION-CHARGES.
- 736: IF WS-MEDICATION-CHARGES NOT EQUAL TO IN-MEDICATION-CHARGES
- 740: DISPLAY WS-MEDICATION-CHARGES
- 756: MOVE WS-MEDICATION-CHARGES TO IN-MEDICATION-CHARGES.

Remote Systems Search

'RECORDS-WRITTEN' - 5 matches in compilation unit of 'TRTMNT.cbl'

TRTMNT.cbl (5 matches)

- 199: 05 RECORDS-WRITTEN PIC 9(7) COMP.
- 672: ADD +1 TO RECORDS-WRITTEN.
- 753: ADD +1 TO RECORDS-WRITTEN.
- 754: MOVE RECORDS-WRITTEN TO IN-RECORD-COUNT.
- 768: DISPLAY RECORDS-WRITTEN.

Search

'BED-ID' - 4 matches in compilation unit of 'TRTMNT.cbl'

TRTMNT.cbl (4 matches)

- 242: 10 BED-ID PIC X(04).
- 535: MOVE BED-IDENTITY TO BED-ID.
- 537: SELECT BED_ID INTO :BED-ID
- 539: WHERE BED_ID = :BED-ID

Browse, View, Edit using Eclipse-style functionality. COBOL, PL/I, JCL

Java/Eclipse Editing Workflow

Same Advanced Tooling from Java/Eclipse Edit

```
graph TD; A[300-FIELD-EDITS] --> B[350-CHECK-LAB-TABLE]; B --> C[350-EXIT]; A --> D[400-NUMERIC-RANGE-EDITS]; D --> E[400-EXIT]; A --> F[450-CROSS-FILE-EDITS]; F --> G[450-EXIT]; A --> H[500-CROSS-FILE-EDITS]; H --> I[500-EXIT]; A --> J[600-DB2-TABLE-EDITS]; J --> K[600-DB2-TABLE-EDITS]; K --> L[600-EXIT]; A --> M[1000-ABEND-RTN];
```

Writable Insert 494:1

SQL Coding Within ISPF Editing

The screenshot shows the z/OS ISPF Editor interface. On the left, a source editor window displays a COBOL program with embedded SQL statements. A red box highlights the SQL code block:

```
EXEC SQL INCLUDE SQLCA END-EXEC  
exec sql include diagcode end-ex  
exec sql include empl end-exec.  
exec sql include cust end-exec.  
EXEC SQL  
  DECLARE C1 CURSOR FOR  
    SELECT DEPT, MIN(PERF), MAX(
```

A context menu is open over the highlighted SQL code, with several options highlighted by a red box:

- Paste
- Select
- Selected
- Deselect Alt+U
- Filter view
- Show all Ctrl+W
- Source
- Preprocessor Statements
- Refactor
- Tune SQL
- Run SQL
- Refresh SQL in Outline View
- Occurrences in Compilation Unit Ctrl+Shift+R
- Open Declaration F3
- Open Perform Hierarchy
- View
- Show In
- Open With
- Profile As
- Debug As
- Run As
- Code Coverage As
- Validate
- Software Analysis
- Team
- Replace With
- Formatted Editor
- Search selection in Lookup
- Compare With
- Start Flagging Changed Lines
- Preferences...
- Save and Syntax Check

The right side of the interface shows the "Remote Systems" panel and a "SQL Statement Results" table.

SQL Options from within PL/I or COBOL Edit

SQL Statement Results

1	2	3	4	5	6	7
2	2	2	15.99	26.75	21.370000	
2	4	3	8.89	32.00	22.546666	
1	1	1	212.01	212.01	212.010000	
1	3	1	6.11	32.41	17.250000	
NULL	NULL	NULL	67.82	67.82	67.820000	

Can also create/test new
embedded SQL
functionality within PL/I
COBOL Edit – including
host variables

Graphical SQL Edit/Run/Save

The screenshot illustrates a graphical interface for editing and running SQL scripts, specifically designed for z/OS environments.

Script Editor: The main window shows a graphical query builder with three tables: PROJ, EMP, and DEPT. The PROJ table has columns like PROJNO, PROJNAME, DEPTNO, etc. The EMP table has columns like EMPNO, FIRSTNAME, MIDINIT, LASTNAME, WORKDEPT, PHONENO, HIREDATE, JOB, EDUCLEVEL, SEX, and BIRTHDATE. The DEPT table has columns like DEPTNO, DEPTNAME, and MGRNO. A context menu is open over the EMP table, showing options like "Add Table...", "Specify Join Type...", and "Remove Join". A "Specify Join" dialog box is displayed, showing the "Join type" section with "Inner join" selected. Below it is a table of selected columns with checkboxes and sorting options.

Column	Alias	Output	Sort Type	Sort Order
DSN81010.DEPT.DEPTN...		<input checked="" type="checkbox"/>		
DSN81010.DEPT.MGRNO		<input checked="" type="checkbox"/>	Descending	2
DSN81010.DEPT.LOCATI...		<input checked="" type="checkbox"/>		
DSN81010.EMP.WORKD...		<input checked="" type="checkbox"/>	Ascending	1
DSN81010.EMP.JOB		<input checked="" type="checkbox"/>		

File System: A file browser window titled "z/OS File System Mapping" is visible at the bottom left, showing a directory structure under "File name: c:\emp_dept_proj.xml".

Format: A dropdown menu for export format includes options: Plain Text (*.txt), XML (*.xml) (selected), HTML (*.html), CSV File (*.csv), and Excel File (*.xls). A blue arrow points from the "Format" dropdown to the "Export" context menu.

Export Options: A context menu for export options includes: Copy Row(s), Save, Export (selected), Print, Current Result..., All Results..., Convert Row(s) To Hexadecimal, and Selected Rows... .

Remote Systems: The right side of the interface shows a tree view of remote systems and files, including "Local", "zserveros", "z/OS UNIX Files", "z/OS UNIX Shells", "MVS Files", "JES", "CICS", "DB2", "IMS", "Message Queue Managers", "CTFMVS08.rtp.raleigh.ibm.com", "demomvs.c9.pok.ibm.com", "WTSC47.ITSO.IBM.COM", and "z/OS UNIX Files".

SQL Results: A table titled "DDS0001.PATINS" is shown on the right, displaying data from the joined tables.

MGRNO	LOCATION	WORKDEPT	JOB	PROJNAME
000070		D21	MANAGER	GENERAL AD SYSTEMS
000070		D21	CLERK	GENERAL AD SYSTEMS
000070		D21	REDEV	GENERAL AD SYSTEMS

ADFz - File Manager Edit Data Files

VSAM/QSAM/DL1/DB2 MQ File/Database Editing

The screenshot displays the ADFz interface, which integrates file management and data editing. On the left, a tree view shows file paths like DDS0001.PATDATA and DDS0001.PATINS. A context menu is open over the DDS0001.PATINS entry, listing options such as Go To, Refresh, Rename..., Delete..., Profile As, Debug As, Run As, Code Coverage As, Host Connection Emulator, and Allocate Like... A blue arrow points from this menu towards the main data grid.

File Manager Editor Context Menu:

- Go To
- Refresh
- Rename...
- Delete...
- Profile As
- Debug As
- Run As
- Code Coverage As
- Host Connection Emulator
- Allocate Like...

Main Data Grid (Patient Insurance Information):

PATIENT-ID	INS-COMPANY-PRIMARY-ID	CARRIER-NAME	CARRIER-PHONE	CARRIER-FAX	INSURED-NAME	
55	000055	INS-0005	PHOENIX HOME/LIFE/AUTO/HEALTH	0	0	TIMOTHY T LEWIS
57	000057	INS-0007	KEMPER	3827657847	3657843875	DIANA D ROBINSON
58	000058	INS-0008	ALLSTATE INSURANCE	3657843875	3827657847	BRUCE B MARTINEZ
59	000059	INS-0009	NEW YORK LIFE & HEALTH	6843576876	6758437647	PAUL P GARCIA
61	000061	INS-0001	MEDICARE	9875876548	6007804224	EVERETT T BILLINGSLEY

Bottom Data Grid (Patient Insurance Details):

PATIENT-ID	Picture	Type	Start	Length	Data
000061	X(6)	AN	1	6	000061
INS-COM...	X(8)	AN	7	8	INS-0001
CARRIER...	X(30)	AN	15	30	MEDICARE
CARRIER...	X(10)	AN	45	10	9875876548
CARRIER...	X(10)	AN	55	10	6097894324
INSURED...	X(30)	AN	65	30	EVERETT T BILLINGSLY
INSURED...	X(01)	AN	95	1	F
PATIENT...	X(02)	AN	96	2	CH

Right Panel: Comparison and Shortcuts

Action	Shortcut
Switch Mode	Alt+M
Page Up	F7
Page Down	F8
Page Left	F10
Page Right	F11
Copy Records	Ctrl+Shift+C
Lookup Selected Text	
Cut Records	Ctrl+Shift+X
Paste Records	Ctrl+Shift+V
Insert Records	Ctrl+Shift+I
Delete Records	Ctrl+Shift+D
Find/Replace	Ctrl+Shift+F
Locate Column	Ctrl+Shift+L
Sort Records	Alt+S
Hex on/off	Alt+H
Validate Records	Ctrl+Alt+Shift+V
Show Options	Ctrl+Alt+Shift+O
Exclude Records	Ctrl+Alt+Shift+X
Reset Excludes	Ctrl+Alt+Shift+R

Bottom Left Callout: Invoke File Manager from IDz Context Menu(s).

Bottom Left Callout: Edit through copybooks, utilize Templates, Single Record and Tabular editing modes, etc.

Bottom Right Callout: Large number of valuable file editing options

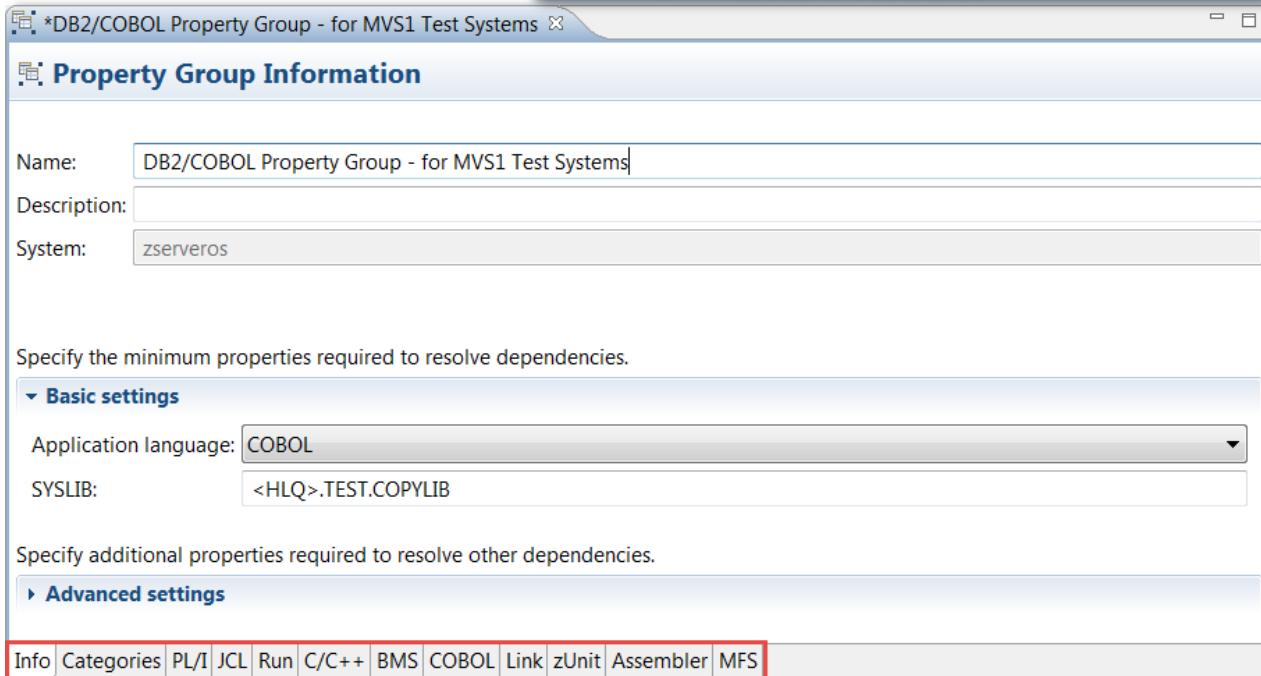
Smart Build

Three ways to Build:

1. Within an SCM
2. Using Menu Manager to invoke SCM build
3. Outside-of-SCM using Property Group files

Using Property Groups you:

1. Select a program
2. Generate JCL for Compile/Link
3. Submit the Job
4. Review Results



Build (compile/link) settings
available for these languages →

IDz – Smart Testing/Debugging

- **IBM z/OS Debugger** will help you increase debugging efficiencies and reduce application development cycle times.
- Program testing and analysis aid that helps you examine, monitor, and control the execution of application programs on z/OS:
 - Batch
 - CICS
 - DB2
 - IMS
 - COBOL
 - PLI
 - ASM
 - C/C++
 - Java
- Code Coverage Facilities (included)
- 3270-based and GUI interface

The screenshot displays the IBM Developer for z Systems interface, specifically the Debug view. The top right shows a 3270 terminal window with command-line monitoring output. The main window contains several panes: a left pane for breakpoints, registers, and modules; a middle-left pane for variables; a bottom-left pane for assembly code with highlighted instructions; and a right pane showing a detailed program control flowchart. The assembly code pane shows lines like:

```
MOVE *** PATIENT NOT-FOUND ON MASTER FILE" TO  
ERR-MSG IN INPATIENT-TREATMENT-REC-ERR  
MOVE "*" TO ERROR-FOUND-SW  
GO TO 500-EXIT.  
MOVE +0 TO RETURN-CD.  
CALL WS-CALLED-MODULE USING TREATMENT-DATE, RETURN-CD.  
IF VALID-RECORD  
PERFORM 600-DB2-TABLE-EDITS THRU 600-EXIT.  
500-EXIT.  
EXIT.  
MOVE *600-DB2-TABLE-EDITS.  
***** EXEC SQL to get info from DB2  
MOVE DIAGNOSTIC-CODE-PRIMARY IN PATIENT-MASTER-REC TO  
DIAG-CODE IN DCLDIAG-CODES.  
CHECK FOR VALID DIAGNOSTIC CODE  
EXEC SQL  
SELECT DIAG_CODE INTO :DIAG_CODE  
FROM DOS0001.DIAG_CODES  
WHERE DIAG_CODE = :DCLDIAG-CODES.DIAG_CODE  
END-EXEC.
```

IBM z/OS Debugger Features

- Source-level debugging
 - Step mode debugging
 - Multiple breakpoint types
 - Conditional and unconditional
 - Stop at statements, variable change, program entry and exit, LE conditions, and others

▪ Visual Debugging

- Graphical view of paragraphs/sections as they execute

▪ Monitor variables, registers, memory, and expressions

- Optionally monitor *all* COBOL working-storage, file section, and/or linkage section variables

▪ Automonitor and Automonitor both feature for COBOL, PL/I, and Assembler programs

▪ Dynamic patching

- Modify variables, storage, and registers
- Change program flow - "jump" to statements
- Insert program statements

▪ Interactive statement record/playback feature

▪ Statement frequency counter

▪ Customizable displays and commands

▪ Integration with Analysis/Edit Tooling

▪ Abend handling

- Automatically intercept abends
- Optionally fix and continue running after an abend
- Built-in interface to Fault Analyzer

Smart Testing: Visual Debug

Debug - RemoteSystemsTempFiles/DebugViewFiles/2/TRTMNTR.expanded.cbl - IBM Developer for z Systems

File Edit Navigate Search Project Data Run Window Help

Activity: Other Activity

Variables

Name	Value
RETURN-CD	+0000
VALID-RECORD	TRUE
+0000	

Breakpoints

- Line [TRTMNTR.expanded.cbl:658]
- Line [TRTMNTR.expanded.cbl:670]
- Line [TRTMNTR.expanded.cbl:769]

Registers

Modules

Monitors

PATIENT-ID IN INPATIENT-TREATMENT-REC = 000004
000004

BNCHMR1.jcl TRTMNTR.expanded.cbl

Program Control Flow

Find on diagram

000-HOUSEKEEPER
000-EXIT
100-MAINLINE
100-EXIT
300-FIELD-EDIT
300-EXIT
350-CHECK-LAE
350-EXIT
400-NUMERIC-F
400-EXIT
450-CROSS-FIEL
450-EXIT
500-CROSS-FILE
500-EXIT
600-DB2-TABLE
600-EXIT
700-WRITE-TRN
700-EXIT
Paragraph 500-CROSS-FILE-EDITS at line 641 of TRTMNTR.expanded.cbl
10-WRITE-TRN
710-EXIT
800-OPEN-FILES
800-EXIT
850-CLOSE-FILE
850-EXIT
851-WRITE-ALL

000649 048400 MOVE "**** PATIENT NOT-FOUND ON MASTER FILE" TO
000650 048500 ERR-MSG IN INPATIENT-TREATMENT-REC-ERR
000651 048600 MOVE "Y" TO ERROR-FOUND-SW
000652 048700 GO TO 500-EXIT.
000653 MOVE +0 TO RETURN-CD.
000654
036100* CALL WS-CALLED-MODULE USING TREATMENT-DATE, RETURN-CD.
000656
000657 048900 IF VALID-RECORD
000658 049000 PERFORM 600-DB2-TABLE-EDITS THRU 600-EXIT.
000659 049100
000660 049200 500-EXIT.
000661 049300 EXIT.
000662 049400
000663 049500 600-DB2-TABLE-EDITS.
000664 049600 MOVE "600-DB2-TABLE-EDITS" TO PARA-NAME.
000665 049700***** EXEC SQL to get info from DB2
000666 049800 MOVE DIAGNOSTIC-CODE-PRIMARY IN PATIENT-MASTER-REC TO
000667 049900 DIAG-CODE IN DCLDIAG-CODES.
000668 050000
000669 050100***** CHECK FOR VALID DIAGNOSTIC CODE
000670 050200 EXEC SQL
000671 050300 SELECT DIAG CODE INTO :DIAG-CODE
000672 050400
000673 050500
000674 050600
000675 050700

Program Source Code

Paragraph Stack Trace – Follows program logic

Smart Testing: zUnit

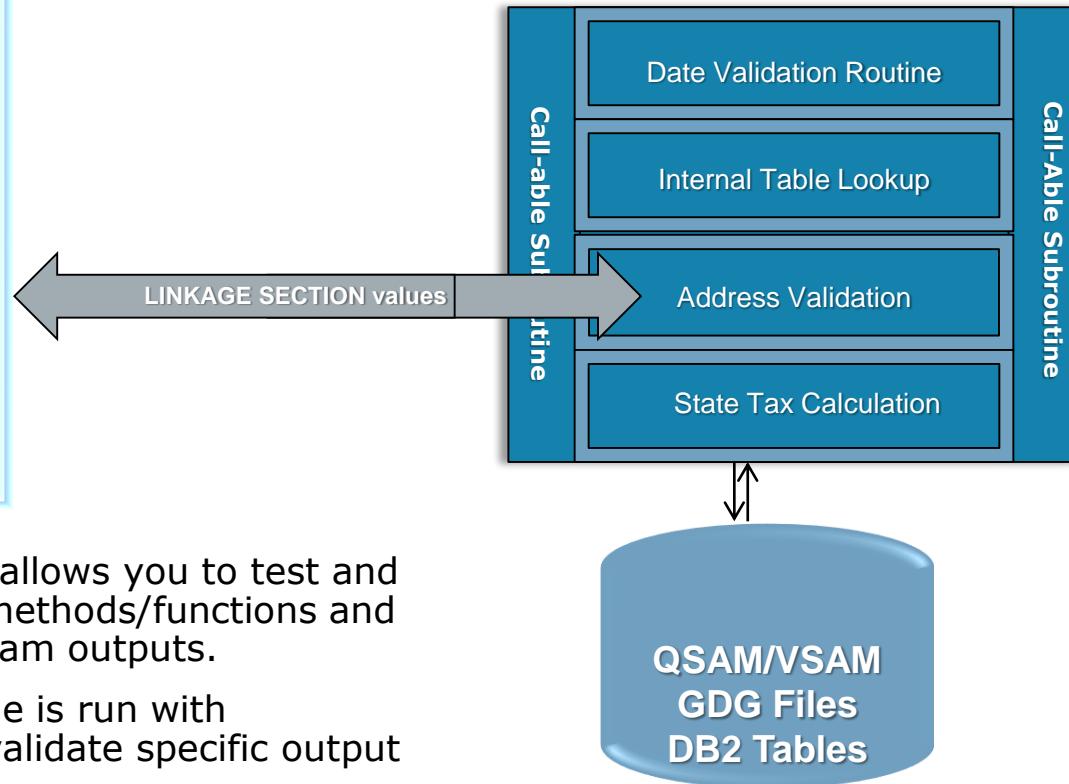
z/OS

zUnit Test Runner

Test Cases -

- Date Validation
- Internal Table Lookup
- Address Validation
- State Tax Calculation ...

zUnit is IBM's implementation of the xUnit unit-test component framework for automated unit testing of z/OS programs

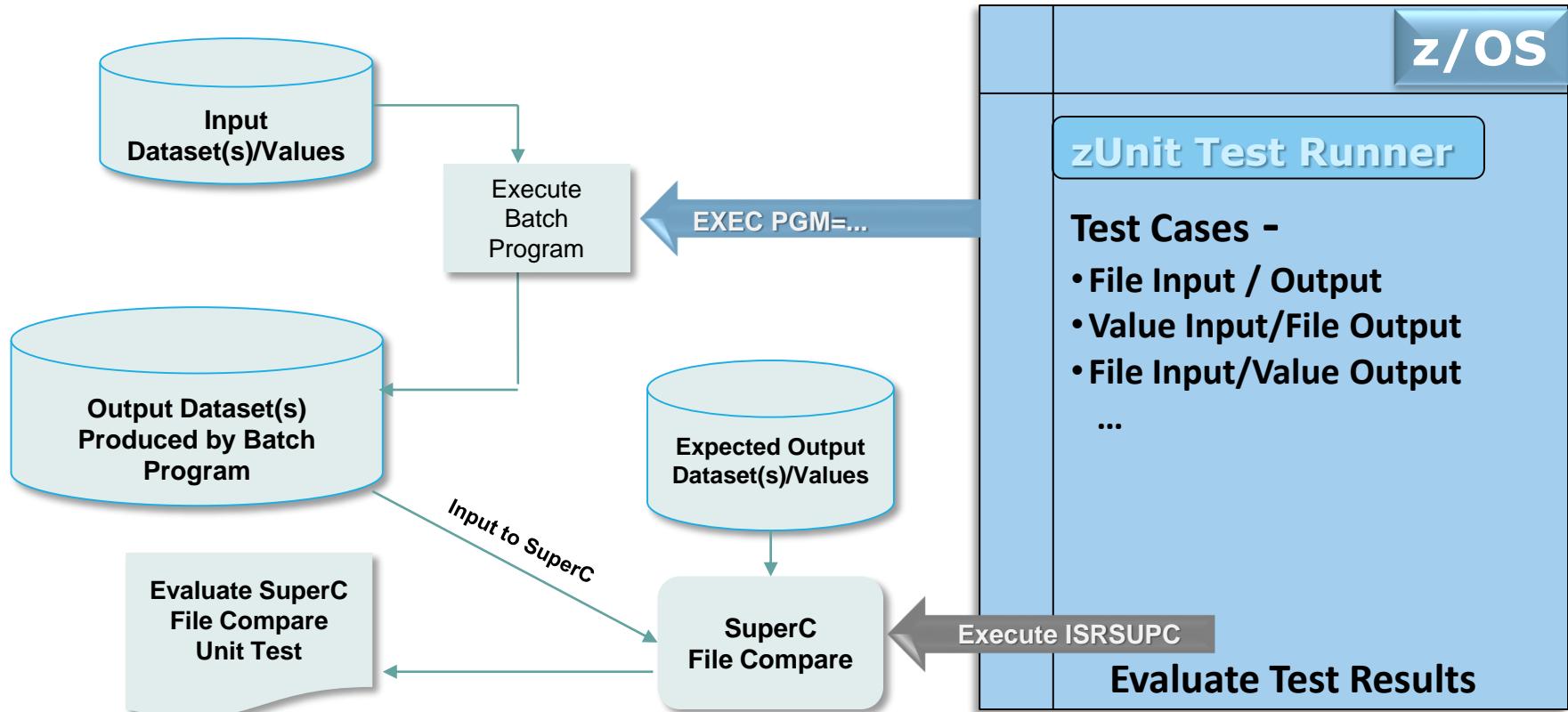


zUnit's "White Box Testing" – allows you to test and evaluate specific application methods/functions and routines- as opposed to program outputs.

During White Box testing, code is run with predefined input values that validate specific output results values.

zUnit Testing Standalone Batch

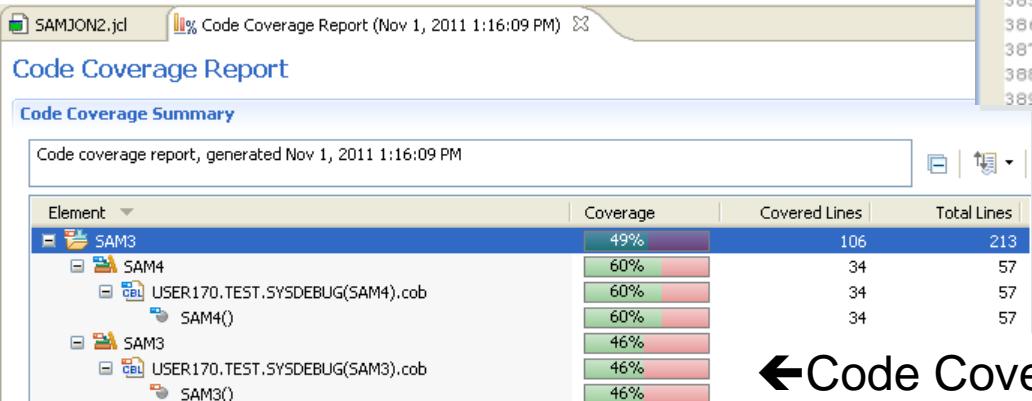
- Emulates standard batch program testing – but provides ability to customize Input / Output file values. Evaluates Unit Test results, based on expected...vs... produced file record values



Smart Code Coverage

Extension to Testing & Debugging:

- Measures testing quality
 - Coverage % - based on input data values from screens, files and databases
 - Tracks tested lines of code
 - Improves application quality
 - Focuses testing resource usage
 - Reports on tested code and trends
 - Supports: Batch, CICS and IMS TM



←Code Coverage Report

SAMJON2.jcl | % Code Coverage Report (Nov 1, 2011 1:16:09 PM) | USER170.TEST.SYSDEBUG(SAM3).cob

```
000 *A-1-B-+---2---+---3---+---4---+---5---+---6---+---7
363 024400      PERFORM 710-READ-TRAN-FILE.
364 024500
365 024600      IF WS-TRAN-EOF NOT = 'Y'
366 024700          COMPUTE NUM-TRAN-RECS = NUM-TRAN-RECS + 1
367 024800          MOVE 'Y' TO WS-TRAN-OK
368 024900          IF TRAN-KEY < WS-PREV-TRAN-KEY
369 025000              MOVE 'TRANSACTION OUT OF SEQUENCE' TO ERR-MSG-DATA1
370 025100              MOVE SPACES TO ERR-MSG-DATA2
371 025200              PERFORM 299-REPORT-BAD-TRAN
372 025300          ELSE
373 025400              EVALUATE TRAN-CODE
374 025500                  WHEN 'UPDATE'
375 025600                      PERFORM 200-PROCESS-UPDATE-TRAN
376
377 026000      ← Coverage Details ESS-ADD-TRAN
378
379 026000          PERFORM 220-PROCESS-DELETE-TRAN
380 026100          WHEN OTHER
381 026200              IF TRAN-COMMENT NOT = ' '
382 026300                  MOVE 'INVALID TRAN CODE:' TO ERR-MSG-DATA1
383 026400                  MOVE TRAN-CODE TO ERR-MSG-DATA2
384 026500                  PERFORM 299-REPORT-BAD-TRAN
385 026600          END-IF
386 026700          END-EVALUATE
387 026800          END-IF
388 026900          MOVE TRAN-KEY TO WS-PREV-TRAN-KEY
389 027000          IF WS-TRAN-OK = 'Y'
```

← Coverage Details

```

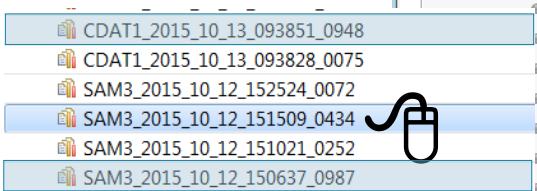
      PERFORM 220-PROCESS-DELETE-TRAN
      WHEN OTHER
        IF TRAN-COMMENT NOT = '*'
          MOVE 'INVALID TRAN CODE:' TO ERR-MSG-DATA1
          MOVE TRAN-CODE TO ERR-MSG-DATA2
          PERFORM 299-REPORT-BAD-TRAN
        END-IF
      END-EVALUATE
      IF
        TRAN-KEY TO WS-PREV-TRAN-KEY
        IS-TRAN-OK = 'Y'
    
```

Code Coverage central to DevOps Continuous Testing

Code Coverage – Reports

- When the Code Coverage batch job or transaction finishes:
 - The current Code Coverage report opens in the editor window
 - The Compiled Code Coverage Results view is opened
- Code Coverage Reports present:
 - Coverage Totals: Lines that were executed
 - A warning symbol to let you know of any modules covered at less than a specified level
 - You set the threshold for coverage warnings in Preferences
 - Individual program paragraph coverage statistics
- Multiple report results can be combined and merged – to provide cumulative testing statistics

Select and Merge multiple
Code Coverage Reports



Code Coverage Report (Line)

Code Coverage Summary

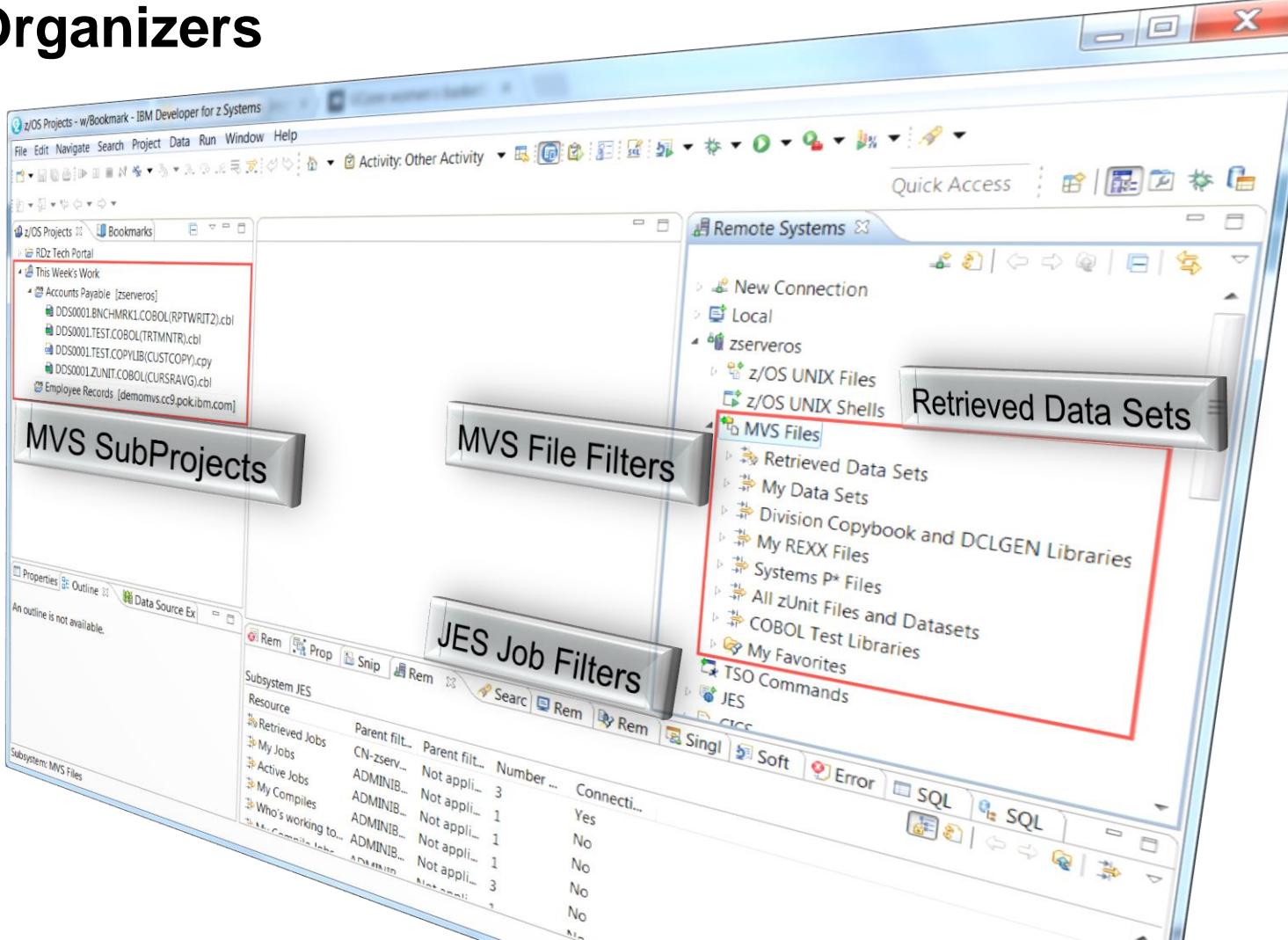
Code coverage report (analyzed at Oct 12, 2015 3:15:43 PM, generated at Oct 13, 2015 3:40:49 PM)

Element	Coverage	Covered	Total
Total	78%	172	218
SAM4	68%	41	60
SAM4	68%	41	60
DDS0001.TEST.SYSDEBUG(SAM4).cob	68%	41	60
SAM4 ← Program Entry	100%	1	1
310-CRUNCH-LOOP	0%	0	8
300-PROCESS-CPU-CRUNCH	0%	0	2
200-PROCESS-TRAN	78%	14	18
100-VALIDATE-TRAN	83%	19	23
000-MAIN	88%	7	8
SAM3	83%	131	158
SAM3	83%	131	158
DDS0001.TEST.SYSDEBUG(SAM3).cob	83%	131	158
SAM3	100%	1	1
850-REPORT-TRAN-STATS	100%	19	19
830-REPORT-TRAN-PROCESSED	100%	5	5
800-INIT-REPORT	100%	7	7
790-CLOSE-FILES	100%	3	3
740-WRITE-CUSTOUT-FILE	44%	4	9
730-READ-CUSTOMER-FILE	63%	5	8
721-COPY-RECORDS	100%	3	3
720-POSITION-CUST-FILE	100%	3	3
710-READ-TRAN-FILE	64%	7	11
700-OPEN-FILES	25%	4	16
299-REPORT-BAD-TRAN	100%	7	7
220-PROCESS-DELETE-TRAN	63%	5	8
210-PROCESS-ADD-TRAN	100%	14	14
200-PROCESS-UPDATE-TRAN	100%	13	13

Smart Code Organizers

Multiple ways to simplify access to source and data through efficient DSN lists and hyper-links:

- **MVS SubProjects** – used to organize individual PDS Members
- **MVS File Filters** – persistent named organizers for subsets and supersets of files
- **JES Job Filters** – persistent named organizers for subsets and supersets of files
- **Retrieved Datasets** – ISPF 3.4 functionality, for one-of Dataset access requirements



Smart Code Reuse

Four IDz tooling options for intelligent code reuse:

1. Templates
2. Snippets
3. Program Skeletons
4. External Copy

Supported in:

- COBOL
- PL/I
- Assembler
- JCL
- SQL
- MFS/BMS
- REXX/CLIST
- Java
- C/C++

The screenshot shows two windows from the IDz tool interface. The left window, titled 'TRTMNTR.jcl', displays a COBOL job card with various parameters and datasets. The right window, titled 'TRTMNTR.cbl', displays a COBOL program snippet with variable placeholders like '04450001' and '044500'. A modal dialog box in the center is titled 'Insert Template: Batch Job Card' and contains a table for setting variables. The table includes columns for 'Variable Name' and 'Value', with entries for 'JobName', 'Accounting Code', 'Programmer Name', 'Message Class', and 'ClassVar'. Below the table, a source code preview shows the template being expanded with user input values.

Variables:

Variable Name	Value
JobName	DDS0001H
Accounting Code	FDSF,F902
Programmer Name	SAYLES
Message Class	H
ClassVar	B

Source:

```
//DDS0001H JOB FDSF,F902,SAYLES,  
// MSGCLASS=H,CLASS=A,REGION=4M,TIME=5
```

Both Snippets and Templates allow for variable text pattern user-input, for greater reusability

Smart Code Review

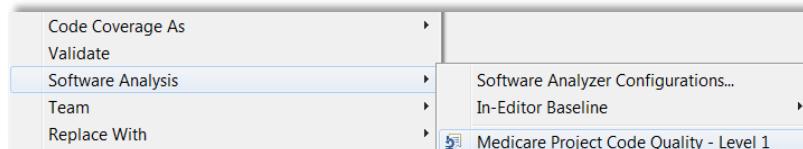
"Electronic desk-checking" that provides enforcement of shop development standards and coding best practices

- Available for COBOL, PL/I and Java programs:

- Interactively – from:
 - Remote Systems Explorer and Local Workstation projects – including an entire z/OS library (PDS)
 - MVS SubProjects
 - Editing
- Run in batch via JCL:
 - Especially applicable to supporting Continuous Integration and DevOps
- Supports Code Baselining

- Easy to use:

- Context-menu accessible



- Easy to setup:

- Create custom rule sets configuration based on in-the-box COBOL and PL/I rules

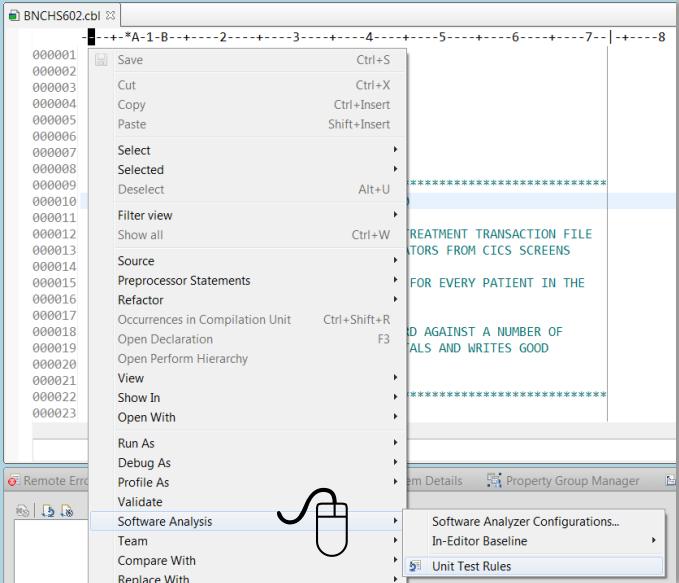
Highly customizable:

- In-the-box rules customizable through Preferences
- Out-of-the-box rules can be added through Java/Eclipse plugins

Four kinds of rules:

1. In the box
2. In the box customized (parameter-driven)
3. Fully-customized
 - Roll your own rules
 - Wizard-driven
 - development process
 - Distribute rules as plug-ins
4. Code Metrics

Code Review - Three modes

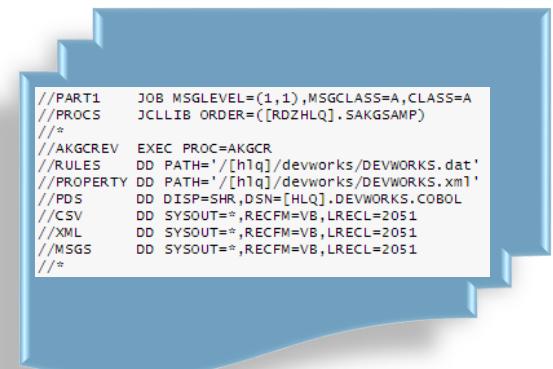
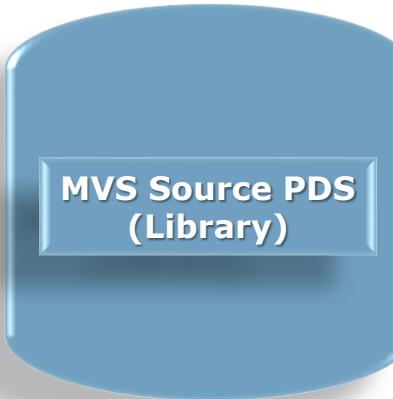


Interactive:

- Code Review a single program at a time:
 - During Edit
 - Or from the Context Menu

Drag & Drop PDS to Local project:

- Code Review MIPS offloaded to workstation
- If the library has been copied down to a local workspace you can select and Code Review multiple (disparate) programs at one time



Run Code Review in Batch:

- Code Review one or more PDS/libraries at a time...Or – Code Review specific members from a library in one run
- MVS Completion Codes returned from rules, allowing you to evaluate results and conditionally run other job steps – as part of Continuous Integration

Code Review Baselineing – available in all three modes

Code Review - Workflow Metrics

Sequence number handling on. Sequence numbers displayed in the prefix area.

-----*A-1-B-----2-----3-----4-----5-----6-----7-----

Line Number	Statement	Description	Data Definition
02030054	020300	05 WS-PHARMACY-CHARGES	PIC S9(6)V99 COMP-3.
02040054	020400	05 WS-ANCILLARY-CHARGES	PIC S9(4)V99 COMP-3.
02050001	020500		
02060001	020600	01 MISC-WS-FLDS.	
02070001	020700	05 STR-LTH	PIC 9(04) VALUE 0.
02080001	020800	05 RETURN-CD	PIC S9(04) VALUE 0.
02090054	020900	05 ROW-SUB	PIC S9(02) COMP-3.
02100001	021000		
02110001	021100	01 FLAGS-AND-SWITCHES.	
02120001	021200	05 MORE-DATA-SW	PIC X(01) VALUE "Y".
02130001	021300	88 NO-MORE-DATA	VALUE "N".
02140001	021400	05 ERROR-FOUND-SW	PIC X(01) VALUE "N".
02150001	021500	88 RECORD-ERROR-FOUND	VALUE "Y".
02160001	021600	88 VALID-RECORD	VALUE "N".
02160153	021600	88 VALID-ROW	VALUE "R".
			VALUE "Y".

Non-compliant Lines Flagged

COBOL Software Metrics COBOL Code Review

Rule	Metric
Basic Metrics	756
Lines of code	80
Number of comment lines	4
Number of copybooks	246
Number of data items	836
Number of lines	
Complexity Metrics	97
Cyclomatic complexity	
Halstead Metrics	
Difficulty level	33.66
Effort to implement	226917.61
Number of delivered bugs	2.25
Number of operands	474
Number of operators	414
Number of unique operands	169
Number of unique operators	24
Program length	888
Program level	1360.79
Program vocabulary size	193
Program volume	6742.10
Time to implement	12606.53

Program Complexity Metrics

Remote Systems

- demomvs.cc9.pok.ibm.com
 - z/OS UNIX Files
 - z/OS UNIX Shells
- MVS Files
 - Retrieved Data Sets
 - DDS0001.CA.COBOL
 - DDS0001.TEST2.SAMFILE
 - My Data Sets (DDS0001.*)
 - DDS0001.TEST.*
 - DDS0001.TEST.ASM
 - DDS0001.TEST.ASM.JCL
 - DDS0001.TEST.BMS
 - DDS0001.TEST.C
 - DDS0001.TEST.CLIST
 - DDS0001.TEST.COBOL
 - DDS0001.TEST.COPYLIB
 - DDS0001.TEST.DBRLIB
 - DDS0001.TEST.DCLGEN

Remote System Det Remote Console Remote z/OS Search DDS0001.PATINS Software Analyzer R

Software Metrics COBOL Code Review

Performance [17 results in 70ms]

- Avoid INITIALIZE statements. Use elementary MOVE statements or VALUE clauses. [1 result in 4ms]
- Avoid using subscripts to access a table. Use indexes. [2 results in 9ms]
- Use an EVALUATE statement rather than a nested IF statement [10 results in 39ms]
- Use an odd number of digits in a COMP-3 or PACKED-DECIMAL data definition [3 results in 13ms]
 - TRTMNTR.cbl:203 Use an odd number of digits in a COMP-3 or PACKED-DECIMAL data definition
 - TRTMNTR.cbl:204 Use an odd number of digits in a COMP-3 or PACKED-DECIMAL data definition
 - TRTMNTR.cbl:209 Use an odd number of digits in a COMP-3 or PACKED-DECIMAL data definition
- Use binary subscripts [1 result in 5ms]

Program Structures [259 results in 723ms]

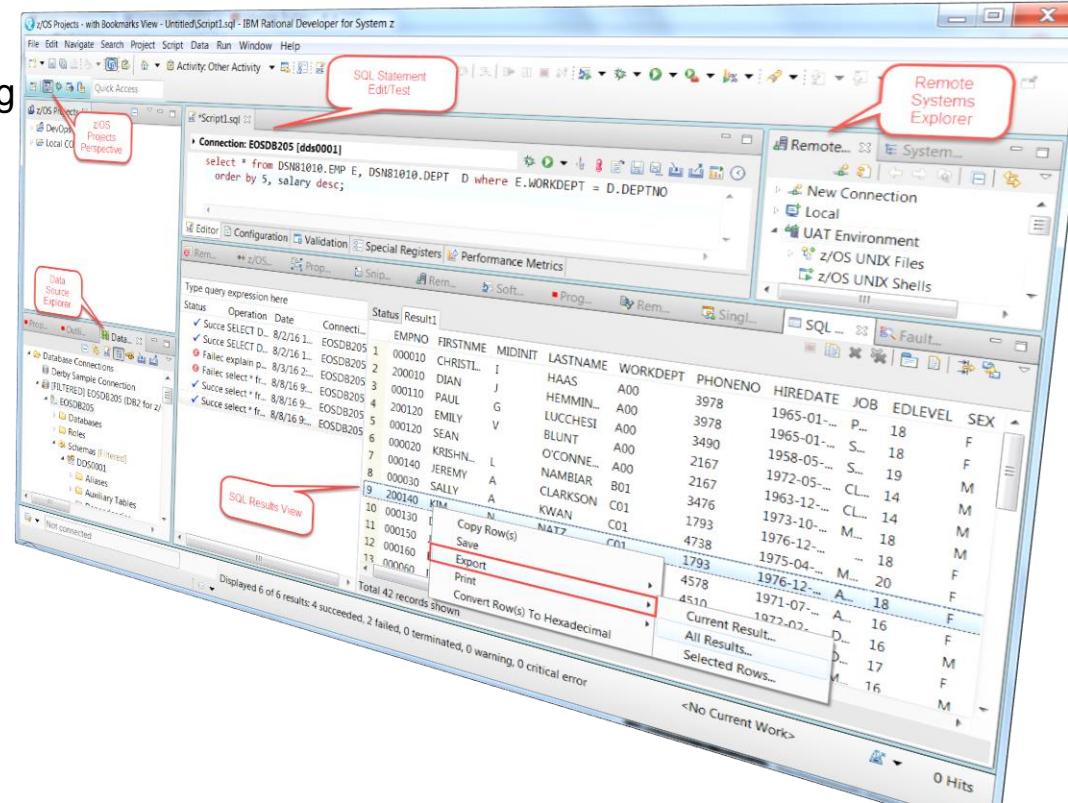
- Avoid ACCEPT statements [1 result in 3ms]
- Avoid DISPLAY statements containing UPON CONSO
- Avoid GO TO statements, except those that reference an EXIT paragraph [9 results in 42ms]

Hyper-links to source lines that fail Code Review Rules

Smart DB2 Development Tooling

Powerful, flexible graphical interface to DB2 and SQL tooling for:

- **DB2 Table/View/Index Analysis, Design** – for the DB2 Data Model and for test data management and manipulation:
 - Edit/View
 - Simple Table row/column sub-setting
- **SQL code and test**
 - Code embedded SQL directly within COBOL, PL/I and Assembler programs
 - Statement content assist from the DB2 Catalog
 - Test/Run/Tune SQL directly from COBOL or PL/I programs
 - Code SQL with graphical tooling
 - Run existing SPUFI files
 - Interactively Code/Test/Tune SQL statements
 - Export SQL statement results to:
 - Spreadsheets
 - HTML
 - XML



IDz: DB2 Tooling

Base Product DB2 Table Edit/SQL Coding

- DB2 Catalog hierarchy for User Objects
- Display detailed properties of DB2 Objects
- Filtering for Schemas and Tables/Views
- E/R Diagramming Tool
- DCLGEN
- Generate DDL – for cloning tables
- Load Table
- Table/Column Group By
- ISPF/SPUFI File Edit/Exec
- Interactive SQL Edit/Exec
- Graphical SQL Edit/Exec
- Table/View Edit, Sample Contents
- Export SQL Results to: XML, Spreadsheet
- Copy DB2 Table Row(s)
- Wizard-driven Create/Maintain DB2 Stored Procedures
- Test Run Stored Procedures
- Find Invalid Packages
- Generate pureQuery
- Drop/Alter DB2 Objects

Partial list of functionality

Data Studio Plug-in DB2 Table Edit/SQL Coding

- DB2 Catalog hierarchy for User Objects – and DBA Objects (STOGROUP, TABLESPACE, etc.)
- Display detailed properties of DB2 Objects
- Filtering for Schemas and Tables/Views
- E/R Diagramming Tool
- DCLGEN
- Generate DDL – for cloning tables
- Load Table
- RUNSTATS
- ISPF/SPUFI File Edit/Exec
- Interactive SQL Edit/Exec
- Graphical SQL Edit/Exec
- Run/Test/Tune SQL from within program edit
- Table/View Edit – with row/column filtering
- Visual Explain
- Multivariate Value Distributions
- Sample Contents
- Export SQL Results to: XML, Spreadsheet
- Copy DB2 Table Row(s)
- Wizard-driven Create/Maintain DB2 Stored Procedures
- Test Run Stored Procedures
- Find Invalid Packages
- Generate pureQuery
- Drop/Alter DB2 Objects

Specific to
Data Studio

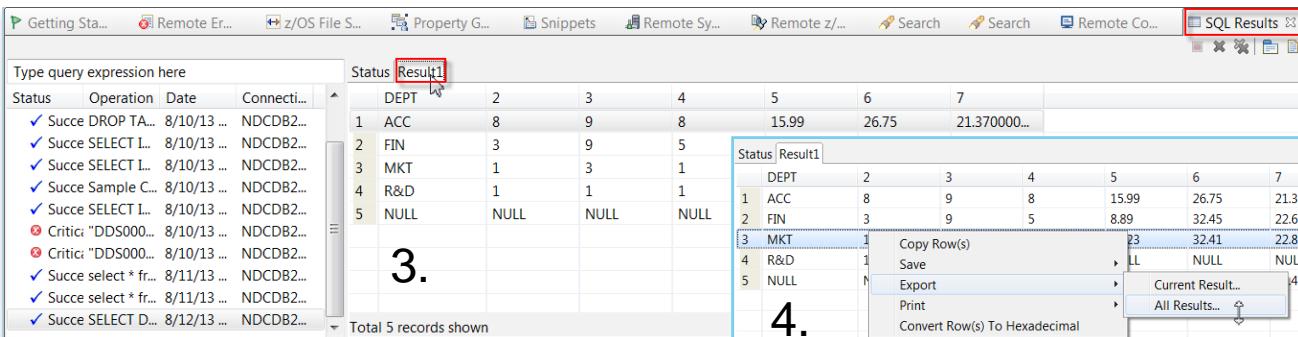
Code/Test/Tune SQL within host program edit

- PL/I and COBOL
 - Can use Content Assist** to code (but not test) embedded SQL within Assembler
 - During program editing:
 1. Filter COBOL/PL1 code to expose embedded SQL statements
 2. Select and Run embedded SQL
 3. Analyze results
 4. Export

****Content Assist accesses
the DB2 Catalog**

The screenshot shows the Rational Developer for System z IDE interface. A context menu is open over the first line of the CURSRAVG.cbl source code. The menu includes standard options like Cut, Copy, Paste, and Ctrl+Insert, Shift+Insert. Below these are 'Select', 'Selected', and 'Deselect' options. A red box highlights the 'Filter view' option. Further down the menu, there's a separator line, followed by 'Show all' (with a Ctrl+W keyboard shortcut), 'Source', 'Preprocessor Statements', 'Refactor', 'Refresh SQL in Outline View', 'Occurrences in Compilation Unit' (with a Ctrl+Shift+R keyboard shortcut), and 'Open Declaration'. At the bottom of the menu, a red box highlights the 'Embedded SQL/CICS/DLI' section, which contains 'Divisions', 'Code', 'Comments', 'Outline', 'Task tags', 'Copy Statements', and 'Call Statements'. The 'Task tags' option has a checked checkbox next to it.

```
+-----+-----+-----+-----+-----+-----+-----+
| *A-1-B-----2-----3-----4-----5 |
+-----+-----+-----+-----+-----+
④ 000124 EXEC SQL INCLUDE SOLCA END-EXEC.
000125 EXEC SQL
000126     DECLARE C1 CURSOR FOR
000127     SELECT DEPT, MIN(PERF), MAX(PERF)
000128             MIN(HOURS), MAX(HOURS)
000129     FROM DDS001.EMPL E, DDS001.DPT D
000130     WHERE E.NBR = P.NBR
000131     GROUP BY DEPT
④ 000132 END-EXEC.
000141 EXEC SQL OPEN C1
④ 000142 END-EXEC.
000143 EXEC SQL FETCH C1 INTO
000144     :DEPT-TBL:DEPT=NULL,
```



E/R Diagram: Analyze DB2 Table/View Relationships

z/OS Projects > DB2 Stuff > RDz Tech Portal

<View> VACT - Connection "EOSDB205"

Part of IDz feature/function

Properties Outline Data Source Explorer

- Views
 - VACT
 - VASTRDE1
 - VASTI
 - VCON
 - VDEPT
 - VDEP
 - VDSP
 - VEMP
 - VEMP
 - VEMP
 - VEMP
 - VFOR
 - VHDEPT
 - VOPTVAL
 - VPHONE
 - VPROJ
 - VPROJECT
 - VPROJECT1
 - VPSTRDE1
 - VPSTRDE2
 - VSTAFAC1
 - VSTAFAC2

Add to Overview Diagram

Generate DDL...

Analyze Impact...

Compare With

Copy

Refresh F5

z/OS File System Mapping Property Group Manager Snippets Remote System Details Remote z/OS Search SQL Results

Type query expression here

Status Operation Date Connecti... Status Message1

Succ SELECT C... 8/24/16 ... EOSDB205 Extracting "DSN81010"."EMP" - Data extraction was successful. 47 row(s) extracted

Visual Explain

- From SQL Outline view:

- Open Visual Explain on and embedded SQL statement

The screenshot shows the DB2 SQL Editor interface. A context menu is open over a selected SQL statement. The menu items include: Open Visual Explain (highlighted with a red box), Get Query Tuner Report, Open Query Tuner, Generate pureQuery Code..., Find in pureQueryXML, Show SQL in Table, Filter..., and Show Data. Below the menu, a table titled "cost_estimation" displays detailed cost estimates for the query.

	Value
Outer input Cardinality	10000.0
Inner Input Cardinality	3333.3333
Join Predicates	Filter Factor
E.NBR=P.NBR	0.04
Output Cardinality	1333333
Cumulative Total Cost	2109.6658
Cumulative Io Cost	237.1454
Cumulative CPU Cost	9.0854195E8

Detailed Cost estimates for the query and each query phase

Different Query stages in the Visual Explain diagram



Pop-up DB2 Optimizer analyzes access path and estimates query step costs

Node Type : Nested loop join[6]
Name : NLJOIN
Cardinality : 1333333
Total Cost : 2109.6658
I/O Cost : 237.1454
CPU Cost : 9.0854195E8
< inner join >

- View/Analyze results
- Save results to discuss with DB2/DBA operations team

Part of IDz feature/function

IBM Query Tuner Integration

Note: Query Tuner is a standalone package that is not included with ADFz/IDz

The screenshot shows the IBM Query Tuner interface. On the left, there's a navigation sidebar with tabs: 1. Status, 2. Capture, 3. Manage, 4. Invoke, 5. Review, and 6. Compare. Under '4. Invoke', the 'Open Summary Report' button is highlighted with a red box. The main area displays a 'Query Tuner Report' with a summary of recommendations. At the bottom, there's a table titled 'Tuning Recommendation Description' with five rows, each containing advice number, type, and a detailed description. A red box highlights the 'Recommended Action' button in the toolbar above the report table.

CURSRAVG.cbl *QTProject2/Query Group 1/Query 1

Query Tuner Workflow Assistant

Open Summary Report

Report name: TuningReport_20130813112339_ad.html

IBM Query Tuner Report

This report contains a summary of the recommendations from the Query Tuner advisor and tools. Examine the recommendations and applicable, and take appropriate actions to tune your query. You can also examine the formatted query and access plan summary, and recommendations generated by the advisors. Use the table, column, and index information to do further analysis and tuning. Navigate to action buttons and then return to the top of the report using [Back to top](#).

Recommended Action View Query Access Plan DB Catalog Info Save Report...

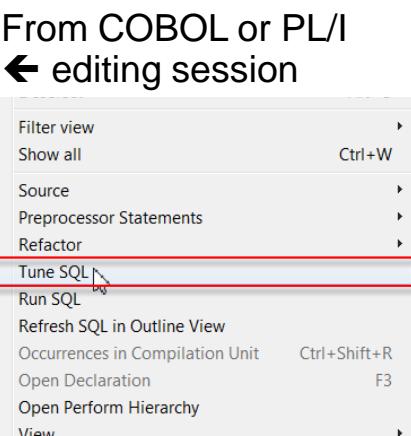
Overview

Recommendation generation timestamp: 2013-08-13 11:16:40
Database server configuration: jdbc:db2://zserveros.demos.ibm.com:5446/EOSDB205 (DSN09015)
Estimated plan cost: 10.972 units
Critical problems: 1 statistics recommendations, 0 index recommendations, 0 query recommendations, and 0 access path warnings.
Best practices: 1 statistics recommendations, 1 index recommendations, 0 query recommendations, and 2 access path warnings.

Advice Number	Advice Type	Tuning Recommendation Description
1	Statistics	CRITICAL: Repair statistics:Query Tuner found problems with the repair statistics for this query. Use RUNSTATS to gather missing statistics. Recollect conflicting statistics and potential obsolete statistics. Collect statistics for potential data skew and data correlation problems. Important: if statistics are missing, Query tuner estimates subsequent recommendations based on database default statistics. Click here to review the recommended RUNSTATS script.
2	Statistics	Consolidate statistics:Use RUNSTATS to recollect all the relevant statistics for this query for an accurate evaluation Important: if statistics are missing, Query tuner estimates subsequent recommendations based on database default statistics. Click here to review the recommended RUNSTATS script.
3	Index	Index recommendation is found for the following tables: DDS0001.EMPL. The total estimated disk space required is 0.023 MB and the estimated performance improvement is 18.279%. This index recommendation will help improve query performance for SCREENING. Click here to review the recommended CREATE INDEX DDL script.
4	Access path	Avoid sorting (QBLOCKNO = 1, PLANNO = 3) on a large number of records. A sort is used. When a large number of records are returned before sorting, DB2 might be using an inefficient access path. Consider rewriting the query or designing an index to avoid the sort if possible.
5	Access path	Avoid table space scan (QBLOCKNO = 1, PLANNO = 1) on table DDS0001.EMPL. The table is accessed by a table space scan (table scan). When a large number of records are returned, DB2 might be using an inefficient access path. Consider running the statistics advisor or running the index advisor to determine

The screenshot shows the DB2 SQL editor with a query window. The query is as follows:

```
-----+-----+-----+-----+-----+-----+
000175 EXEC SQL
000176   CLOSE C1
000177 END-EXEC .
000202 EXEC SQL
000203   DECLARE C2 CURSOR FOR
000204     SELECT EMP_ACT.PROJNO, PROJNAME, C
000205       SUM ( (DAYS(EMENDATE)-DAYS(
000206         EMPTIME * DECIMAL((SALARY /
000207           DDS0001.EMP_ACT, DDS0001.PROJ
000208           WHERE EMP_ACT.PROJNO=PROJECT.PROJN
000209             EMP_ACT.EMPNO = EMPLOYEE.EMPNO
000210               PRENDATE > :RAISE-DATE
000211                 GROUP BY EMP_ACT.PROJNO, PROJNAME
000212                   ORDER BY 1
000213
000214   END-EXEC .
000215 EXEC SQL
```



- The Summary Report is a detailed list of recommended actions for indexing, query re-writing, and other tuning approaches

From COBOL or PL/I
← editing session

Smart Integration

IDz integrates with existing application and systems tooling:

- ISPF Dialog Panels and 3rd Party Products
- Source Management products and solutions
- CLISTS and REXX Execs and other z/OS functionality
- Eclipse Distributed and DevOps Tooling
- Windows Tooling
- IBM Eclipse-based products and solutions

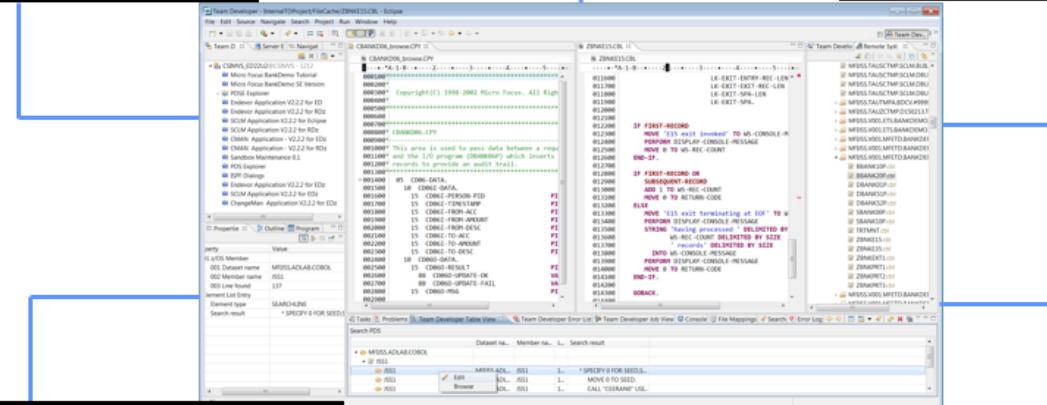
• **Integration with your ISPF Dialog applications, REXX Execs and CLISTS is not optional.**

- Swapping out an IDE requires accounting for all necessary app-dev functionality.

DevOps Analytics
and Dashboards
Report Exports...

z/OS Problem Determination Tools
(All products)

DevOps
UrbanCode Deploy



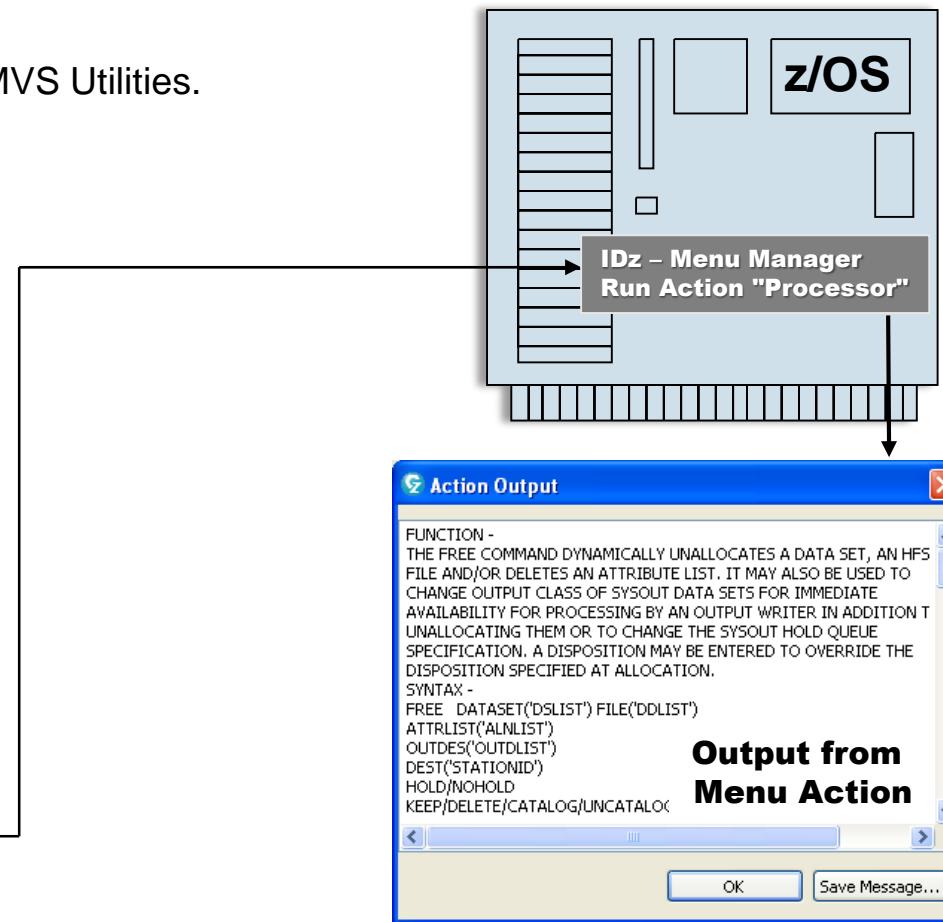
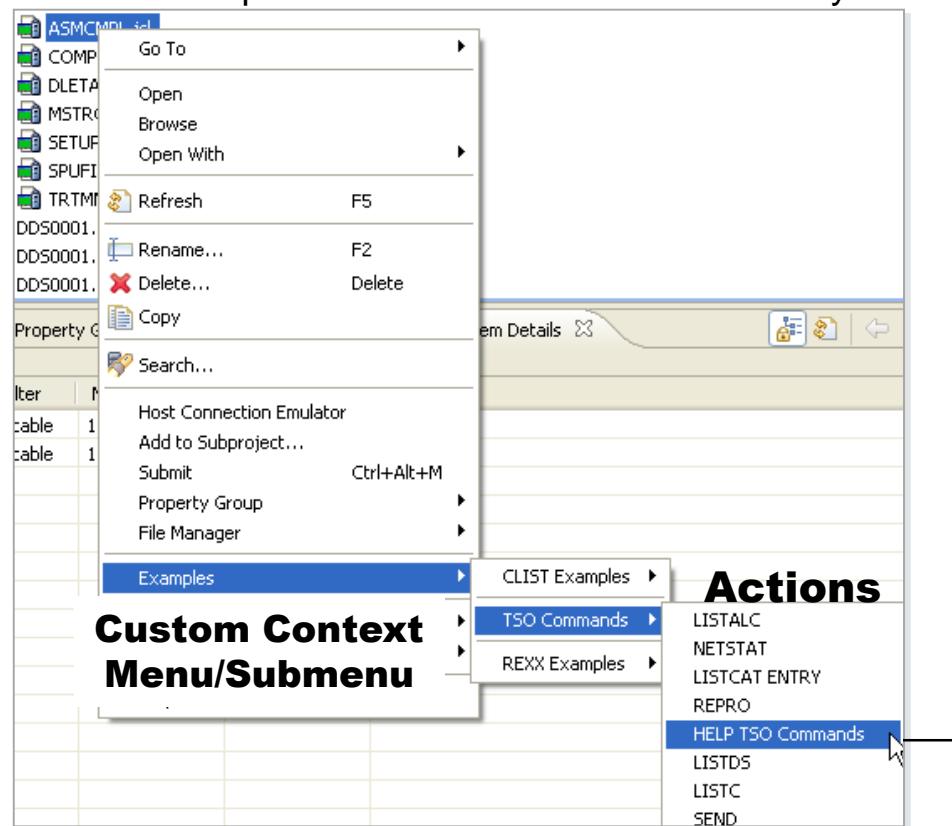
Seamless integration
with z/OS functionality
ISPF Panels, REXX,
CLIST tools/products

Agile/SCM Integration
Rational Team Concert

Agile Regression
and Integration
Testing Tools
RTW, RFT, ...

z/OS Integration – Menu Manager

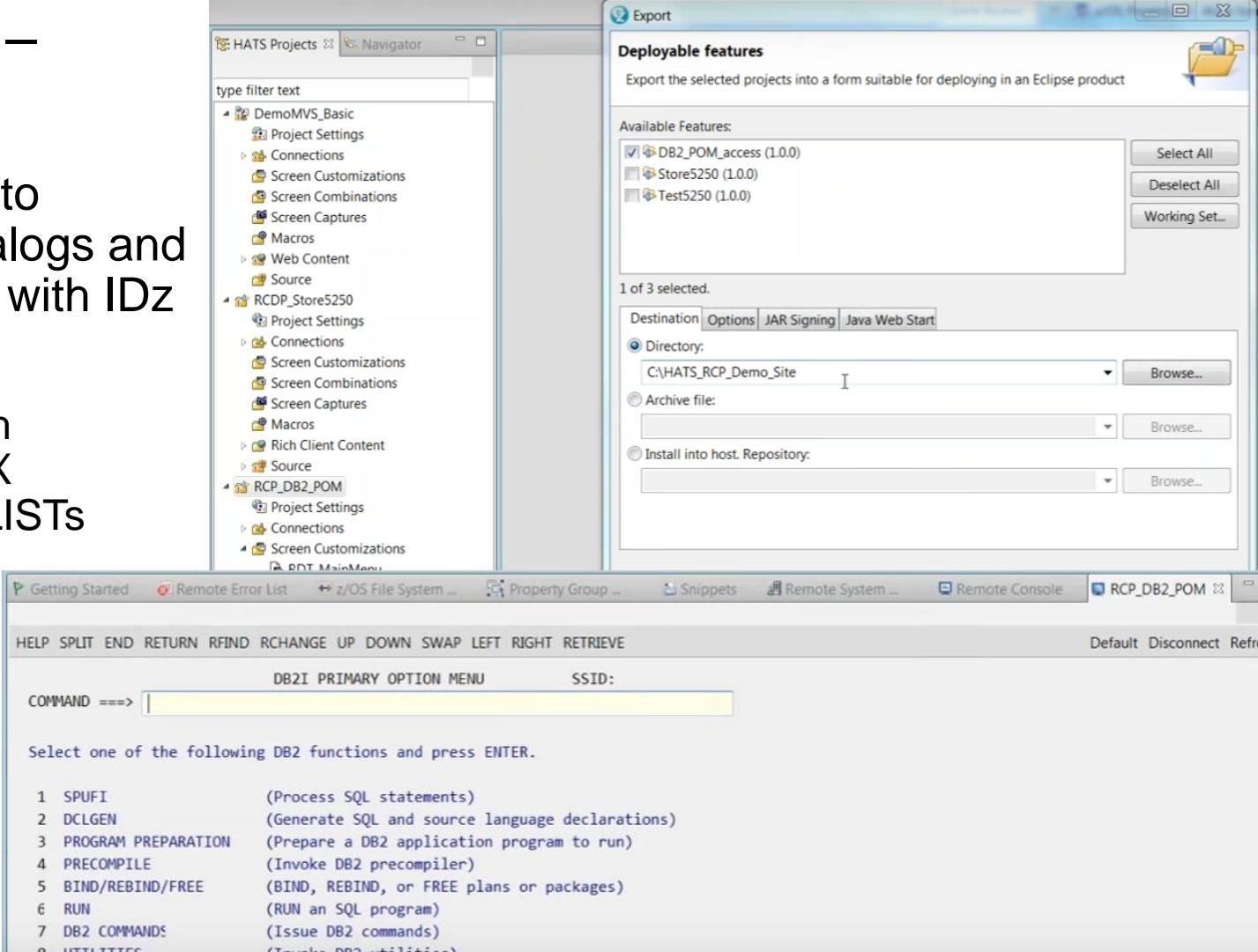
- Menu Manager is a free, light weight solution for integrating REXX Execs, CLISTS and TSO Commands into IDz
 - Can provide access to SDSF functionality and MVS Utilities.



z/OS Integration – HATS/RCP

- Free tooling used to integrate ISPF Dialogs and 3rd Party products with IDz

- Also used for integration with complex REXX Execs and CLISTS



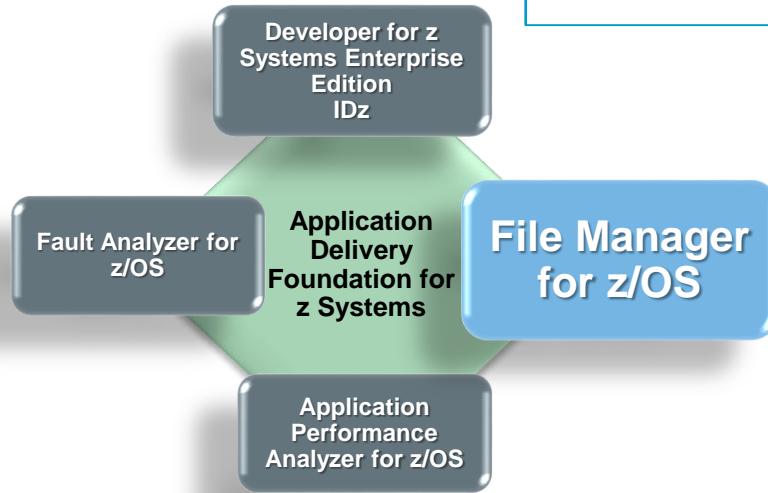
UNIT

ADFz – IDz – Introduction



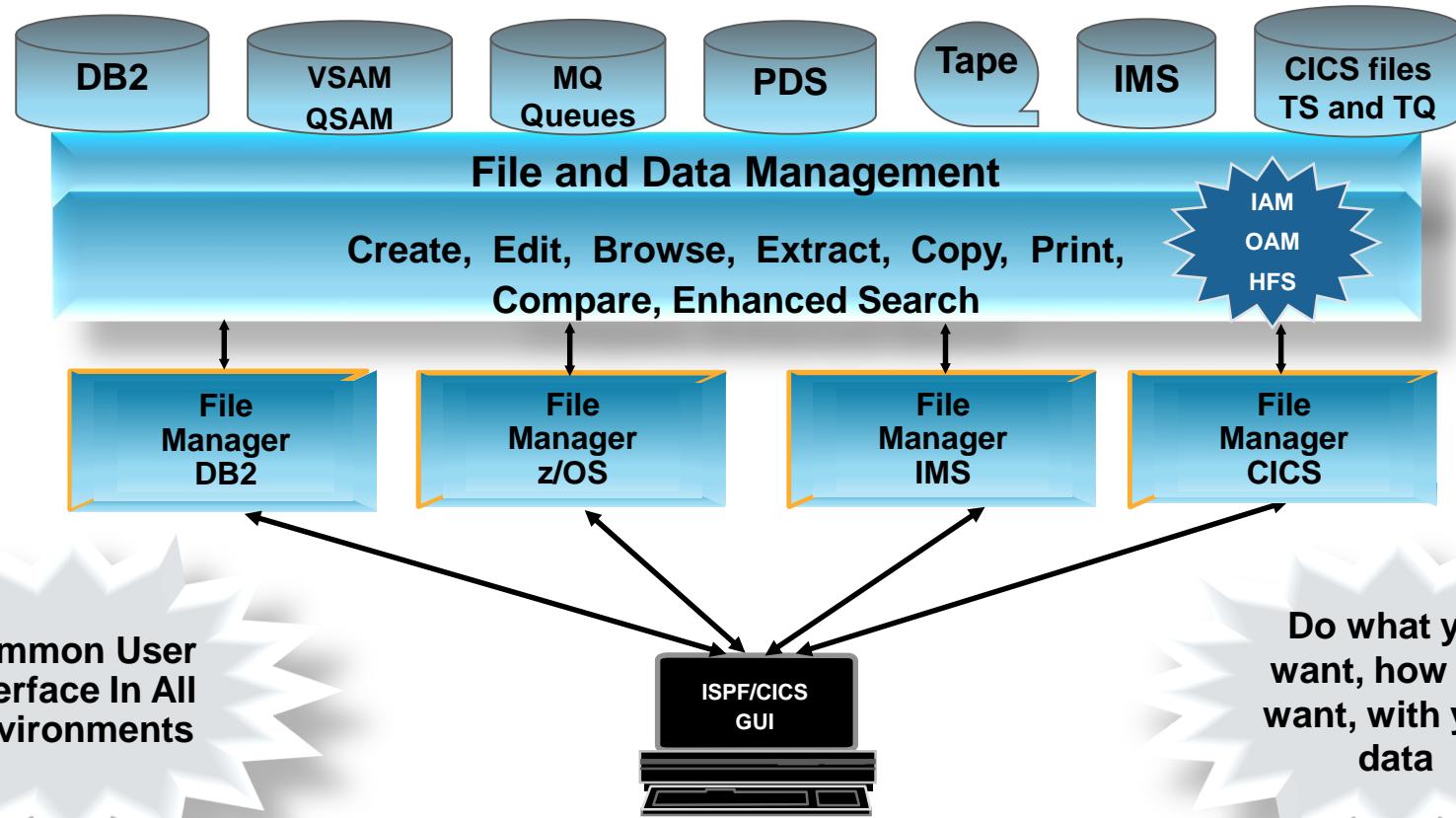
Topics:

- Product
- Benefits - What's in it for me?
- DevOps and ADFz - What's in it for me?
- IDz Deep Dive
- **ADFz – File Editing and Extract and Management Tools**
- ADFz – ABEND Resolution Tools
- ADFz – Application Performance Analysis Tools
- Application Discovery (AD) integration with ADFz
- IMS-specific Tooling
- CICS-specific Tooling



IBM File Manager for z/OS

Manage a variety of enterprise data file structures



ADFz – IBM File Manager for z/OS

IBM File Manager allows you to manage production, test, and development data across multiple formats and storage media

Create, edit, copy, browse, extract, print,
and compare enterprise data
(VSAM/DB2/IMS,CICS/MQ)

Edit entire files - regardless of size

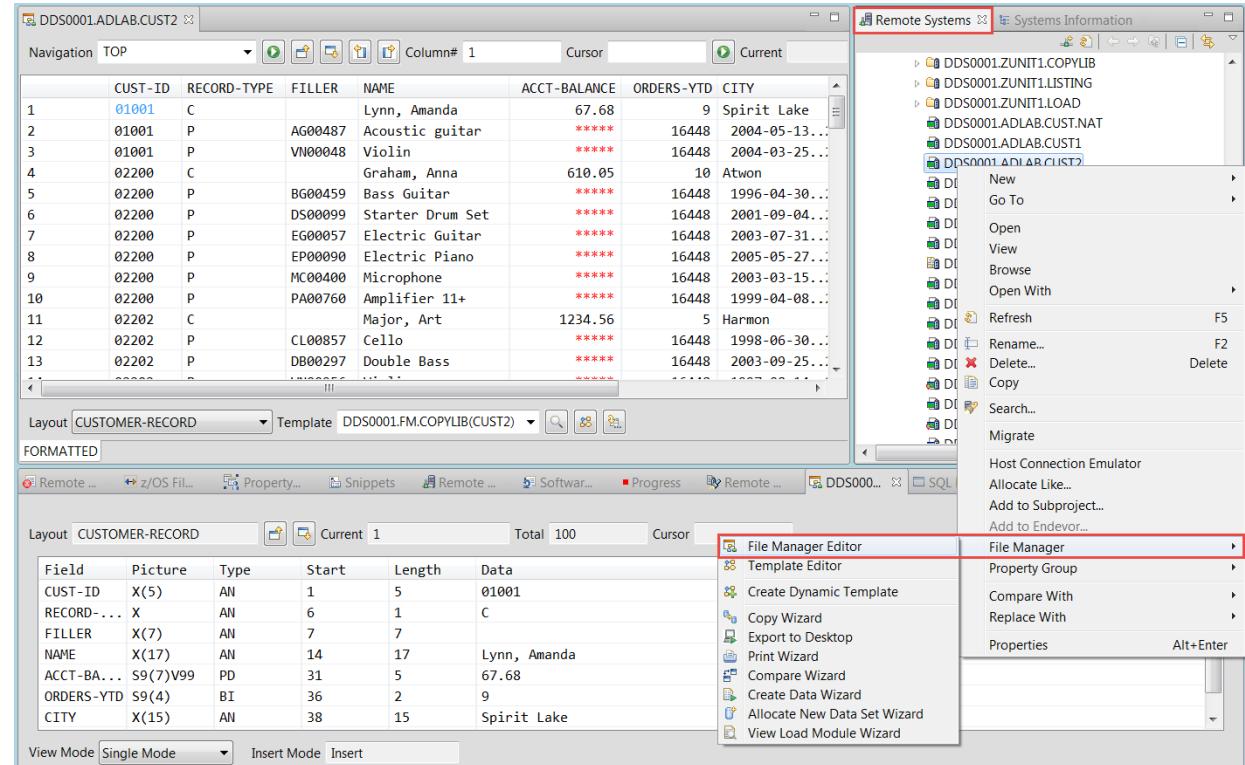
Scramble sensitive data to insure data privacy across all environments

Fully integrated with ADFz

Leverages Eclipse windowing

Detailed File System Explorer

Proven 3270-based interface



File Manager

Edit VSAM (KSDS)

Edit VSAM Files directly from IDz Edit
(Remote Systems view)
Comprehensive File Editing options
Single and Tabular records

The screenshot shows the IDz Edit interface. On the left, a tree view lists remote systems and users: DDS0001.PATDATA, DDS0001.PATINS, Go To, Refresh, Rename..., Delete..., Profile As, Debug As, Run As, Code Coverage As, Host Connection Emulator, Allocate Like..., File Manager, MVS Utilities, and TSO Commands. A context menu is open over a table row for record 00061. The table has columns: Record Number, Carrier, Insured, Type, and Data. The row for 00061 contains INS-0001, MEDICARE, and 9875876548. The context menu includes options like F5, F2, Delete, and several system-related commands. Below the table, a detailed view shows the structure of the record 00061, including fields for Picture, Type, Start, Length, and Data, with values X(6), AN, 1, 6, 00061; X(8), AN, 7, 8, INS-0001; X(30), AN, 15, 30, MEDICARE; and X(10), AN, 45, 10, 9875876548. At the bottom, there are tabs for View Mode (Single Mode) and Insert Mode (Insert).

ADFz - File Manager for z/OS: Highlights and Common Use Cases

Product Features and Highlights

- Edit entire files regardless of size – records cached (similar to ISPF editing)
- Scramble sensitive data to insure data privacy across all environments
- Format data using COBOL, PL/I, or Assembler record layouts
- Quickly locate fields that contain invalid values for correction
- Generate test data based on record layouts
- Compare data/load modules between datasets using field level mapping
- Obtain cross sections of data
 - “N”th select with skipping
 - Selection criteria with AND/OR logic
- View data forwards and backwards in all environments

Common Use Cases and Development Scenarios

- Analyze/Edit/Browse/Copy/Print/Format and Re-Format test data
- SQL Prototyping and Execution – insure correct data for program processing
- Access Files and Storage Queues in CICS
- Quick User Reports of Data
 - Exclude / Show specific columns of data
 - Select only records which meet criteria (i.e. all cities in MN that contain the letter ‘o’)
- Generate XML data
- Intelligent Test data sub-setting
- Export data between different formats – (i.e. VSAM to DB2 or DB2 to Sequential, or Sequential to CSV for use in Spreadsheets)

ADFz - File Manager: Eclipse Perspective

Highlights:

- Integrate directly into ADFz Remote Systems Explorer
... or ...
- Utilize from unique File Manager Perspective ➔

The screenshot displays the ADFz - File Manager perspective within the Eclipse IDE. The interface includes a top menu bar with File, Edit, Navigate, Search, Project, Run, File Manager, Window, and Help. A toolbar with various icons is located above the main workspace.

The left side features the "Systems Information" view, which lists several subsystems and their sub-components:

- Action History
- CICS
 - Browse CICS Systems
- Data Sets
- DB2
 - Browse DB2 Subsystems
- HFS
- IMS
 - Browse IMS Subsystems
 - IMSA:
 - IMSB:
- Message Queue Managers
- zserveros.demos.ibm.com:2800 - Z

A callout bubble highlights "Easy access to:" followed by a list of resources:

- CICS Resources
- ISPF Datasets
- DB2 Tables
- HFS files
- IMS Databases
- MQ Resources

The central area shows a "DNET246.ADLAB.CUST1" table with the following data:

	CUST-ID	NAME	ACCT-BALANCE	ORDERS-YTD	ADDR
1	01001	Lynn, Amanda	610.05	10	89 Clay S
2	02200	Graham, Anna	67.68	9	119 North
		Major, Art	1234.56	5	1512 Pine
		Prentice, Anna	0.00	7	33 Rensha
		Deeds, Darren	71.00	2	610 Brown

A "Formatted file editor" callout points to the right pane, which displays the "IMS Segment Editor" for the "CUST-REC" layout. It shows the following table:

Field	Picture	Type	Start	Length	Data
CUST-ID	X(5)	AN	1	5	01001
NAME	X(17)	AN	6	17	Lynn, Amanda

A "Single record mode editor" callout points to the bottom right of the screen, indicating the current mode of operation.

The status bar at the bottom shows the message "IZE0100I Connected to demomvs.demopkg.ibm.com:2800 - DNET246" and the connection identifier "DEMOMVS".

ADFz - File Manager: Intelligent Editing/Test Data Subsetting

(zserveros) dds0001@zserveros.centers.ihost.com-2800:DDS0001.PATINS X

Navigation LOCATE 333 Column# 1 Cursor Current 251 Total 1000 Edit type FULL

PATIENT-ID COMPANY-PRIMARY-ID CARRIER-NAME CARRIER-PHONE CARRIER-FAX INSURED-NAME INSURED-GI

3 rec...						
244	000244	INS-0004	FIDELITY HEALTH INS.	9874384097	2123437897	GEORGE G ROBERTO M
247	000247	INS-0007	TRAVELERS INSURANCE CORP	9192327897	7764328764	SANJAY S WEBSTER M
251	000251	INS-0001	PROGRESSIVE INSURANCE	6758427647	6912576076	ERIEDA F ALLEN M
255	000255	INS-0005	PENSACOLA MUTUAL			TIMOTHY T LEWIS M
259	000259	INS-0009	FIDELITY HEALTH INS.			PAUL P GARCIA M
262	000262	INS-0002	TRAVELERS INSURANCE CORP			HAYDEN H HARRIS M
266	000266	INS-0006	PROGRESSIVE INSURANCE			GEORGETTE G ANDERSON M
270	000270	INS-0000	PENSACOLA MUTUAL			KELLY K MILLER M
3 rec...						

Layout PATIENT-INSURANCE System (zserveros) dds0001@zserveros.centers.ihost.com-2800:DDS0001.PATINS FORMATTED

z/OS Fil Remote Prop Snippet Remote Remote DDS0001.PATINS

Layout PATIENT-INSURANCE Current 251 Total 1000

Field	Picture	Type	Start	Length	Data
PATIENT-ID	X(6)	AN	1	6	000251
INS-COM...	X(8)	AN	7	8	INS-0001
CARRIER...	X(30)	AN	15	30	PROGRESSIVE
CARRIER...	X(10)	AN	45	10	6758427647

Template Record Filter applied

Compare With

- Switch Mode Alt+M
- Page Up F7
- Page Down F8
- Page Left F10
- Page Right F11
- Copy Records Ctrl+Shift+C
- Lookup Selected Text
- Cut Records Ctrl+Shift+X
- Paste Records Ctrl+Shift+V
- Insert Records Ctrl+Shift+I
- Delete Records Ctrl+Shift+D
- Find/Replace Ctrl+Shift+F
- Locate Column Ctrl+Shift+L
- Sort Records Alt+S
- Hex on/off
- Validate Records
- Show Options
- Exclude Records
- Reset Excludes
- Save Records Ctrl+S
- SaveAs Records Ctrl+Alt+Shift+S
- Validate
- Software Analysis
- Team

Remote Sys Systems Info Type here to search the tree (Ctrl+F)

zserveros.centers.ihost.com:2800 - zserveros

- Fault Analyzer for z/OS
 - Browse History Files
- Action History
 - Recent Actions
 - Edit Template
 - View/Edit DB2 Object
 - View/Edit Resource
- CICS
- Data Sets
 - Browse My Data Sets
 - DDS0001:**
 - DDS0001:**
- DB2
 - Browse DB2 Subsystems
 - DB1D: ** not defined in install
 - DB1I: ** not defined in install
 - DB2: ** defined in install

Copy paste VSAM record values into DB2 Table rows

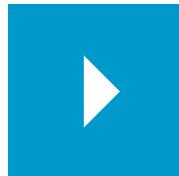
Create File Data Subset for specific testing

0001@zserveros.centers.ihost.com-2800:DB2:TBL:DSNA:DDS0001.ENTRANTS X

NAME	ENTRANT_AGE	SEX	ADDR	BRACKET
JACOBS	29	M	155 ELM STREET	0
IZABETH HAWKINS	32	F	1087 FERRY COURT	S
AN JOHNSON	38	M	11 PICCARD DRIVE	S
STARON	19	M	458 MAIN STREET	J

UNIT

ADFz – IDz – Introduction



Topics:

- Product
- Benefits - What's in it for me?
- DevOps and ADFz - What's in it for me?
- IDz Deep Dive
- ADFz – File Editing and Extract and Management Tools
- **ADFz – ABEND Resolution Tools**
- ADFz – Application Performance Analysis Tools
- Application Discovery (AD) integration with ADFz
- IMS-specific Tooling
- CICS-specific Tooling

Fault Analyzer
for z/OS

Developer for z
Systems Enterprise
Edition
IDz

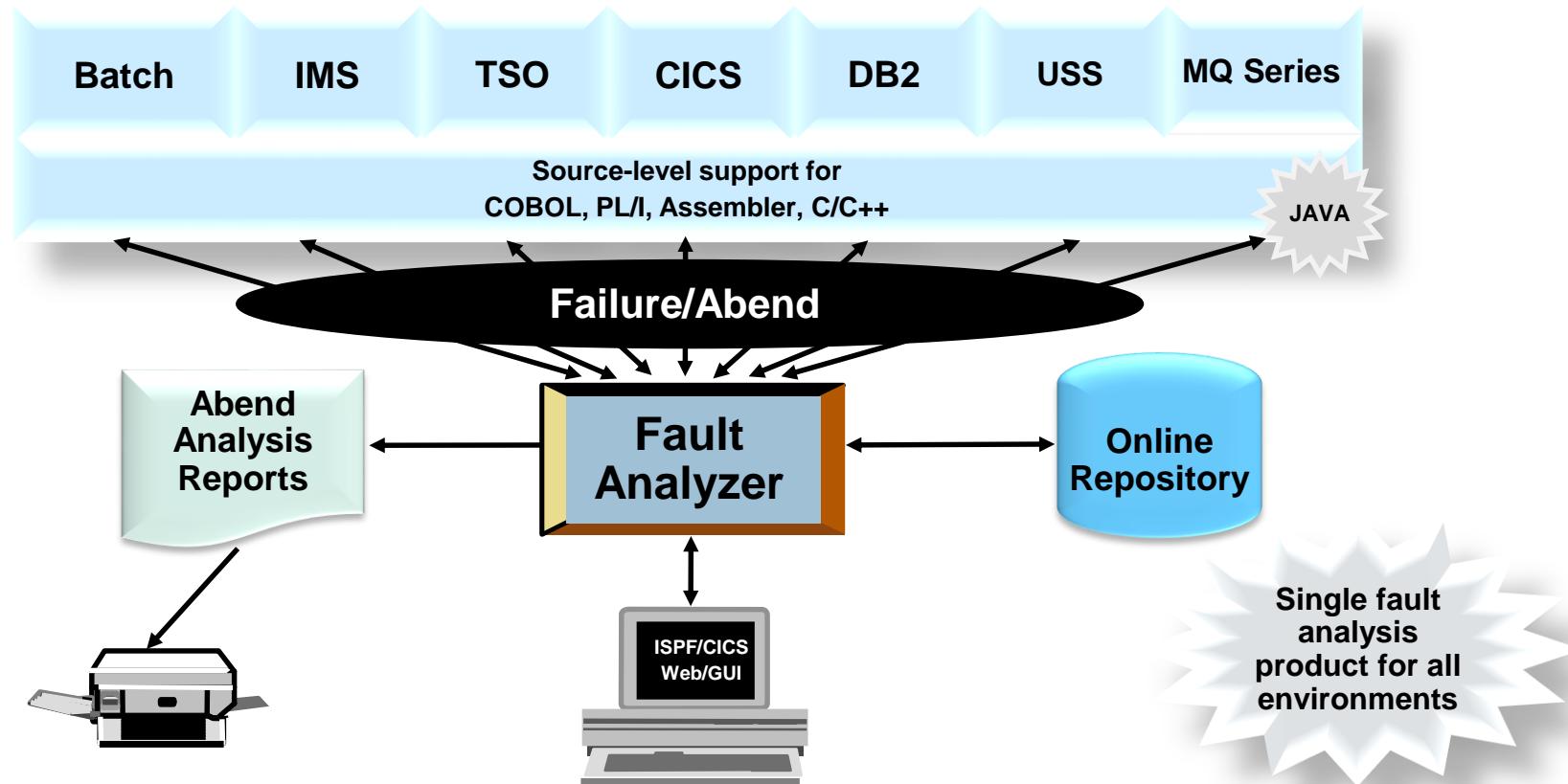
Application
Delivery
Foundation for
z Systems

File Manager for
z/OS

Application
Performance
Analyzer for z/OS

Fault Analyzer –

Helps you rapidly pinpoint why and where an application failed



ADFz - Fault Analyzer

- **IBM Fault Analyzer** improves developer productivity and decreases deployment costs by helping to analyze and correct application failures quickly (CICS,DB2,IMS,MQ,COBOL,PLI,ASM, C/C++,JAVA)

- Automatic program abend capture and reporting
- Program source-level reporting
- Provides a detailed report about program failures to help resolve them quickly
- Enables you to track and manage application failures and fault reports
- Integration with ADFz and 3270-based Interface

Report
Outline
Hyperlinks

The screenshot shows the IBM Fault Analyzer interface with several windows open:

- Fault Analyzer - FaultAnalyzer/9.30.128.24/3960/IDI.HIST/F00836.F00836.fam1**: The main window title.
- File Manager**: Shows a file tree for the project.
- 9.30.128.24:3960/IDI.HIST(F00836)-Report**: The report window containing:
 - Line 11: 11
 - Line 12: 12 A decimal digit or sign was invalid.
 - Line 13: 13
 - Line 14: 14 The cause of the failure was program SAM2 in module SAM2. The COBOL source code that immediately preceded the failure was:
 - Line 15: 15
 - Line 16: 16
 - Line 17: 17 Source Line #
 - Line 18: 18 -----
 - Line 19: 19
 - Line 20: 20 000088 * *** Add this customer's BALANCE to the grand total ***
 - Line 21: 21 000089 COMPUTE BALANCE-TOTAL =
 - Line 22: 22 000090 BALANCE-TOTAL + CUST-ACCT-BALANCE
 - Line 23: 23
 - Line 24: 24 The COBOL source code for data fields involved in the failure:
 - Line 25: 25
 - Line 26: 26 Source Line #
 - Line 27: 27
- Report – Hyperlinks to program source file**: A callout box pointing to the report window.
- 9.30.128.24 : 3960/IDI.HIST.CICSC41F**: A table showing a list of fault (ABEND) entries:

FAULT_ID	JOB/TRAN	USER_ID	SYS/JOB	ABEND	T_ABEND	JOB_ID	JOBNAME	USERNAME
F00056	CICSC41F/PSC1	KPHUME	STLAF6 /CICSC41F	DHTJ	DHTJ	STC02738	CICSC41F	
F00055	CICSC41F/PSC1	KPHUME	STLAF6 /CICSC41F	DHAI	DHAI	STC02738	CICSC41F	
F00054	CICSC41F/PSC1	KPHUME	STLAF6 /CICSC41F	ADCI	ADCI	STC02738	CICSC41F	
F00053	CICSC41F/PSC1	KPHUME	STLAF6 /CICSC41F	ADCI	ADCI	STC00997	CICSC41F	
F00052	CICSC41F/CFA	TSS21	STLAF6 /CICSC41F	FLT2	AEXZ	STC09911	CICSC41F	
F00051	CICSC41F/PSC1	MACHIND	STLAF6 /CICSC41F	ADCI	ADCI	STC09636	CICSC41F	

- List of fault (ABEND) entries**: A callout box pointing to the table.

ADFz - Fault Analyzer Reports and IDz Integration

Additional
ABEND
resolution
assistance →

Available
ABEND reports →

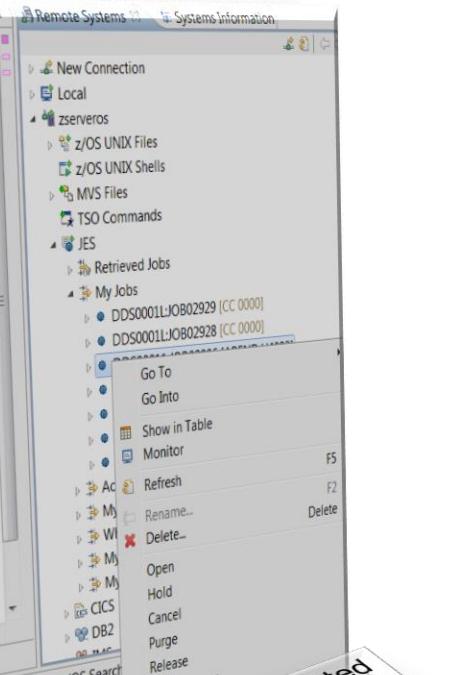
ABEND cause →

```
10 2 Module SAM2, program SAM2, offset X'866': Abend S0C7 (Data Exception)
11 3 IBM FAULT ANALYZER SYNOPSIS
12
13 A system abend 0C7 occurred in module SAM2 program SAM2 at offset X'866'.
14 A program-interruption code 0007 (Data Exception) is associated with this abend
15 and indicates that:
16   A decimal digit or sign was invalid.
17 13 The abend was caused by machine instruction FA4530178000 (ADD DECIMAL).
18
19 Recently referenced data items:
20
21 Data Item . . . . . : BLL=0001+017
22 At Address. . . . . : 230B917F
23 Length. . . . . . . . : X'5'
24 Data Item Storage . . . : 7C7B5B6C 50 *#@%$%&*
25
26 Data Item . . . . . : BLW=0000+000
27 At Address. . . . . : 230BB0C0
Length. . . . . . . . : X'6'
Data Item Storage . . . : 00000000 789C *.....*
```

NOTE: Source code information for program SAM2 could not be presented because no

Main Report Event Details Abend Information System-Wide Information Miscellaneous

FAULT_ID	JOB/TRAN	USER_ID	ADPOT28	SYS/JOB	ABEND	LABEND	JOB_ID	JOBNAME	USERNAME
F01192	ADPOT28T	AZKS	ESYMSVS	S0C7	S0C7	STC02716	ADPOT28T		
F02967	AZKS	CICSUSR	ESYMSVS	S222	S0C4	STC00726	AZKS	CICSAOR1	
F02973	DBMO	CICSUSR	CICSAOR1	AD2R	AICG	STC05494	CICSAOR1		
F02919	DBMO	CSAYLES	CICSAOR1	AICG	S0C7	JOBO1920	RTPOT02L		
			ESYMSVS	U0688	U0688	JOBO1673	IMSBMSG3		
			ESYMSVS2	U0071	U0071	JOBO4855	DDS00274		
			ESYMSVS	U0071	U0071	JOBO4721	DDS00274		
			ESYMSVS	U0071	U0071	JOBO4705	DDS00275		
			ESYMSVS	U0041	U0041	JOBO6240	DDS27001		



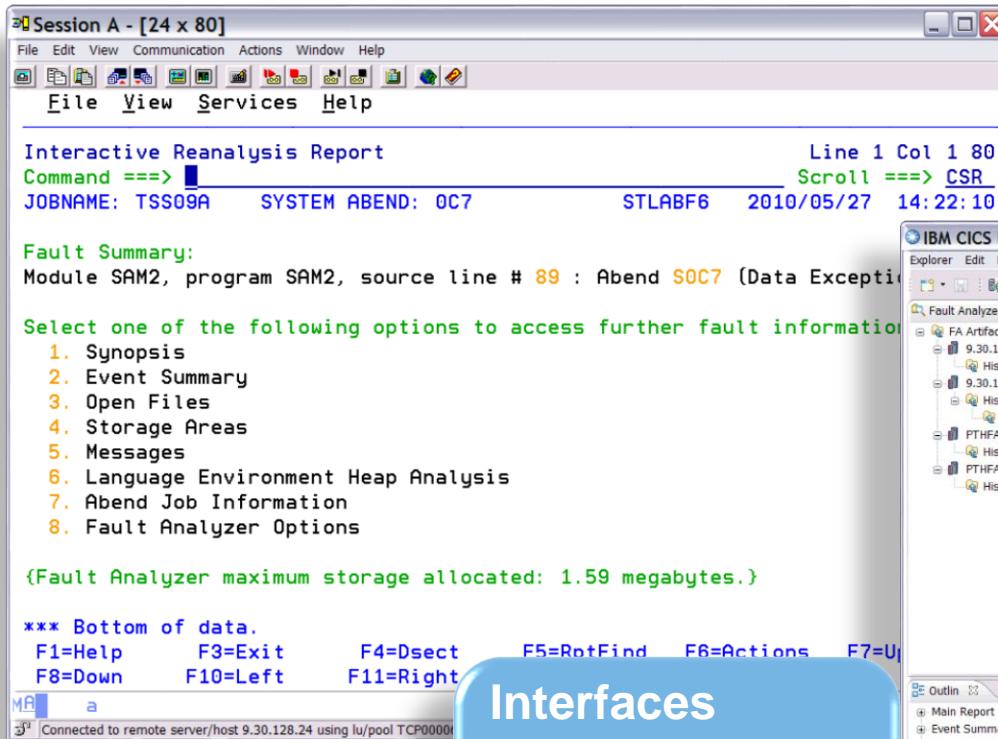
Integrated
w/IDz
Remote
Systems

ADFz - Fault Analyzer: Features and Common Usage Scenarios

- Can be invoked directly from ADFz Remote Systems
- Analysis at the application level translating low level information into application level information
 - Tells the developer:
 - What happened, and why?
 - What program?
 - What line of source code?
 - What source variables were involved?
- Expands abend code and message descriptions – no need to look up
- No recompile of applications
- No JCL changes
- No performance overhead
- Source does not have to be available at the time of the Abend

- Integrates with the ADFz “Lookup” view – a compendium of ABEND Codes for: MVS, IMS, CICS, DB2
- Supports Multiple History Files to store Abends
 - Production .v Test
 - SYSA .v. SYSB
 - HR .v. ACCTS
 - Batch .v. Online
 - Secure sensitive information
- Technically Up-To-Date
 - CICS TS Channels and containers in 64-bit storage
 - DB2
 - IMS
- Synergy across PD Tool Products
 - Shares Source Repository
 - File Manager
 - Can be Invoked in Debug Tool

ADFz - Fault Analyzer for z/OS: Multiple Interfaces and Operational Modes



Interfaces

- ADFz/IDz
- ISPF
- CICS Explorer
- Web

Modes Of Operation

- Real-time analysis
- Batch dump re-analysis
- Interactive dump re-analysis

The screenshot shows the IBM CICS Explorer interface with the following details:

- Title Bar:** IBM CICS Explorer
- Toolbar:** Explorer, Edit, Run, Window, Help
- Left Panel:** FA Artifacts tree view showing nodes for 9.30.128.24:23, 9.30.128.24:8000, and PTHFAE1:7007.
- Central Panel:**
 - Browse Dump
 - Fault Summary
 - Synopsis

Module SAM2, program SAM2, source line # 89 : Abend SOC7 (Data Exception)

IBM FAULT ANALYZER SYNOPSIS

A system abend 0C7 occurred in module SAM2 program SAM2 at offset X'39A'.
A program-interruption code 0007 (Data Exception) is associated with this abend and indicates that:
A decimal digit or sign was invalid.
The cause of the failure was program SAM2 in module SAM2. The COBOL source code that immediately preceded the failure was:
- Bottom Panel:** Main Report, Event Summary, Abend Job Information, System Wide Information, Misc Information, Test, Lookup, Column Configuration.

Integration/Accelerated delivery: Fault Analyzer and File Manager

- Quick access to lookup ABEND code explanation for failed jobs
- Quick access to Fault Analyzer ABEND analysis report while browsing job output
- Quick access to display the contents of a PDS or PDS/E as Fault Analyzer history file
- Access to additional resource types: VSAM/QSAM, DB2, IMS, CICS TS (TS queues and TD queues), WebSphere MQ and access to formatted editor and utility functions

The screenshot shows the IBM Systems Information interface. On the left, there's a navigation tree with nodes like 'Remote Systems', 'Team', 'Systems Information', 'z/OS UNIX Files', 'MVS Files', 'TSO Commands', 'JES', 'Retrieved Jobs', 'My Jobs', 'Active Jobs', 'T's, and several entries under 'TRYIT' and 'TERSE'. Below the tree are icons for 'CICS', 'DB2', 'IMS', and 'Message Queue Managers'. At the bottom, there are tabs for 'Properties', 'Remote Scratchpad', and a 'Properties' table with columns 'Property' and 'Value'.

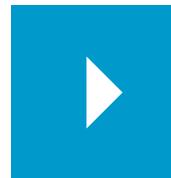
The main window displays a spool file titled 'DAPLB559:JOB48435.spool'. The log content includes:

```
1 J E S 2 J O B L O G -- S Y S T E M F A E 1 -- N O D E P T H A P E 0
2
3 14.07.33 JOB48435 ---- THURSDAY, 14 APR 2016 ----
4 14.07.33 JOB48435 IRR010I USERID TRAVIST IS ASSIGNED TO THIS JOB.
5 14.07.33 JOB48435 ICH70001I TRAVIST LAST ACCESS AT 14:07:07 ON THURSDAY, APRIL 14, 2016
6 14.07.33 JOB48435 $HASP373 DAPLB559 STARTED - INIT 21 - CLASS 7 - SYS FAE1
7 14.07.33 JOB48435 IEF403I D Show In ▾%W ▶
8 14.07.33 JOB48435 -
9 14.07.33 JOB48435 -JOBNAME Copy 36C CPU SRB CLOCK SERV PG PAGE SWAP VIO SWAP:
10 14.07.33 JOB48435 -DAPLB559 .00 .00 .00 105 0 0 0 0 0 0 0
11 14.07.33 JOB48435 -DAPLB559 .00 .00 .00 99 0 0 0 0 0 0 2
12 14.07.33 JOB48435 -DAPLB559 .00 .00 .00 133 0 0 0 0 0 0 0
13 14.07.34 JOB48435 -DAPLB559 .00 .00 .00 3781 0 4 0 0 0 0 4
14 14.07.34 JOB48435 -DAPLB559 .00 .00 .00 935 0 0 0 0 0 0 3
15 14.07.34 JOB48435 -DAPLB559 .00 .00 .00 436 0 0 0 0 0 0 0
16 14.07.34 JOB48435 +IDI00011 .00 .00 .00 1/13) invoked by IDIXCEE using SYS1.PARMLIB.FAE1.USERC
17 14.07.35 JOB48435 +EQAUEDA1 Open Fault Analyzer Report
18 14.07.35 JOB48435 +EQAUEDA1
19 14.07.35 JOB48435 +EQAUEDA1 Preferences...
20 14.07.35 JOB48435 +IDI0002I Module DAPLB503, program DAPLB503, compiler listing file 591
21 591 CTEST.DALEXPLE.IDILANGX.DAPLB559 statement # 29: Abend S0C9
22 591 (Fixed-Point-Divide Exception)
23 14.07.35 JOB48435 +IDI0003I Fault ID F41619 assigned in history file CTEST.DALEXPLE.FAE1
24 14.07.35 JOB48435 -DAPLB559 GO 3000 5564 .00 .00 .02 18263 0 0 0 0 4 0
25 14.07.36 JOB48435 -DAPLB559 DARUN 00 4299 .00 .00 .01 7738 0 0 0 0 2 0
26 14.07.36 JOB48435 -DAPLB559 NOABEND FLUSH 0 .00 .00 .00 0 0 0 0 0 0 0 0
```

A context menu is open over the log entry for line 17, with options: Go To, Go Into, Show in Table, Monitor, Refresh (F5), Rename..., Delete..., Open, Hold, Cancel, Purge, Release, Refresh Status, Show JCL (SJ), Resubmit, Fault Analyzer, and Lookup abend code. The 'Lookup abend code' option is highlighted with a blue arrow.

UNIT

ADFz – IDz – Introduction



Topics:

- Product
- Benefits - What's in it for me?
- DevOps and ADFz - What's in it for me?
- IDz Deep Dive
- ADFz – File Editing and Extract and Management Tools
- ADFz – ABEND Resolution Tools
- **ADFz – Application Performance Analysis Tools**
- Application Discovery (AD) integration with ADFz
- IMS-specific Tooling
- CICS-specific Tooling

Developer for z
Systems Enterprise
Edition
IDz

Fault Analyzer
for z/OS

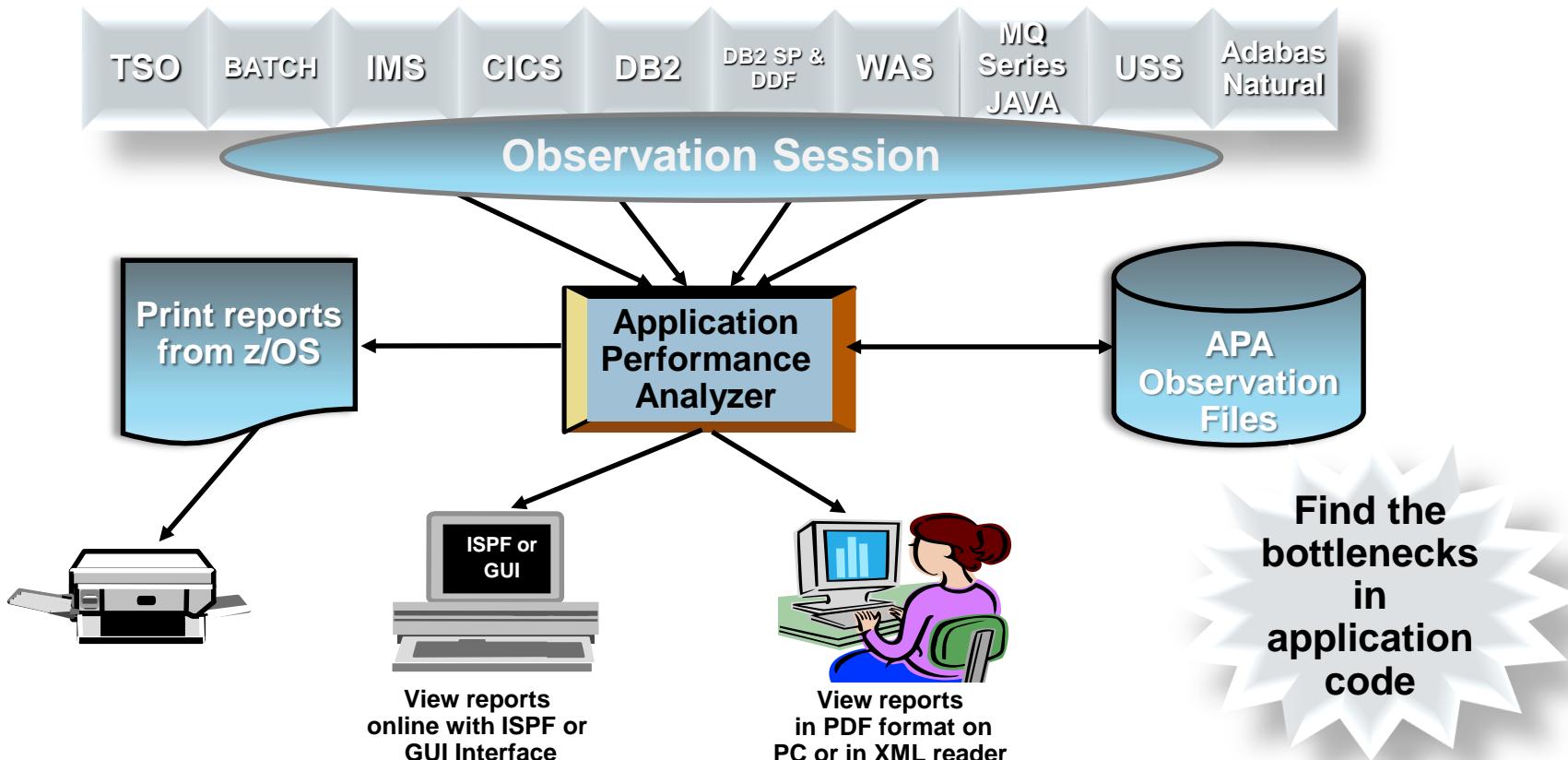
Application
Delivery
Foundation for
z Systems

File Manager for
z/OS

Application
Performance
Analyzer for z/OS

IBM Application Performance Analyzer for z/OS

Provides rapid pinpointing of enterprise application bottlenecks

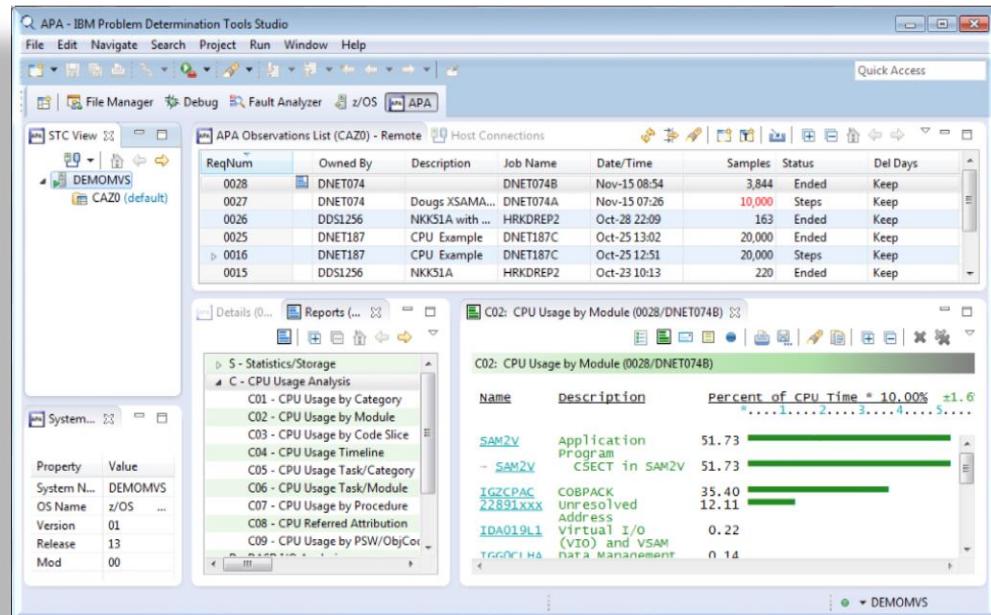


ADFz - IBM Application Performance Analyzer for z/OS

▪ IBM Application Performance Analyzer

helps maximize the performance of your applications and improve the response time of your online applications and batch turnaround

- Identify constraints and improve the entire application's performance no matter where the problem resides (CICS,IMS,DB2,MQ,COBOL,PLI, ASM,JAVA)
- Displays overall system activity, enabling you to check job execution online and select which active job to monitor
- Automatically starts to monitor job performance when the job or program becomes active
- Provides multiple summary reports to assist in identifying key areas of performance bottlenecks
- Integration with ADFz and 3270-based Interface



- APA is a tool that helps you perform *application performance tuning* for applications running on z/OS systems
- What is *application performance tuning*?
 - The process of minimizing the amount of time and system resources (CPU, IO, and so on) that an application uses

Application Performance Analyzer Features (Detailed)

▪ Types of Observation Sessions

- Real-Time, Scheduled
- Via batch submission

▪ Non-intrusive performance analyzer used to:

- Improve response time in online applications
- Improve batch turn around time
- Identify excessive I/O activity
- Identify excessive CPU usage
- Test the effects of increasing workload
- Isolate performance problems in new and existing applications

▪ Language support for: Assembler, C/C++ , COBOL, PL/I

- Optimized code support for COBOL & PL/I – enables monitoring of production applications

▪ Automatic Monitoring of:

- Active jobs
- Scheduled jobs

Online Performance Reporting:

- Multiple summary reports available
- Assists in identifying key areas of performance bottlenecks
- Print Reports as:
 - Adobe PDF file
 - XML file

Performance analysis by:

- CPU usage
- Referred attribution
- Wait time by task, category and module

64-Bit support: Sixty-four bit memory use is now reported

Subsystem Monitoring:

• *DB2 monitoring:*

- CPU ,Wait and Service time by:
 - ✓ DBRM
 - ✓ SQL statements
 - ✓ Plan Name
- DB2 Stored procedures written in JAVA

• *CICS monitoring:*

- Service time by Trans, Task ID, Terminal, User
- CPU usage by program and transaction
- Wait time by transaction

• *IMS Application monitoring:*

- CPU, Wait and Service Times by:
 - ✓ Program Specification Block
 - ✓ Transaction
 - ✓ DLI Calls

• *WAS monitoring:*

- Overall WAS requests activity
- EJB activity by origin and servant
- Servlet/JSP activity by origin and servant

• *WebSphere MQ monitoring:*

- CPU, Wait and Service time by:
 - ✓ Queue
 - ✓ Request
 - ✓ Transaction

ADFz – APA: Sample Reports and Analysis

Two screenshots of the IBM Problem Determination Tools Studio (APA) interface are shown side-by-side.

Left Screenshot: This screenshot shows the main workspace of the APA interface. It includes:

- A top menu bar: File, Edit, Navigate, Search, Project, Run, Window, Help.
- A toolbar with various icons for file operations.
- An "STC View" window showing host connections and a tree view of system components.
- A "File Manager" window showing a directory structure.
- A "Debug" window showing a stack trace or similar information.
- A "Fault Analyzer" window showing error logs.
- A central pane titled "APA Observations List (CAZ0) - Remote" displaying a table of observations:

ReqNum	Owned By	Description	Job Name	Date/Time	Samples
0028	DNET074	Doug's XSAMA...	DNET074A	Nov-15 08:54	3,844
0027	DNET074	Doug's XSAMA...	DNET074A	Nov-15 07:26	10,000
0026	DDS1256	NKK51A with ...	HRKDREP2	Oct-28 22:09	163
0025	DNET187	CPU Example	DNET187C	Oct-25 13:02	20,000
0016	DNET187	CPU Example	DNET187C	Oct-25 12:51	20,000
0015	DDS1256	NKK51A	HRKDREP2	Oct-23 10:13	220

- A "Reports..." window showing a list of CPU usage analysis reports:

 - S - Statistics/Storage
 - S01 - Measurement Profile
 - S02 - Load Module Attributes
 - S03 - Load Module Summary
 - S04 - TCB Summary
 - S05 - Memory Usage Timeline
 - S06 - Data Space Usage Timeline
 - S07 - TCB Execution Summary
 - S08 - Processor Utilization Summary
 - S09 - Measurement Analysis
 - C - CPU Usage Analysis
 - C01 - CPU Usage by Category
 - C02 - CPU Usage by Module
 - C03 - CPU Usage by Code Slice
 - C04 - CPU Usage Timeline
 - C05 - CPU Usage Task/Category
 - C06 - CPU Usage Task/Module
 - C07 - CPU Usage by Procedure
 - C08 - CPU Referred Attribution
 - C09 - CPU Usage by PSW/Object
 - D - DASD I/O Analysis
 - W - CPU WAIT Analysis
 - G - Coupling Facility
 - J - Java Measurement

Right Screenshot: This screenshot shows the results of a measurement profile (S01) for job DNET074A. It includes:

- A top menu bar: File, Edit, Navigate, Search, Project, Run, Window, Help.
- A toolbar with various icons for file operations.
- A left sidebar showing the same list of reports as the left screenshot.
- A main pane titled "S01: Measurement Profile (0076/DNET074A)" containing several charts and tables:

 - Overall CPU Activity:** A chart showing CPU Active (5,582), Application (2,814), System (2,026), DB2 SQL (0), Data Mgmt (110), Unresolved (632), and IMS DLI Call (0) samples across 10,000 total samples. The overall activity is 55.8%.
 - CPU Usage Distribution:** A chart showing the distribution of CPU Active, Application, System, DB2 SQL, Data Mgmt, Unresolved, and IMS DLI Call samples.
 - Most CPU Active Modules:** A chart showing the top modules: CPU Active (5,582), SAM2V (2,813), IGZCPAC (1,853), IDA019L1 (211), IEAVELK (33), and IAXPQ (7). The overall activity is 100.0%.
 - Most CPU Active CSECTS:** A chart showing the top CSECTS: CPU Active (5,582), SAM2V (2,813), in SAM2V (1,852), IGZCPAC (3,762), and IGZCXDI (0.5%). The overall activity is 100.0%.

ADFz – APA: Easy drill down to show source statements in problem areas

APA - IBM Problem Determination

C01: CPU Usage by Category Source Program Mapping (0076/DNET074A)

File Edit Navigate Search

LineNo Offset Prcnt Source Statement

92 line(s) not displayed

050-CALC-BALANCE-STATISTICS.
MOVE 0 TO LOOP-COUNT.
PERFORM 100-CRUNCH-LOOP
UNTIL LOOP-COUNT > CRUNCH-CPU-LOOPS .

100-CRUNCH-LOOP.
MOVE 'CALCULATING BALANCE STATS' TO WS-PROGRAM-STATUS.
* *** Increment Record Count ***
ADD +1 TO BALANCE-COUNT
* *** Add this customer's BALANCE to the grand total ***
COMPUTE BALANCE-TOTAL =
BALANCE-TOTAL + CUST-ACCT-BALANCE
* *** Calculate Average ***
COMPUTE BALANCE-AVERAGE =
BALANCE-TOTAL / BALANCE-COUNT
* *** Calculate Minimum ***
IF WS-FIRST-TIME-SW = 'Y'
MOVE CUST-ACCT-BALANCE TO BALANCE-MIN.
IF CUST-ACCT-BALANCE < BALANCE-MIN
MOVE CUST-ACCT-BALANCE TO BALANCE-MIN.
* *** Calculate Maximum ***
IF WS-FIRST-TIME-SW = 'Y'
MOVE CUST-ACCT-BALANCE TO BALANCE-MAX.
IF CUST-ACCT-BALANCE > BALANCE-MAX
MOVE CUST-ACCT-BALANCE TO BALANCE-MAX.
* *** CALCULATE RANGE ***
COMPUTE BALANCE-RANGE = BALANCE-MAX - BALANCE-MIN.
ADD 1 TO LOOP-COUNT.

500-INIT-STATISTICS.

APA Report hyper-links...to source →

LineNo	Offset	Prcnt	Source Statement
000093			050-CALC-BALANCE-STATISTICS.
000094	000388		MOVE 0 TO LOOP-COUNT.
000095	000392	1.75	PERFORM 100-CRUNCH-LOOP
000096			UNTIL LOOP-COUNT > CRUNCH-CPU-LOOPS .
000097			
000100			100-CRUNCH-LOOP.
000101	0003D6	5.39	MOVE 'CALCULATING BALANCE STATS' TO WS-PROGRAM-STATUS.
000102			* *** Increment Record Count ***
000103	0003EE	13.88	ADD +1 TO BALANCE-COUNT
000104			* *** Add this customer's BALANCE to the grand total ***
000105			COMPUTE BALANCE-TOTAL =
000106	000416	19.04	BALANCE-TOTAL + CUST-ACCT-BALANCE
		40.68	* *** Calculate Average ***
			COMPUTE BALANCE-AVERAGE =
000107			BALANCE-TOTAL / BALANCE-COUNT
000108			* *** Calculate Minimum ***
000109	00045E	.26	IF WS-FIRST-TIME-SW = 'Y'
000110	00046E		MOVE CUST-ACCT-BALANCE TO BALANCE-MIN.
000111	000478	.91	IF CUST-ACCT-BALANCE < BALANCE-MIN
000112	00048A		MOVE CUST-ACCT-BALANCE TO BALANCE-MIN.
000113			* *** Calculate Maximum ***
000114	000494	.19	IF WS-FIRST-TIME-SW = 'Y'
000115	0004A4		MOVE CUST-ACCT-BALANCE TO BALANCE-MAX.
000116	0004AE	.94	IF CUST-ACCT-BALANCE > BALANCE-MAX
000117	0004C0		MOVE CUST-ACCT-BALANCE TO BALANCE-MAX.
000118			* *** CALCULATE RANGE ***
000119	0004CA	2.93	COMPUTE BALANCE-RANGE = BALANCE-MAX - BALANCE-MIN.
000120	0004DC	4.62	ADD 1 TO LOOP-COUNT.
000121			
000122			500-INIT-STATISTICS.

1:18

Sample Reports

K01- CPU SRB Usage by SRB Type

APA - IBM Explorer for z/OS

Name	Description	ZTIP	ZAAP	GPU	Total
ENCLAVE Enclave SRBs					
- DSNVSRX	Agent Services Manager	0.00	0.00	88.52	88.52
- DSNVSRX	Agent Services Manager	0.00	0.00	7.05	7.05
- PREEMPTABLE	Preemptable SRBs	0.00	0.00	5.29	5.29
- DSNVSRX	Agent Services Manager	0.00	0.00	2.94	2.94
- DSNVSRX	Agent Services Manager	0.00	0.00	2.35	2.35
- NON-PREEMPT	Non-Preemptable SRB	0.00	0.00	3.82	3.82

K02- CPU SRB Usage by PSW/ObjCode

APA - IBM Explorer for z/OS

Address	Module	AM	S/P	AS	ASID	Percent of CPU Time * 10.00%	±5.4%
1B08060C	DSNXGRDS	64	S7	005E		3.31	
15C04292	Unknown	31	S7			3.01	
19F45D1C	DSNIDM	64	S7	005E		2.71	
00E1E68B	IEAVELK	31	S0			2.10	
00C9E5F0	DSNIDR	64	S0			2.10	
19F29D3A	DSNIDM	64	S7	005E		2.10	
19538A30	DSNLILMM	64	S7			1.80	
1710334C	EZBTINI	64	S6			1.80	
01382BEA	IEAVPMCS	31	S0			1.80	
1950E86	DSNLILMM	64	S7			1.50	
1A133178	DSNIDM	64	S7	005E		1.50	
1735A298	EZBTINI	64	S6			1.50	
1ADD10AD	DSNXGRDS	64	S7	005E		1.50	
1953603B	DSNIDM	64	S7			1.50	
1953603B	DSNLILMM	64	S7			1.50	
ABAC4CD8	DSNXGRDS	64	S7	005E		1.20	
01054B60	IEAWUWQA	64	S0			1.20	

B13 - Async Work Requests

APA - IBM Explorer for z/OS

Package/Class	Request Count	--CPU Time-- Total	--SVC Time-- Mean
00001 com.ibm.ws.asyncbeans.C0	101	2.59	0.02573
worklistenerRunnable			0.20
- 00001 wmbretwml	101	2.59	0.02573
00002 /wastester/Asyncservlet	24	25.64	1.08833
- 00002 wmbretwml	24	25.64	1.08833
00003 com.banknet.wastester.ser	9	28.81	3.20112
vlets.AsyncServletTester2			117.53
- 00002 wmbretwml	9	28.81	3.20112

Q11 – MQ+ Activity Timeline

APA - IBM Explorer for z/OS

Seqno	Call	Location	Msg Len.	Call Time	Svc Time	CPU Time
00001	Get	IMSQAPGM+F1E	80	17:10:16.52	0.00074	0.00022
00002	Close	IMSQAPGM+F1E	0	17:10:16.53	0.00021	0.00022
00003	Open	IMSQAPGM+F1E	0	17:10:16.58	0.00066	0.00015
00004	Put	IMSQAPGM+E4A	80	17:10:16.88	0.00103	0.00080
00005	Get	IMSQAPGM+F1E	80	17:10:16.88	0.00105	0.00080
00006	Close	IMSQAPGM+F46	0	17:10:16.88	0.00023	0.00021
00007	Open	IMSQAPGM+F1E	80	17:10:17.21	0.00048	0.00048
00008	Put	IMSQAPGM+F1E	80	17:10:17.21	0.00079	0.00019
00009	Get	IMSQAPGM+F1E	80	17:10:17.21	0.00667	0.00663
00010	Close	IMSQAPGM+F1E	0	17:10:17.21	0.00222	0.00019
00011	Open	IMSQAPGM+F1E	0	17:10:17.64	0.00551	0.00551
00012	Put	IMSQAPGM+E1A	80	17:10:17.64	0.00077	0.00072
00013	Get	IMSQAPGM+F1E	80	17:10:17.64	0.00073	0.00070
00014	Close	IMSQAPGM+F46	0	17:10:17.64	0.00020	0.00019
00015	Open	IMSQAPGM+F1E	0	17:10:18.04	0.00098	0.00054
00016	Put	IMSQAPGM+E4A	80	17:10:18.04	0.00139	0.00095
00017	Get	IMSQAPGM+F1E	80	17:10:18.04	0.00235	0.00082
00018	Close	IMSQAPGM+F46	0	17:10:18.04	0.00018	0.00018

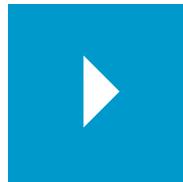
Q12 - MQ+ CPU/SVC Time by Queue

APA - IBM Explorer for z/OS

Name	Description	Nbr of Calls	--CPU Time-- Total	--CPU Time-- Mean	--SVC Time-- Total	--SVC Time-- Mean
CSQR	SYSTEM.DEFAULT.LOCAL.QUEUE	470	0.23	0.00050	0.27	0.00059
- PUT	IMSQAPGM+E1A	117	0.08	0.00071	0.09	0.00083
- GET	IMSQAPGM+E1E	118	0.07	0.00064	0.08	0.00074
- OPEN	IMSQAPGM+D82	117	0.05	0.00048	0.06	0.00057
- CLOSE	IMSQAPGM+F46	118	0.02	0.00019	0.02	0.00021

UNIT

ADFz – IDz – Introduction

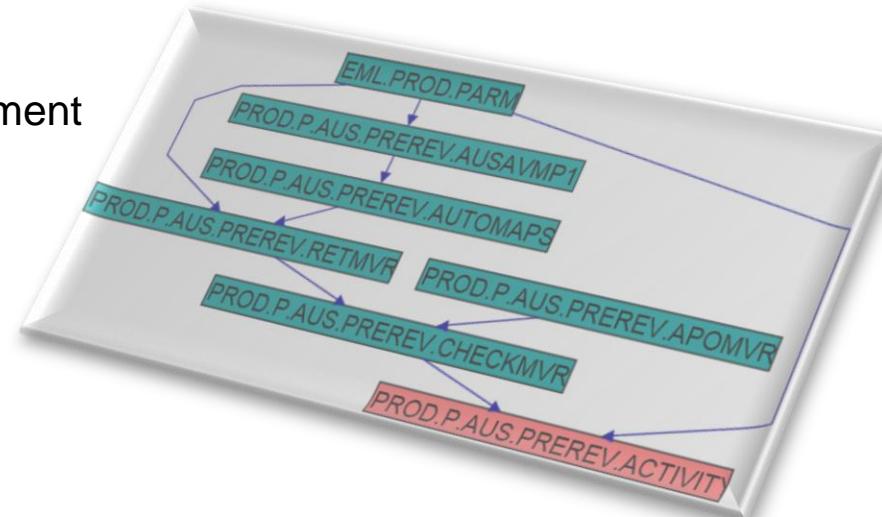


Topics:

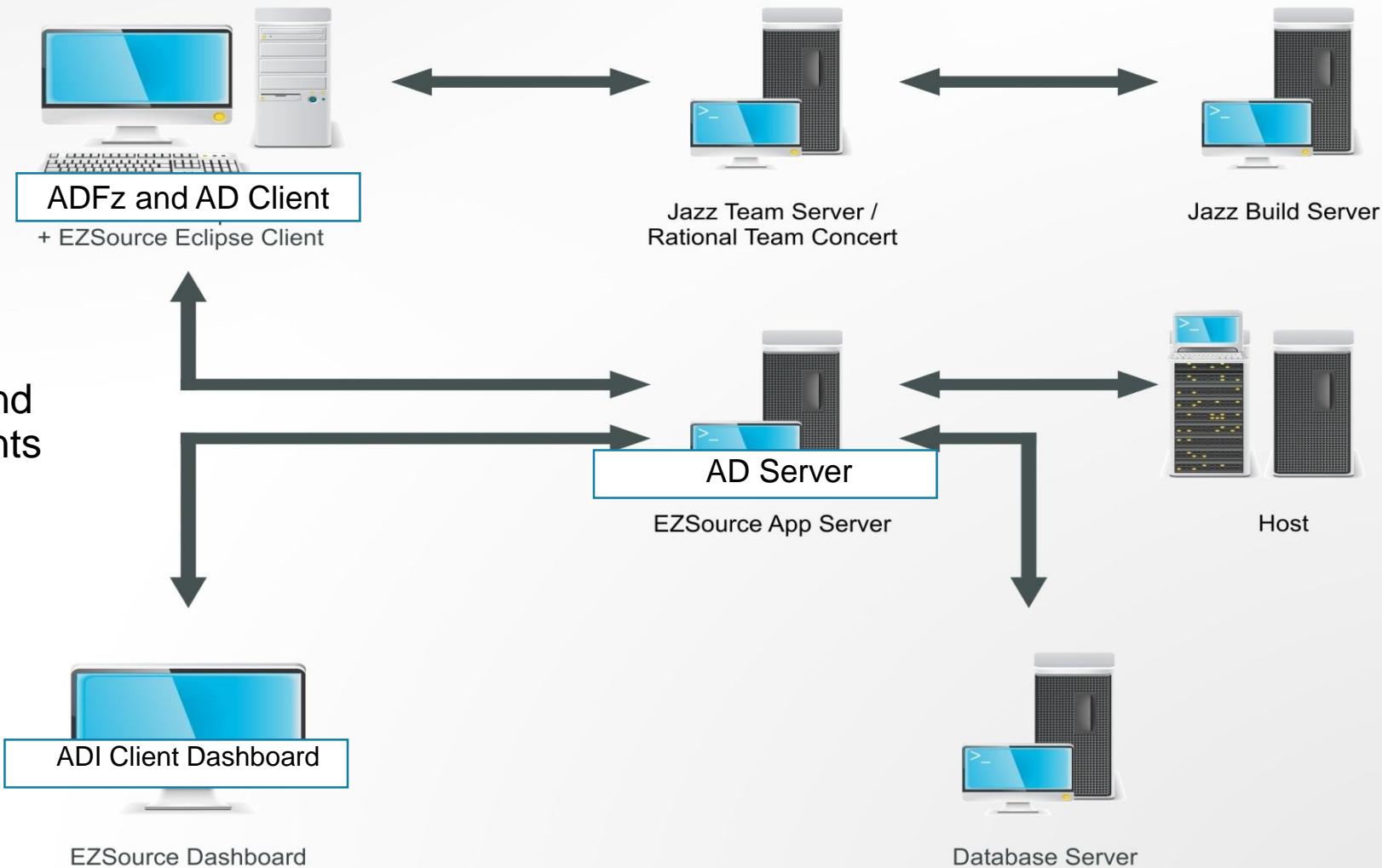
- Product Components and Environments
- Benefits – What's in it for me?
- DevOps and ADFz
- IDz Deep Dive
- ADFz – File Editing and Management Tools
- ADFz – ABEND Resolution Tools
- ADFz – Application Performance Analysis Tools
- **Application Discovery (AD) integration with ADFz**
- IMS-specific Tooling
- CICS-specific Tooling

Application Discovery (AD) – Static Analysis Tooling

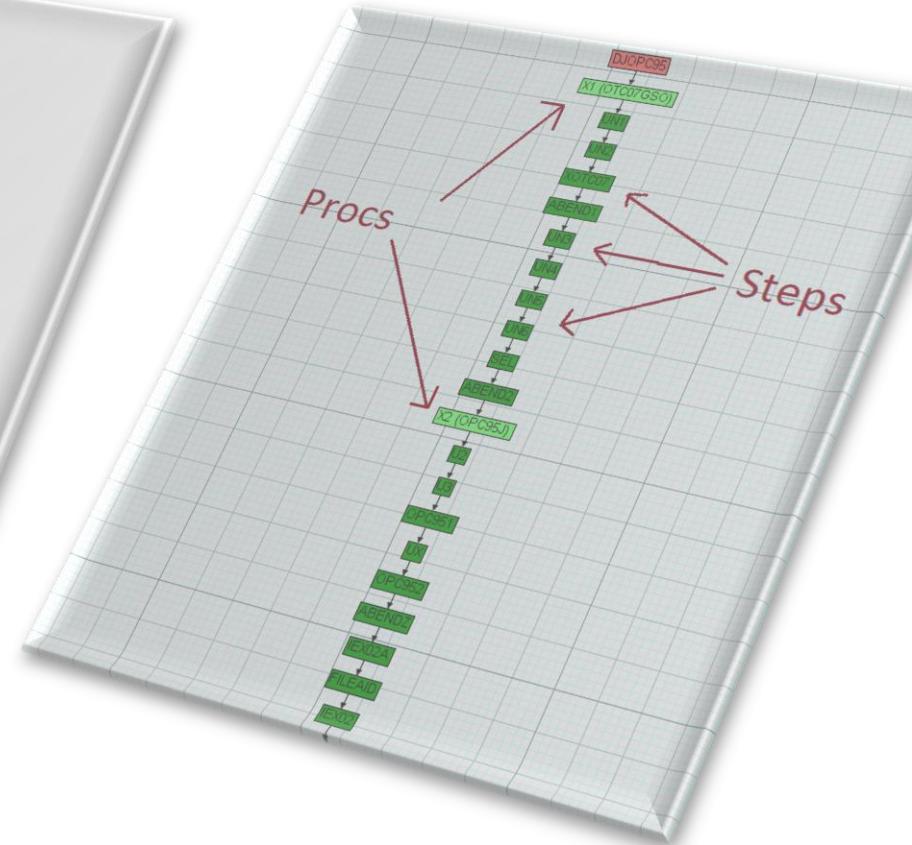
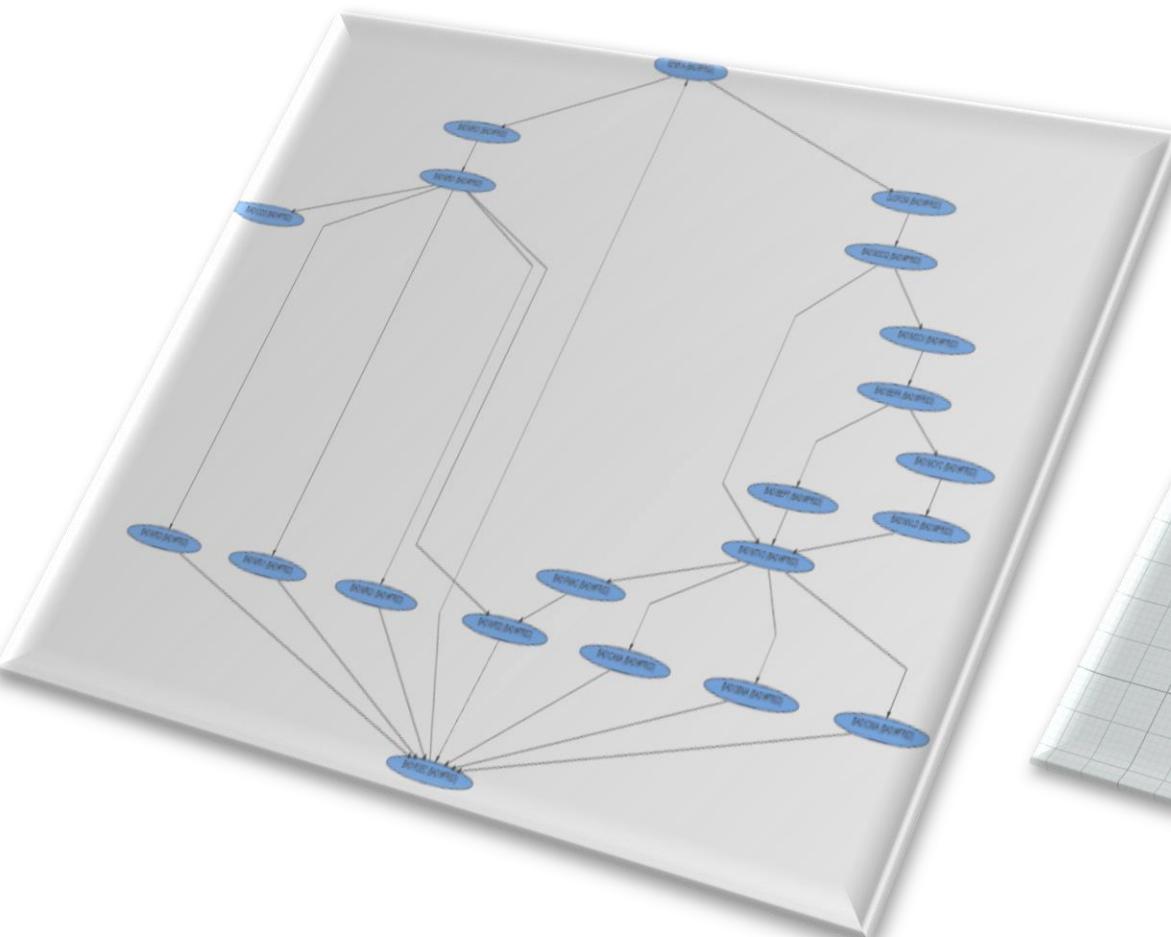
- AD is an integrated static and dynamic software analysis architecture that combines, processes and multiplies key benefits of IBM's code analytics, application intelligence, and testing solutions.
- Built on a single-system repository, AD works with COBOL, PL/I, Assembler, batch and online, and can:
 - Provide hyper-linked visualization layouts and real-time automatic synchronization of all z/OS Enterprise application components
 - Detect and surface dependencies within and among applications
 - Produce and correlate precise, detailed reporting on application components
 - Where-used and Impact analysis
 - z/OS Application APIs
- Supports third-party Eclipse tooling integration
- Deliver higher quality code thru Standards Enforcement and metrics collection/assessments
- Additional functionality for:
 - Cross application analysis
 - Comprehensive metrics
 - Management / delivery dashboards
 - CA Endevor / Serena ChangeMan ZMF integration
 - Joining of Mainframe and Non mainframe code analysis



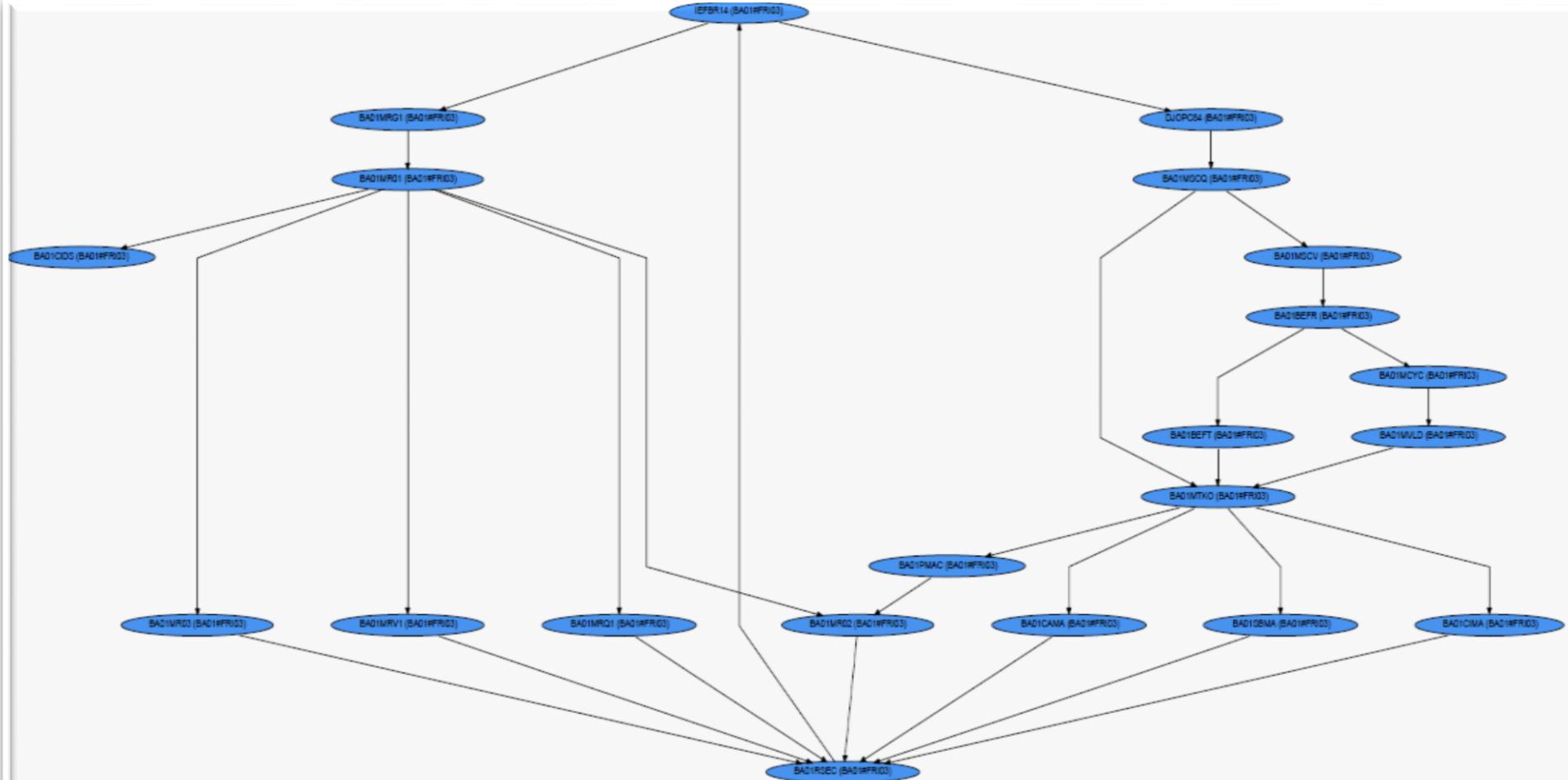
AD with ADFz and IBM ZDevOps



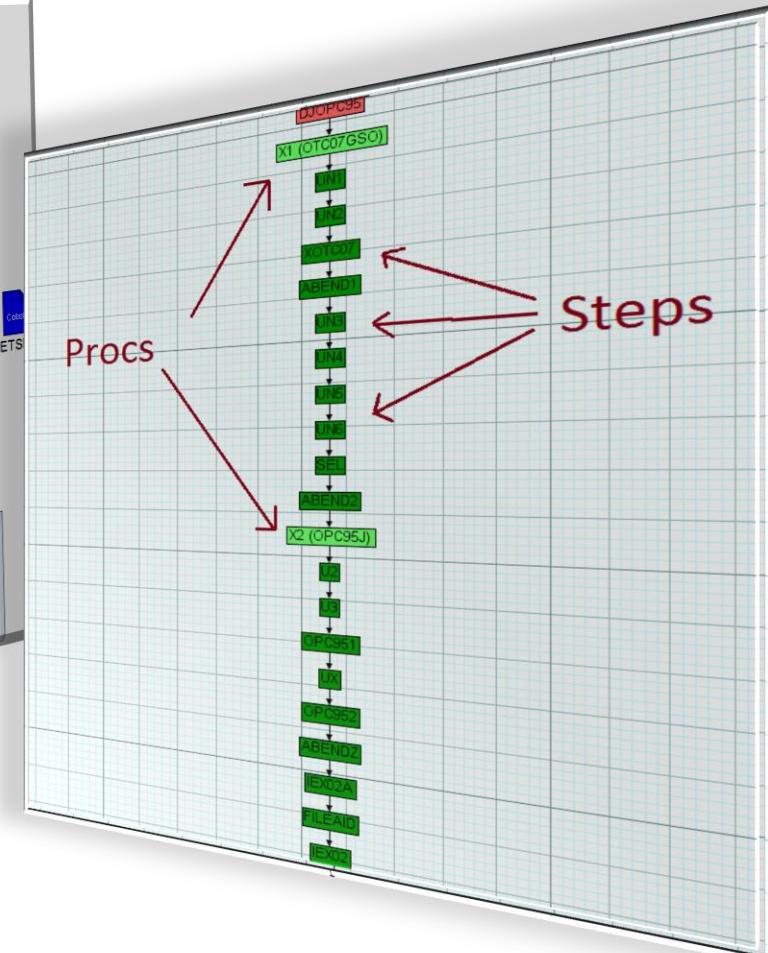
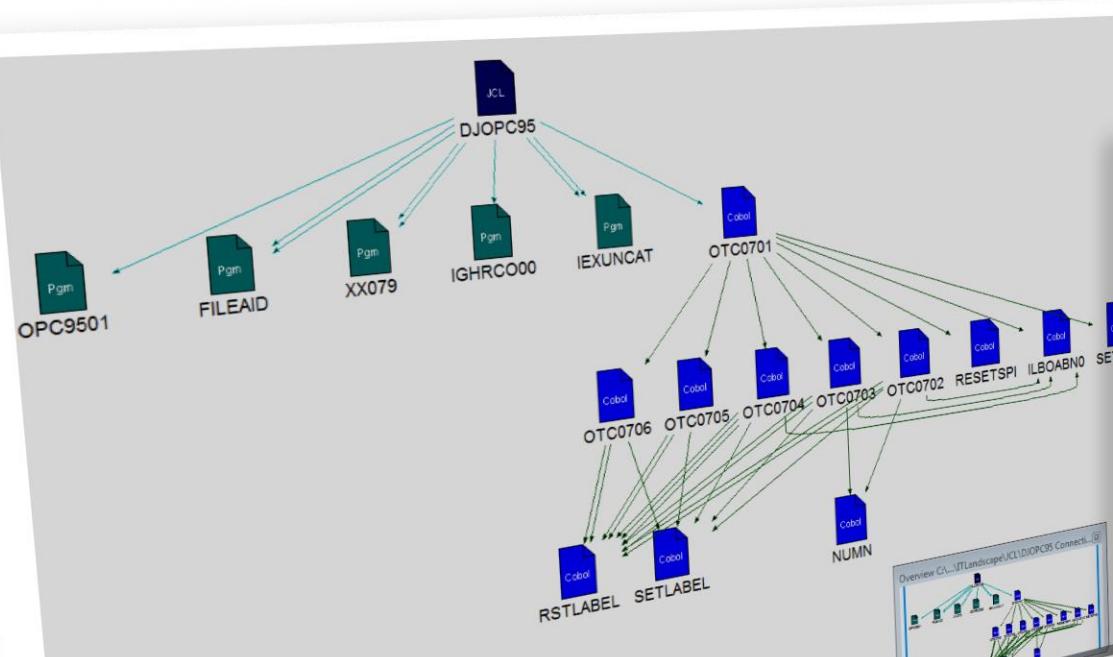
AD: Scheduling and JCL examples



AD Scheduling Analysis: Jobs and Job Dependencies

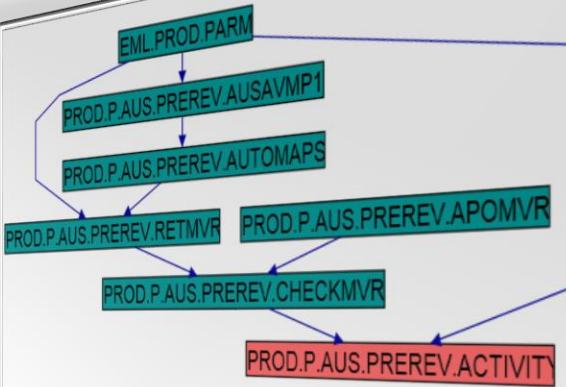


AD Job Analysis: JCL/Step/Program Call Graph and Flow Graph



AD Dataset Flow Analysis:

Datasets and Program Access



Report details
Dataset: PROD.P.AUS.PREREV.ACTIVITY

dataflow graph

Backward chains

EML.PROD.PARM

PROD.P.AUS.PREREV.ACTIVITY

<- EML.PROD.PARM

PROD.P.AUS.PREREV.ACTIVITY

<- PROD.P.AUS.PREREV.CHECKMVR

<- PROD.P.AUS.PREREV.RETMVR

<- PROD.P.AUS.PREREV.AUTOMAPS

<- PROD.P.AUS.PREREV.AUSAVMP1

<- EML.PROD.PARM

PROD.P.AUS.PREREV.ACTIVITY

<- PROD.P.AUS.PREREV.CHECKMVR

<- PROD.P.AUS.PREREV.RETMVR

<- EML.PROD.PARM

PROD.P.AUS.PREREV.APOMVR

PROD.P.AUS.PREREV.ACTIVITY

<- PROD.P.AUS.PREREV.CHECKMVR

<- PROD.P.AUS.PREREV.RETMVR

AUSMVR(33)[EMAUSPRE/STEP310/EMAUSPRE(749)]

AUSMVR(37)[EMAUSPRE/STEP310/EMAUSPRE(749)]

SORT[EMAUSPRE/STEP300/EMAUSPRE(716)]

AUSRTEV(32)[EMAUSPRE/STEP090/EMAUSPRE(269)]

SORT[EMAUSPRE/STEP070/EMAUSPRE(226)]

AUSAVM(82)[EMAUSPRE/STEP050/EMAUSPRE(177)]

AUSAVM(86)[EMAUSPRE/STEP050/EMAUSPRE(177)]

AUSMVR(37)[EMAUSPRE/STEP310/EMAUSPRE(749)]

SORT[EMAUSPRE/STEP300/EMAUSPRE(716)]

AUSRTEV(33)[EMAUSPRE/STEP090/EMAUSPRE(269)]

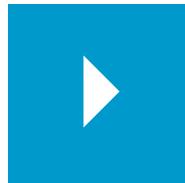
AD Datasets Where Used: Showing applications, JCL and Programs using the dataset

The screenshot displays the EZSource Analyze interface with several windows open:

- File**, **Edit**, **View**, **Project**, **Build**, **Slicing**, **Window**, **Help** menu bar.
- Toolbars** with various icons for file operations and analysis.
- Job List** window on the left showing a tree view of jobs:
 - AD30AO.PBQ.OP05.PRINT1.DM2YWC5
 - AD30AO.PBQ.OP05.PRINT1.DM2YWC5_1
 - AD30AO.PBQ.OP05.PRINT1.DM2YWC5_2
 - AD30AO.PBQ.OP05.PRINT1.DM2YWC5
 - AD30AO.PBQ.OP05.PRINT1.DV1
 - AD30AO.PBQ.OP05.PRINT1.DWVC
 - AD30AO.PBQ.OP05.PRINT1.DWVC_1
 - AD30AO.PBQ.OP05.PRINT1.DWVC_2
 - AD30AO.WBQ.OP504.FAID0003.FILE1.DCURDYC
 - AD30AO.WBQ.OP504.FAID0003.FILE1.DM1YWCS
- Job Detail** windows:
 - DJOPC95**: Shows the source code for the DJOPC95 job, which includes PARM definitions and EXEC statements for IEXUNCAT and XTC07.
 - Otc07gso**: Shows the source code for the Otc07gso job, which includes PARM definitions and EXEC statements for IEXUNCAT, XTC07, and TAPEIA.
 - OTC0702**: Shows the source code for the OTC0702 job, which includes SELECT statements for PRC-PRINT3 and PRC-PRINT2.
- File Status** windows:
 - OTC0702**: Shows the status of PRC-PRINT3 and PRC-PRINT2.
 - OTC0701**: Shows the status of PRC-READER1.
 - OTC0703**: Shows the status of PRC-TAPEA.
 - OTC0704**: Shows the status of PRC-TAPEIB.
 - OTC0705**: Shows the status of PRC-TAPEOA.
 - OTC0706**: Shows the status of PRC-TAPEOB.
- AD30AO.WBQ.OP504.FAID0003.FILE1.DM1YWCS Detailed Info** window at the bottom left, listing details for the selected file.

UNIT

ADFz – IDz – Introduction



Topics:

- Product
- Benefits - What's in it for me?
- DevOps and ADFz - What's in it for me?
- IDz Deep Dive
- ADFz – File Editing and Management Tools
- ADFz – ABEND Resolution Tools
- ADFz – Application Performance Analysis Tools
- Application Discovery (AD) integration with ADFz
- **IMS-specific Tooling**
- CICS-specific Tooling

Smart IMS Tools – IMS Explorer

Free Plug-in that provides broad & deep high-quality functional contributions to IMS application development with ADFz:

- IMS Catalog Navigator
- Query and Edit IMS Segments using SQL statements
 - (not a typo – using SQL statements)
- Graphical manipulation and visualization of IMS: DBD, PSB, including: Secondary Indexes and Logical Relationships
- IMS Unit Testing
- IMS Web 2.0 & Mobile development
- Create and publish REST services



Querying an IMS Database with IMS Explorer

Here you can create SQL scripts with Select, Update, Delete, Insert statements

SQL Builder with content assistance to build a SQL statement

Connect ...
and start
querying,
updating,
deleting
IMS
segment
data

Connection →
PSB & Schema →
DB PCB = Database →

Database Segments

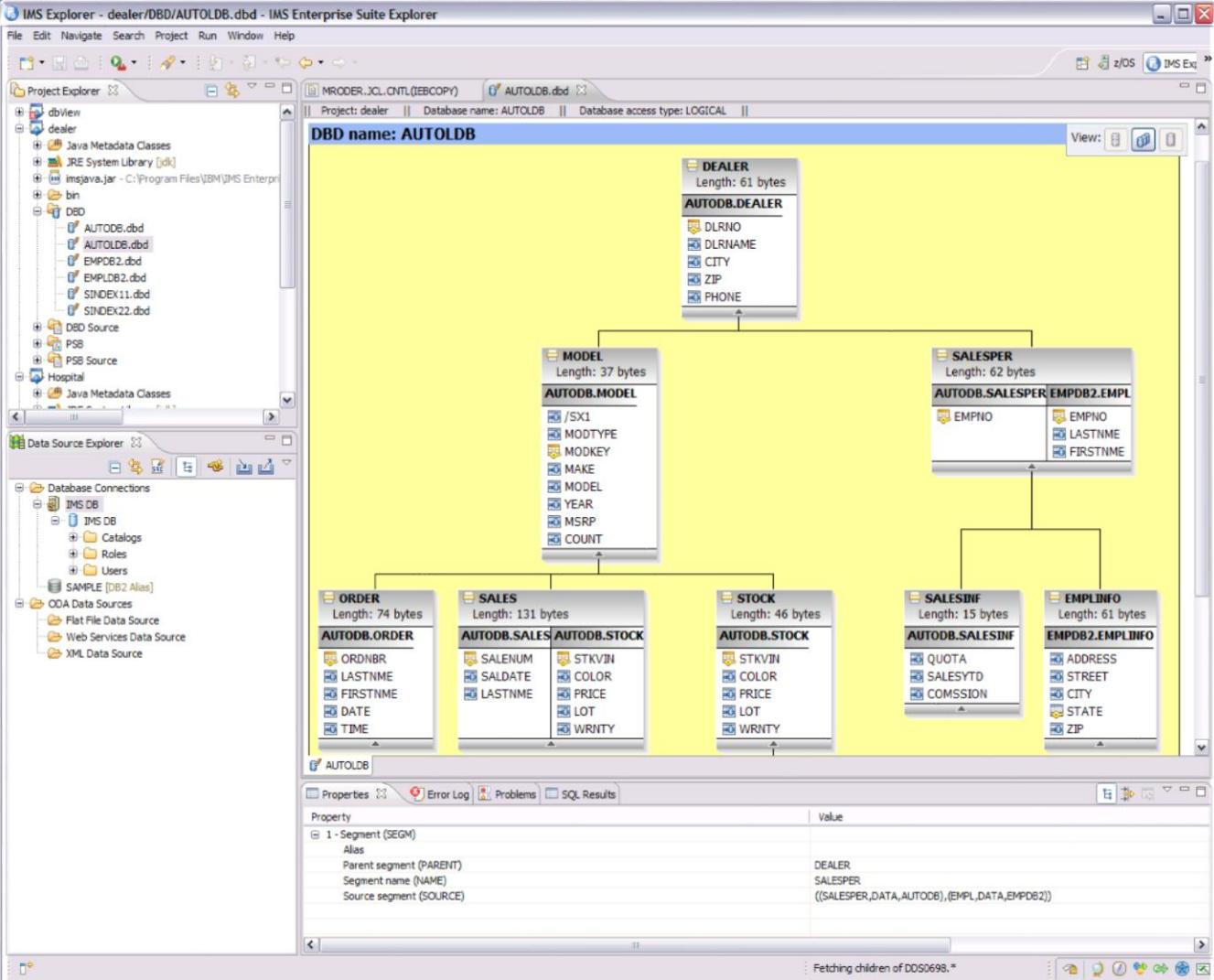
Analyze/Export segment data using the SQL results view

	HOSPLI	HOSPCODE	HOSPNAME	HOSPITAL_HOSPCODE	WARD_WARDNO
1	L	R121001000...	GOOD SAMA...	R1210010000A	0004
2	L	R121001000...	GOOD SAMA...	R1210010000A	0004
3	L	R121001000...	GOOD SAMA...	R1210010000A	0004
4	L	R121001000...	GOOD SAMA...	R1210010000A	0007
5	L	R121002000...	SANTA TERE...	R1210020000A	0002
6	L	R121004000...	NEW ENGLA...	R1210040000A	0011
7	L	R121004000...	NEW ENGLA...	R1210040000A	0011
8	L	R121004000...	NEW ENGLA...	R1210040000A	0011
9	L	R121004000...	NEW ENGLA...	R1210040000A	0070
10	L	R121004000...	NEW ENGLA...	R1210040000A	0070

Database type: IMS_V11, Current profile: IMS Hospital, Database: IMS Hospital, connected

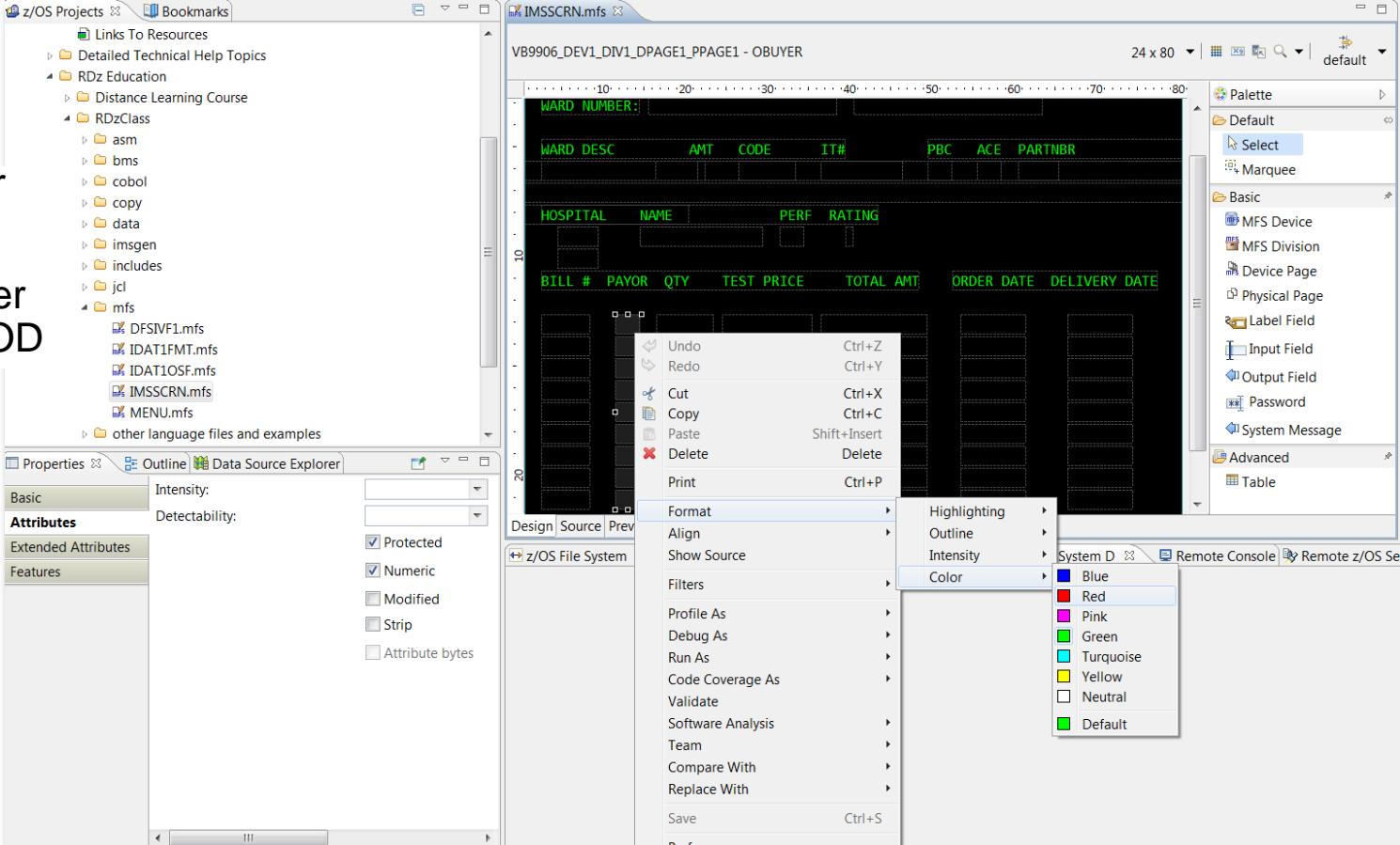
View DL/I Database Entity/Relationship Hierarchy with IMS Explorer

Can also edit/build and generate PCB and DBD Control Blocks from graphical tooling



MFS Editor

- Graphical Editor for MFS Maps
- Replaces Assembler DIF/DOF – MID/MOD coding
- Drag & Drop fields
- Copy/Paste fields
- Customizable defaults
- Sample values
- Zoom in/out
- Synchronization between:
 - Graphic Design view
 - Source code view



UNIT

ADFz – IDz – Introduction

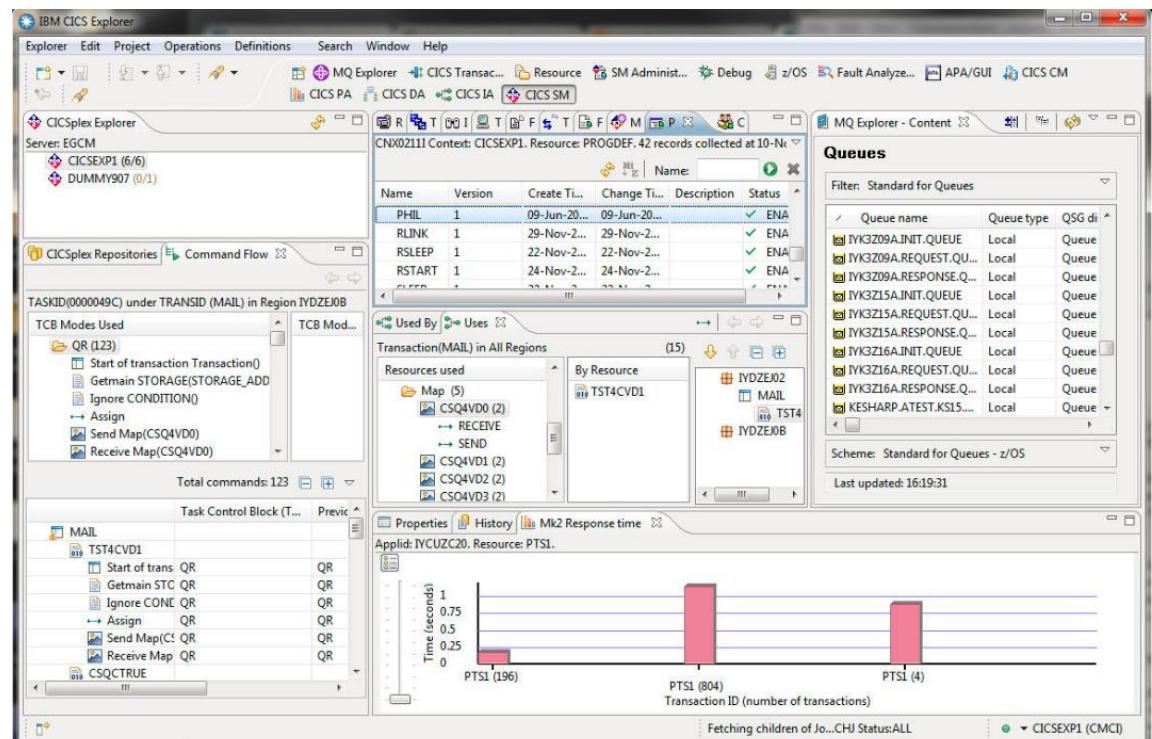


Topics:

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- **CICS-specific Tooling**

Smart CICS Tools – CICS Explorer

- ADFz is (per se) an application developer IDE.
- Many shops have asked for CEMT-like functionality:
 - Enable and disable resources
 - Open and close resources
 - Acquire and release resources
 - Place resources in and out of service
 - Purge tasks associated with a resource
 - Discard resource definitions from a CICS system
 - TS Queues
 - Tasks, Task Associations



DevOps Tooling – CICS Explorer

SYSPROG DevOps Tooling

- Atom Services
- Bundle Parts
- Completed Tasks
- CORBA Servers
- DBCTL Subsystems
- DB2 Connections, Entries
- Event Processing, Capture Specifications
- Global Dynamic Storage Areas
- Interval Control Requests
- IPIC/ISC/MRO Connections
- JVM resources
- LIBRARYs, LIBRARY DS Name
- TS Queues
- Tasks, Task Associations

Applications DevOps Tooling

- Bundles
- DB2 Transactions
- Create CICS Cloud Application
- Document Templates
- Event Bindings
- Files/Pipelines
- Process Types
- Programs
- TD Queues
- Regions
- RPL List
- Transactions
- URI Maps
- Web Services and XML Transforms

Files View – CICS Explorer

The screenshot shows the CICS Explorer interface with the 'Files' view selected. The left pane displays a tree view of CICS regions and their sub-components. The middle pane shows a list of files with properties. The right pane displays a detailed table of file metadata.

Left Pane (Tree View):

- Server: EICM
- A (0/0)
- CICSEX52 (8/8) (selected)
- DUMMY907 (0/0)

Middle Pane (List View):

Region	Name
IYCWEID1	DFHAD
IYCWEID1	DFHCS
IYCWEID1	DFHDB
IYCWEID1	DFHLR
IYCWEIE1	DFHAD
IYCWEIE1	DFHCS
IYCWEIE1	DFHDB
IYCWEIE1	DFHLR
IYCWEIF1	DFHAD
IYCWEIF1	DFHCS
IYCWEIF1	DFHDB
IYCWEIF1	DFHLR
IYCWEIG1	DFHAD
IYCWEIG1	DFHCS
IYCWEIG1	DFHDB
IYCWEIG1	DFHLR

Right Pane (Table View):

Browse	Delete	Read	Update	LSR Pool ID	DS N
BROWSABLE	DELETABLE	READABLE	UPDATABLE	1	EXPA
BROWSABLE	DELETABLE	READABLE	UPDATABLE	1	EXPA
BROWSABLE	DELETABLE	READABLE	UPDATABLE	1	EXPA
BROWSABLE	DELETABLE	READABLE	UPDATABLE	1	EXPA
BROWSABLE	DELETABLE	READABLE	UPDATABLE	1	EXPA
BROWSABLE	DELETABLE	READABLE	UPDATABLE	1	EXPA
BROWSABLE	DELETABLE	READABLE	UPDATABLE	1	EXPA
BROWSABLE	DELETABLE	READABLE	UPDATABLE	0	EXPA
BROWSABLE	DELETABLE	READABLE	UPDATABLE	1	EXPA
BROWSABLE	DELETABLE	READABLE	UPDATABLE	1	EXPA
BROWSABLE	DELETABLE	READABLE	UPDATABLE	1	EXPA

- Context Menus
- Actions for CEMT functionality

CICS Explorer - Create an Application for a CICS Cloud Environment

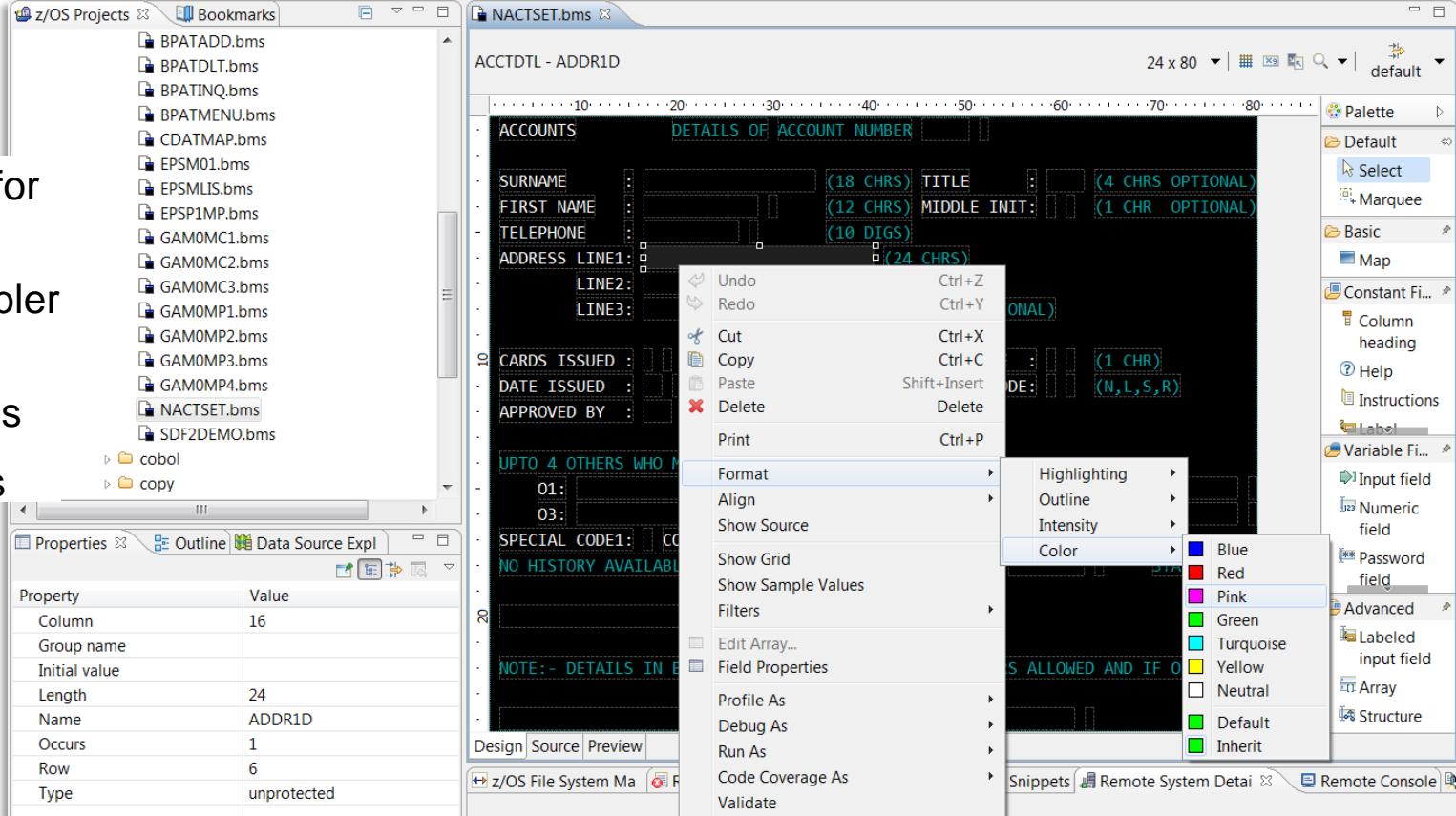
- Declarative development and wizard-driven Java code/test/deploy

The screenshot shows the RAD interface with the following components:

- Cloud Explorer View:** Shows a project named "java.web.example.application v1.0.0 ENABLED". It contains a "my.demo.platform" entry labeled "ACTIVE,EMPTY", "Operations", "Region Types", "Application.services (2/2)" which includes "Bundles" (with "java.web.example.interfaces v1.0.0 ENABLED" and "java.web.example.programs v1.0.0 ENABLED").
- Project Explorer View:** Shows a project named "com.ibm.cics.server.examples.web" containing files like "java.web.example.application", "java.web.example.binding", "java.web.example.interfaces", "java.web.example.programs", and "my.demo.platform".
- Overview Editor:** The active editor is titled "java.web.example.application".
 - General Information:** Describes the application as "ENABLED". Fields include Name: "java.web.example.application", Version: "1.0.0", and Description: "Application".
 - CICS Bundles:** Lists "java.web.example.programs" and "java.web.example.interfaces". Buttons for "Add..." and "Remove" are present.
 - Actions:** Lists steps:
 1. [Create a CICS bundle](#) to provide application dependencies, resources, and entry points.
 2. [Add CICS bundles](#) to the application using this editor.
 3. [Create an application binding](#) to bind the application to a particular platform.
 4. [Export the application](#), which includes the application binding and CICS bundles, to the platform home directory in zFS.
 - Entry Points:** Shows an entry point: "READ (DFJ\$JWB1)".

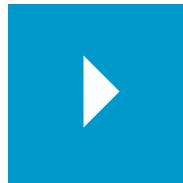
BMS Editor

- Graphical Editor for BMS Maps
- Replaces Assembler DFH... coding
- Drag & Drop fields
- Copy/Paste fields
- Customizable defaults
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- **Testimonials and Getting Started**

IBM Application Delivery Foundation for z Systems V3.0

Success story with Danske Bank



Why choose IBM ADFz?

- **Enhances** visibility of performance and availability in development landscapes
- **Accelerates z Systems development** contributing to first-mover advantage for the bank
- **Simplifies** development with standards-based graphical environment
- **ADFz APIs strengthen bank's API strategy** – using an enterprise service bus to transform internal capabilities by setting up more APIs to encourage reuse for boosted productivity

"What's great about ADFz and Rational Developer for z Systems is that almost everything we need to deliver software rapidly is in one interface" says Henrik Hartvig Jensen, Lead Software Engineer and Technical Architect

"We continue to work closely with the IBM labs, in particular to inspire them to incorporate our home-grown functionality into the IBM tools. It's a great two-way relationship, and we appreciate the cooperation." Jesper Hollitsch Poulsen, Senior Development Manager

About Danske Bank

- Established in 1871, Danske Bank is a Nordic universal bank. In its core markets of Denmark, Norway, Sweden and Finland, it serves all types of customer, from personal customers and businesses to large institutional clients. In total, the bank has 3.5 million customers, 2.2 million of whom use e-banking, and operates a network of 300 branches across eight countries. Danske Bank has 19,000 full-time employees and continues to grow both organically and through mergers and acquisitions.
- Driving faster innovation in banking and customer services with IBM z Systems – Service innovation is a major driver of competitive differentiation in banking. To maintain first-mover advantage and win market share, Danske Bank needed the ability to develop and test software faster.
- [Read the full story.](#)

Cut down a backlog of work

from years to less than six months

Increased efficiency

by supporting hybrid developers
who can work across different application
platforms

Helped programmers

without extensive COBOL experience
maintain COBOL code in a familiar
development environment



The transformation: Canada Mortgage and Housing Corp. (CMHC) was at risk of losing talent because many of the programmers supporting the organization's flagship COBOL application were approaching retirement. To modernize its development environment, the company implemented IBM® Rational® Developer for z® Systems software, which helps programmers maintain COBOL code in an environment that looks similar to Microsoft .NET or Java environments.

"We can be more responsive to the business, and we've gained that agility we need to keep up with changing regulations."

—Jeff Blackadar, application development manager

Solution component Software

- IBM® Rational® Developer for z® Systems

Success story with the next generation z/OS debugger



- An European financial services company uses a large number of Enterprise PL/I batch programs to process data stored in DB2.
- With expected increase of data to process in coming years, it was evident that their batch applications will eventually run out of virtual storage in near future.
- The customer approached IBM to develop a solution which enables exploitation of 64-bit virtual storage from their Enterprise PL/I applications.
- Given the importance of suitable development tools, the customer approached IBM to ensure development tools are enhanced (specifically Debug Tool for z/OS as the priority) to enable debugging of their 64-bit applications.
- In collaboration with the customer, IBM z/OS debugger team delivered a solution which satisfies the customer's requirements.

IBM Explorer for z/OS V3.0.1 Aqua

Enabling next level of integration across Dev & Ops tools

Strategic integration platform and trouble free install and maintenance

- Products install and work together nicely (either Installation Manager or Eclipse P2)

Integration across dev and ops

- Select and install those you need for development and operations

Monthly updates

- New enhancements & fixes delivered to you on monthly basis

Comprehensive and convenient packaging

- Build high quality z/OS applications with ADFz, leveraging robust integration across development and problem determination tools

Application Delivery Foundation for z Systems

Application Performance Analyzer

Developer for z Systems Enterprise Edition

Fault Analyzer

File Manager

CICS Tools & Software

Deployment Assistant

Configuration Manager

CICS Explorer

Performance Analyzer

Interdependency Analyzer

CICS TG

z/OS Connect EE

Data Studio

Rational Team Concert

IMS Explorer

MQ Explorer

z/OS Explorer Integration Platform

IBM z Systems Continuous Integration & Delivery



Central community of DevOps solutions

- Product downloads and installation assistance
- Videos
- Technical, Process and SDLC Blogs from IBM subject matter experts
- Events and announcements
- Q&A Forums
- How-to-Contribute ideas and steps

Mainframe Development

DevOps For Enterprise Systems

IBM DevOps solutions for Enterprise Systems optimize development, testing, and deployment of enterprise applications. It helps streamline existing infrastructure and accelerate the delivery of high quality software while lowering overall cost. Hover over a DevOps concepts to learn which products support each methodology phases.

Deliver

- Accelerate time to market and reduce costs
- Accelarate speed to market using continuous integration and continuous delivery
- Improve code quality and isolate problems
- Use zero-downtime deployment to ensure high availability and reduce deployment risk
- Expense reduction
 - IBM UrbanCode
 - Release Team Concert
 - Application Delivery Intelligence
 - Rapid Intelligent Testing for System z

Tweets

IBM DevOps (@IBMDevOps) May 19 in San Antonio See #IBM demos on how to define, wire, & automate continuous app delivery ibm.biz/DevOpsSanAntonio... #DevOps #zCloud
10:20 pm - 05/19/2016

Follow @IBMDevOps
IBMsystems IBM z Systems
It's a fact. One IBM z Mainframe can run 2.5 billion transactions a day. ibm.co/yGChNc
pic.twitter.com/51OVi5gjuND
6:45 pm - 05/11/2016

Follow @IBMDevOps
Cloud-Based Trial

Download Eclipse Tools

Client Installation

Platform Installation Options

IBM Installation Manager (IM)

IBM Explorer for z/OS

IBM CICS Explorer (I)

IBM Rational Developer for z Systems (S)

Eclipse (p2)

IBM Explorer for z/OS

IBM CICS Explorer (I)

Extendable Features

IBM Problem Determination Tools [1]

IBM CICS Tools [2]

Other Tools

Application Performance Analyzer

File Analyzer

File Manager

Debug Tool[7]

CICS

Interdependency Analyzer

Deployment Assistant

Performance Analyzer

Transaction Gateway

Visit <https://developer.ibm.com/mainframe/>

Home Products Blogs Forum Events Videos Announcements

Blogs

New Features for IBM File Manager and Fault Analyzer Plug-ins in Q2 2016 – ChristineJ/IBM

Recent refreshes of z/OS Explorer Aquahave featured some significant enhancements to the IBM File Manager (FM) and IBM Fault Analyzer (FA) plug-ins. For FA, you can now directly open reports from job output and also drag and drop history files.

CHRISTINEJENKINS / 07/15/2016 / 0 COMMENTS

Rapid Intelligent Testing for z Systems – KimM/IBM

Are you a tester, test team lead or system programmer? If so, we're looking for you!

KIMASELLI / 07/13/2016 / 0 COMMENTS

MQ Explorer on z/OS Explorer Aqua in p2 or Installation Manager -JoeW/IBM

The z/OS Explorer Aqua composite update site binds together different IBM tools for z/OS system programming and application development.

JOEWINCHESTER / 06/30/2016 / 2 COMMENTS

Home Products Blogs Forum Events Videos Announcements

Video Categories

All

Compilers (1)

z/OS (1)

Fault Analyzer (1)

Testing (1)

ADI (2)

ABO (2)

RD&T (5)

Debug (5)

RDz (20)

Videos

IBM DevOps

Modernise mainframe apps for the #Cloud & #Mobile. ibm.biz/btly29Fjxk6
pic.twitter.com/t3CK30xCe2

9:03 pm - 07/14/2016

Rapid Intelligent Testing for z Systems 49 views

Using Source Level Breakpoints in Visual Debug 50 views

Creating breakpoints and callpaths in Visual Debug 39 views

Better DevOps on IBMz with Rational Development and Test Environment for z Systems (RD&T) – Part 1 1 190 views

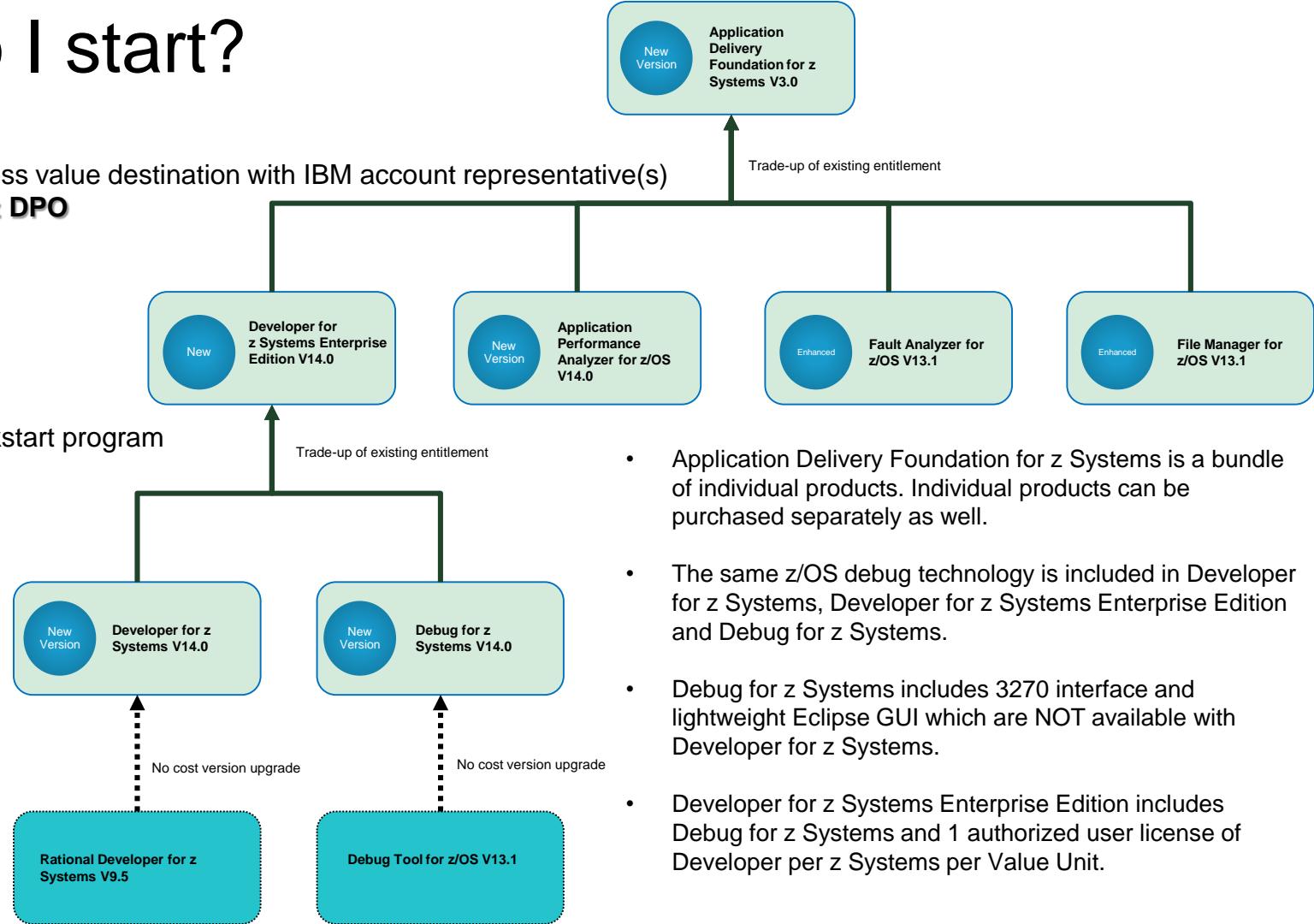
Introducing the Visual Debug Feature 49 views

Where do I start?

- Discuss your business value destination with IBM account representative(s)
- Ask about the **ADFz DPO**
 - Deployment
 - Project
 - Office

- DPO is a **free** Quickstart program that includes:

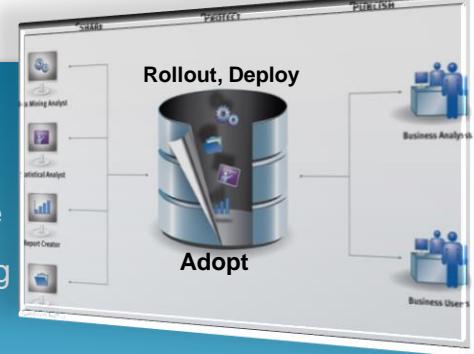
- Installation
- Configuration
- Tuning
- Training



DPO (Deployment Project Office)

▪ Assistance provided

- ▶ A **12-week program** that provides up to 50 hours of technical guidance provided by senior IBM staff technical experts with over 40 years of cumulative IDz rollout and support experience
- ▶ All communications with you and your staff are done via phone and remote web conferencing



▪ Pricing – NO CHARGE

- ▶ DPO is offered as an investment in customer satisfaction, successful product deployment, wide-spread adoption and ROI

▪ Areas of Focus

- ▶ Rollout and deployment planning, installation, configuration, tuning – IDz Server/Client/Workspace components
- ▶ Best Practices – in the areas of product Adoption
- ▶ Instructor-led training & mentoring – available for qualified accounts
 - ▶ Additional free services from IBM (over and above the 50 hours for solution setup)
 - ▶ Delivered via remote/web-conferencing by qualified IBM technical professionals and IDz subject matter experts
 - ▶ In-depth hands-on labs and workshops
 - ▶ Pre-reqs the DPO setup program
 - ▶ Standard product Entry-Level curriculum

▶ Out of scope:

- ▶ SDLC Process definition & implementation of custom functionality
- ▶ Menu Manager/HATS RCP

DPO: No-Charge Product Enablement

- **IDz Technical Education**

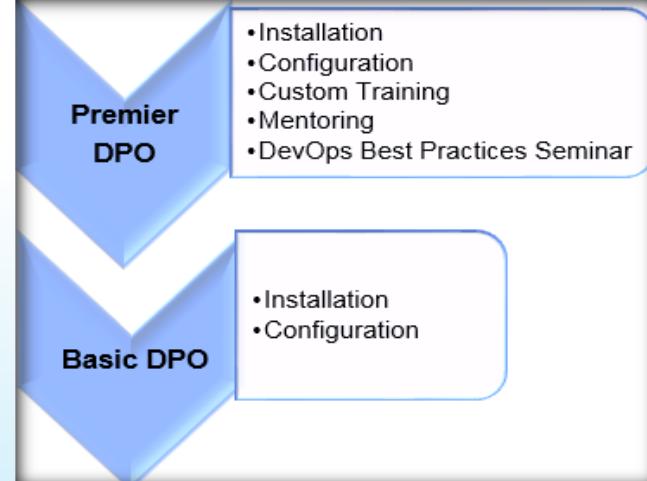
- Foundation product training: **10 hours**
- Max enrollment: **25 users/per class**
 - Customer provides Webex
 - All training is delivered as Remote/Instructor-led
 - Training delivered using an education/custom-workspace
 - All classes taught in English - With English learning content materials
 - Must use the latest production/G.A. version of IDz
 - Course materials exist for additional/advanced topics – which can be delivered on-demand

- **IDz Mentoring**

- Transition Mentoring: **30 minutes/per user**
- Customer provides Webex
- User “drives” the session:
 - **Option for customer mentors/coaches to sit in**
- Customer must provide mentoring for all new users

- **Quarterly/Private “Best Practices in Transitioning to and Leveraging DevOps”**

- Conferences between senior IBM DevOps staff
- Introduction to other DevOps solutions



Backup Slides

But wait...
There's more!

File Manager z/OS Features

- Supports QSAM, VSAM (including IAM), PDS, HFS and Websphere MQ data
- Doublebyte (DBCS) support
- Full function edit and view
 - Table
 - Single
 - Find or change fields
 - Multiple record structures
- Flexible selection criteria
 - Work with copybooks or templates
- Edit any file regardless of size
- Generate JCL to
- Create data
- Print data
- Copy data
 - File reformatting using copybooks
 - Scramble fields
- Catalog services
- Work with VTOC
- Compare
 - Data or Load Modules
- Enhanced Search Facility (new)
- Remote Services (new)
- Search for and change data
 - Insert continuation JCL statement
- View or print
 - Copybooks or Templates
- Modes Of Operation
 - Interactive or Batch
- Interfaces
 - ISPF or Workstation GUI
- File Manager Batch
 - Robust languages to quickly develop programs to copy, print, compare files, and much more

File Manager CICS Features

- ISPF-like panels
- Full function edit and view
 - Table
 - Single
- Flexible selection criteria
 - Work with copybooks or templates
- CICS Resource
 - VSAM Files
 - No need to take files offline to edit
 - Temporary Storage
 - Transient Data
- Print data
- List Resources
- Support for extended addressability ESDSs
- Interface to:
 - File Manager z/OS
 - Interface to File Manager DB2
 - Interface to File Manager IMS
- Modes Of Operation
 - Interactive
- Support for IBM Software
 - CICS TS V5.3

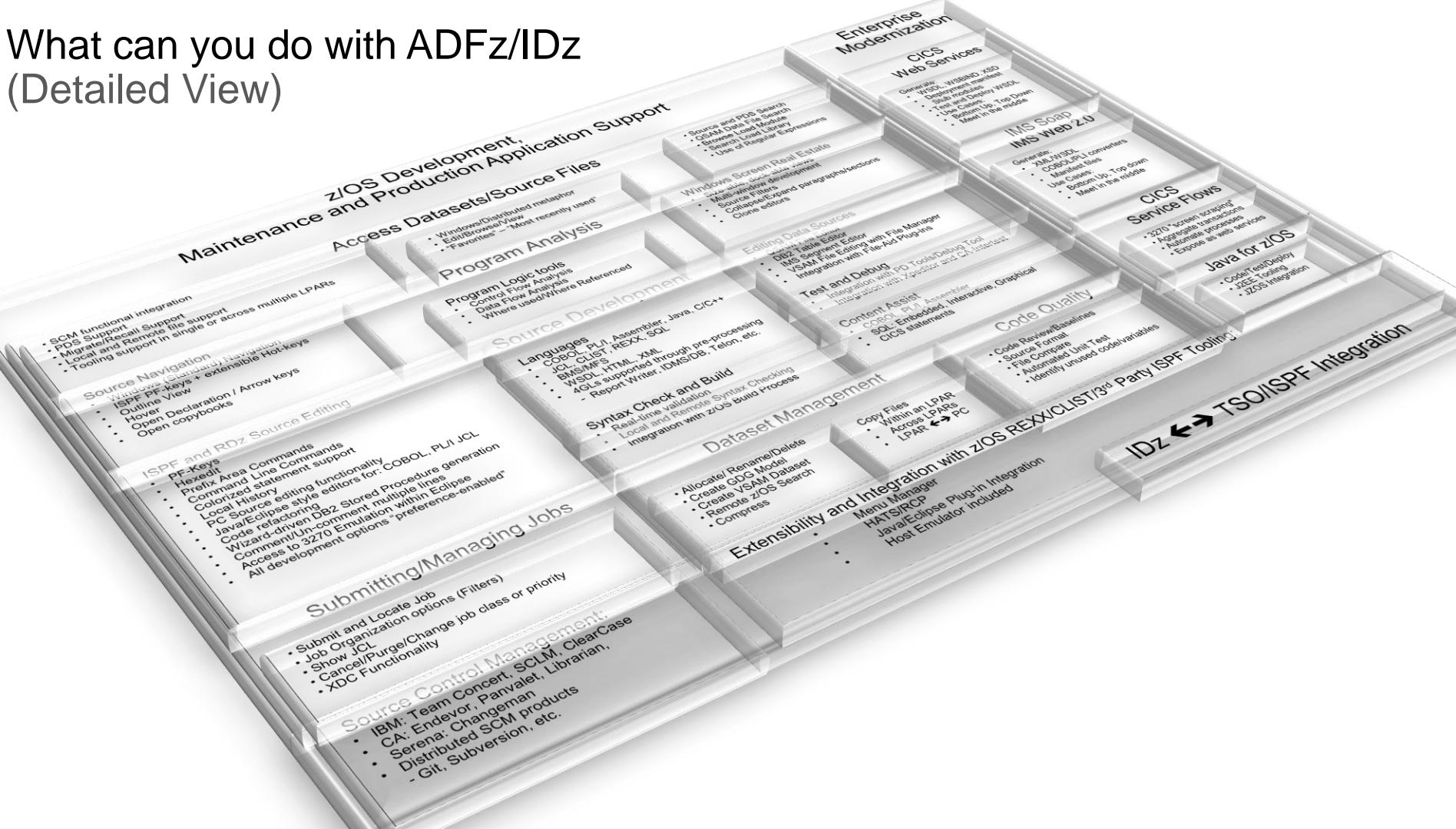
File Manager DB2 Features

- Edit and View data
 - Edit a DB2 Table or View
 - select rows and columns displayed
- Print
 - Table or Single format
 - select rows and columns
- Create and Drop DB2 objects
- Copy data
 - Select rows
 - Map columns from an input table to an output table
 - Reformat and generate data while copying
 - Scramble columns
- Work with a list of DB2 objects
 - Use line commands to initiate functions
- Generate JCL for DB2 utilities:
 - COPY, LOAD, REBUILD, RECOVER, REORG, RUNSTATS
- Relational Edit¹⁰⁹
- Grant and Revoke DB2 privileges
- Import and Export data
 - Select Rows
 - Export to a file in default FM/DB2 format, a format defined by a copybook, or a comma-delimited file
 - Import from a file generated by the Export function, or a file described by a copybook
 - Scramble columns
- Execute SQL Statements
- Create and test new SQL statements
 - Two methods: Basic and Advanced
- Modes of Operation
 - Interactive
 - Batch
- Interfaces
 - ISPF
 - CICS

File Manager IMS Features

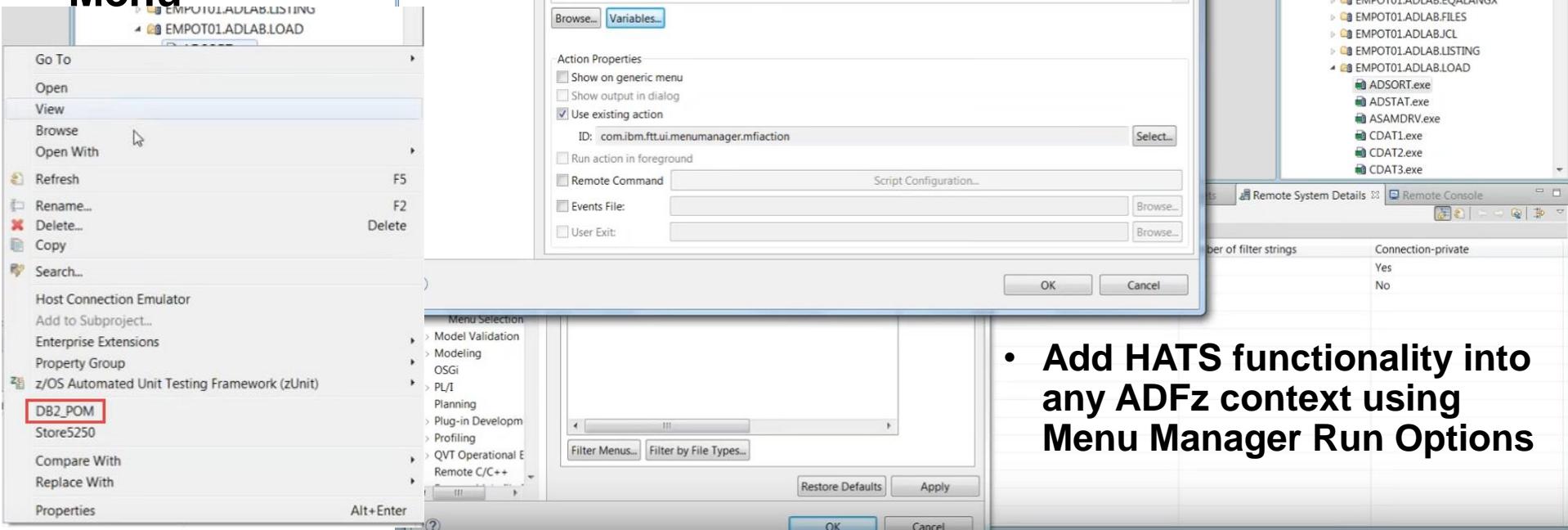
- Online utilities for IMS databases
 - Edit and Browse data
 - Extract segments from a database
 - Load segments into a database
- Support for processing databases using either:
 - physical DBD
 - logical DBD
- Access databases using either:
 - Static (existing) PSBs
 - Dynamic PSBs
- Process databases in alternate sequences using secondary indexes
- Support for HDAM, HIDAM, HISAM, HSAM, DEDB, MSDB
- Optional audit trail to record database updates
- Work with segments that have multiple layouts
- Optionally use COBOL or PL/I segment layouts to format data into fields
 - Edit and Browse segments in tabular or character format
 - Access source in PDS, PDSE, or Panvalet libraries
- Use flexible criteria to select segments for browse, edit, and extract processing
- Change segment selection criteria and formatting “on the fly”, while browsing or editing
- Modes of Operation
 - Interactive
 - Batch
- Interfaces
 - ISPF
 - CICS
- Support for IBM Software
 - IMS V14

What can you do with ADFz/IDz (Detailed View)



HATS/RCP + Menu Manager Integration

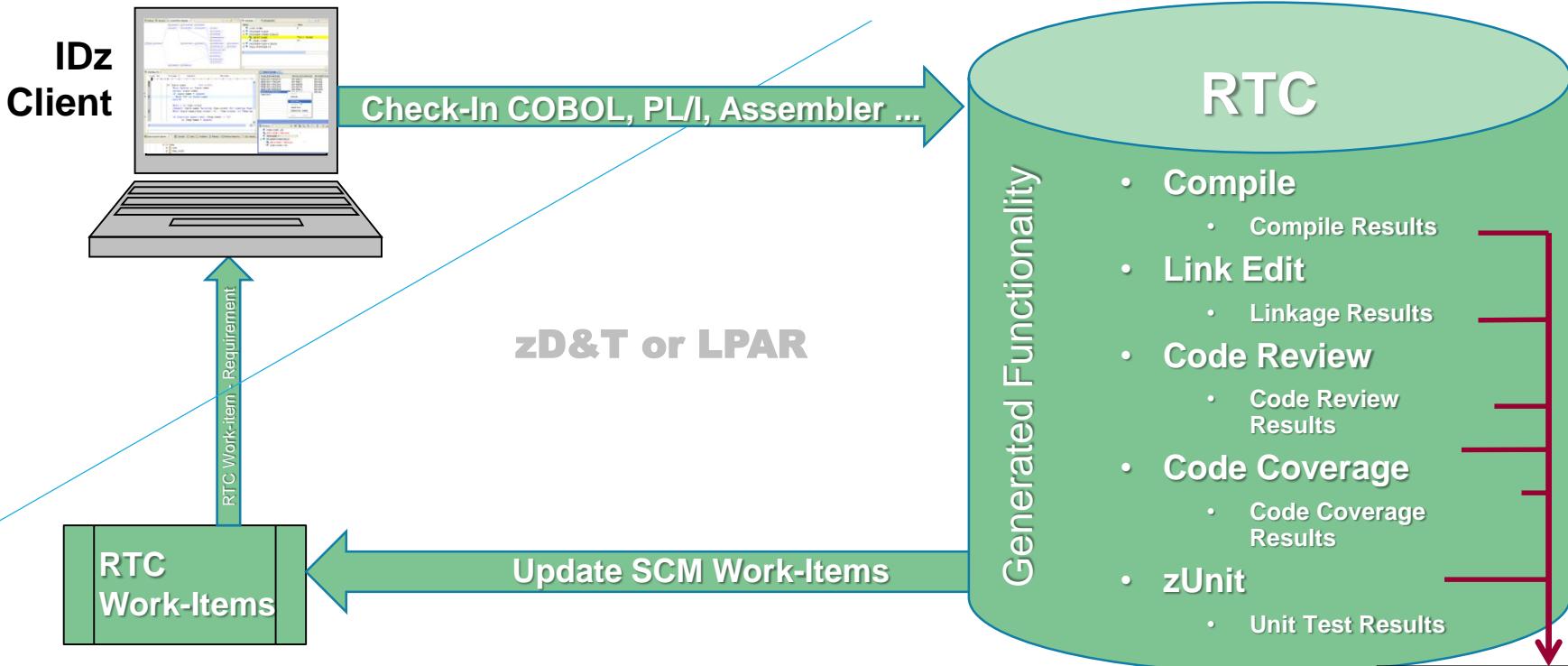
- Custom Context Menu



- Add HATS functionality into any ADFz context using Menu Manager Run Options

One View of Continuous Integration

Build Process



This is a working example of one aspect of “Continuous Integration.” Where once a program is checked in and built, automated tests can run to confirm that it behaves as expected.

WHERE does ADFz fit in the IBM DevOps Enterprise Systems Solution?

ATTRACT NEW TALENT &
ENABLE DIGITAL
TRANSFORMATION

Application Delivery Foundation (ADFz)

Modern development,
maintenance and problem
determination

Application Discovery (AD)

Application discovery
and understanding

Automatic Binary Optimization (ABO)

Optimize your applications without
recompiling

COBOL 6.1

Serve your mobile apps even faster

DELIVER WITH SPEED
& AGILITY

Application Delivery Foundation (ADFz)

Tools that deliver faster
time-to-market

Rational Team Concert (RTC EE):
Cross-platform collaboration,
planning, software configuration
management and build

UrbanCode Deploy
Cross-platform deployment
automation

COBOL Value Unit Edition:
Compile up to 10X more for one
price

IMPROVE QUALITY &
REDUCE RISK

Application Delivery Foundation (ADFz)

Tools specific to application quality
and developer task/testing precision

Application Delivery Intelligence (ADDI)
Optimize your process through Cognitive
DevOps

z Systems Development and Test
Environment (zD&T)
z/OS test environment running on x86 HW

Rational Test Workbench (RTW), Rational
Test Virtualization
Test automation & service virtualization

Service Management Suite for z/OS

- End-to-end lifecycle coverage
- Integrated cross-platform, multi-technology solutions including z
- Open, extensible platform with many partner and open source integrations

