

Positioning Your Enterprise for Cloud, Analytics and Mobile Computing

Easy and Agile Development and Administration
for Cloud, Analytics and Mobile Computing

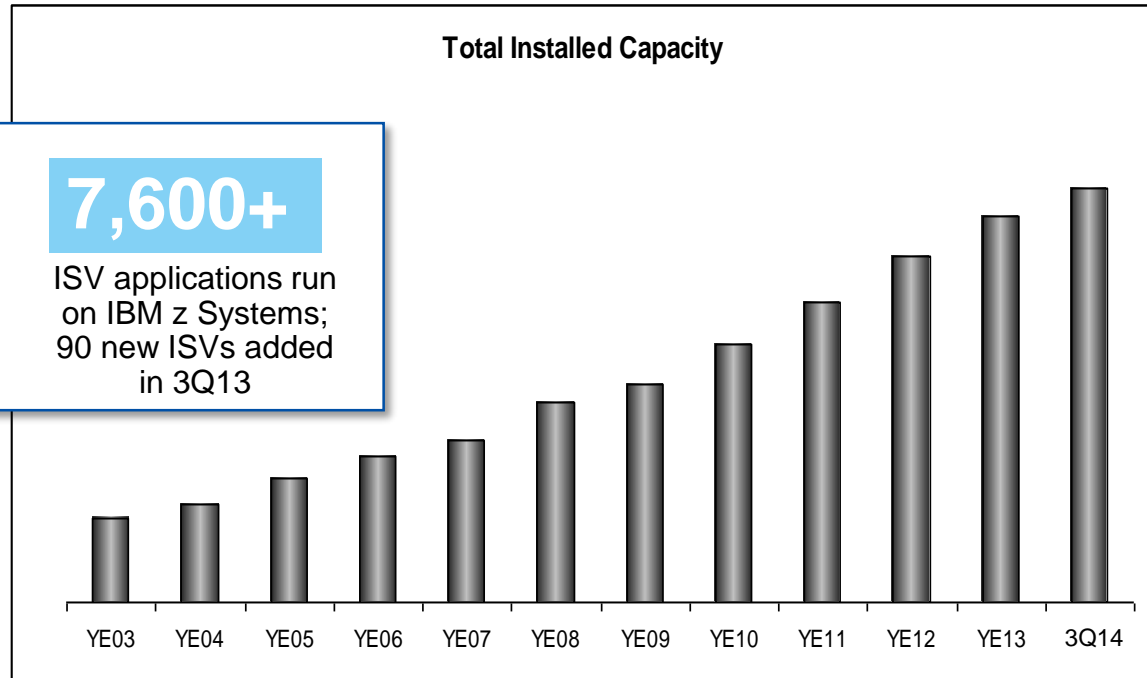


Numerous indicators show mainframe usage continuing to grow for the foreseeable future

- The first mainframe was introduced 50 years ago, and it continues to thrive today

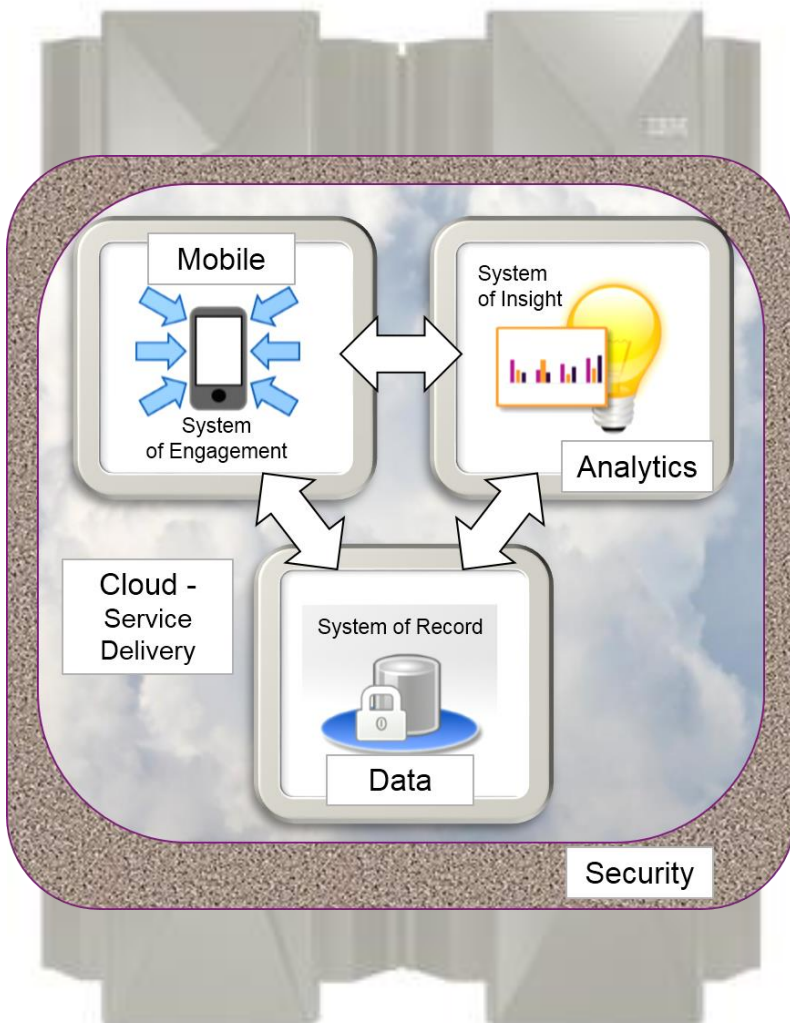
294	12%	7,600+
new accounts over last four years	growth in installed IFL MIPS (YTY)	ISV applications run on IBM z Systems; 90 new ISVs added in 3Q13

- As one generation moves into retirement, another generation must replace it
 - Younger workers today will want new, modern tools, languages and devices



It's important for businesses to keep their pipelines for new, skilled z Systems talent full!

IBM is committed to making it easier for businesses to find and keep new z Systems administrators and developers



A full spectrum of easy-to-use, GUI-based mainframe administrative tools

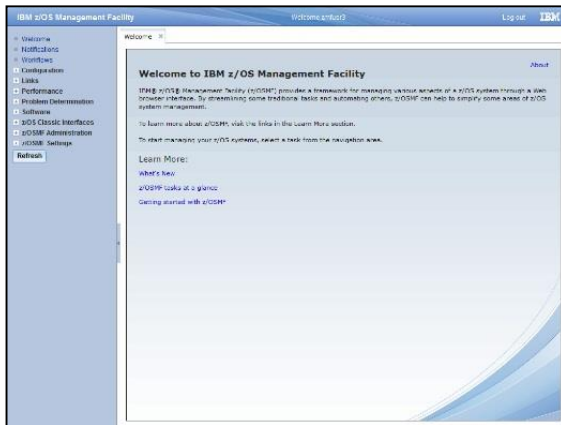
Rich, familiar development tools and processes for new mainframe recruits

Worldwide university programs to excite and train students in the ease and value of working with the mainframe

IBM z/OS Management Facility (z/OSMF) is a modern, browser-based console...

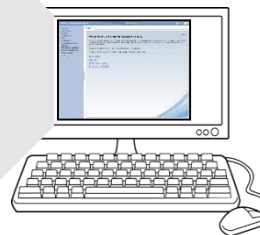
...revolutionizing day-to-day z/OS operations and administration!

- New mainframe system administrators work in a familiar environment
- Maximizes productivity of a diversified workforce
 - Simplification of tasks
 - Enhanced collaboration
 - Reduced learning curve
- Role-based, scenario-based, integrates with other tools

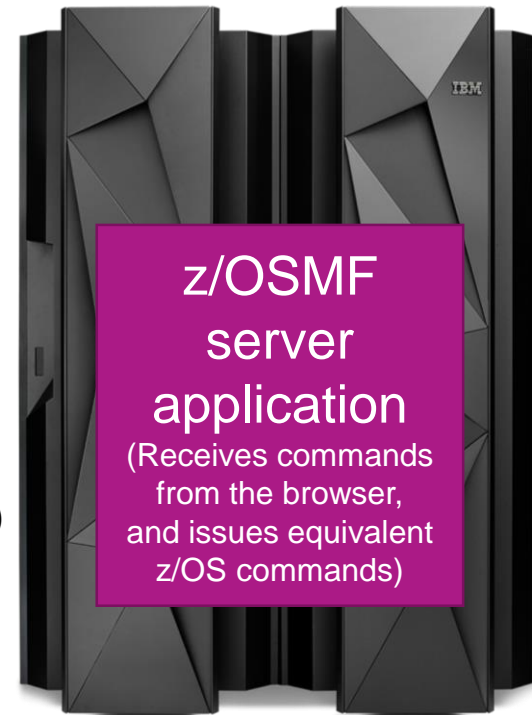


z/OSMF

Browser

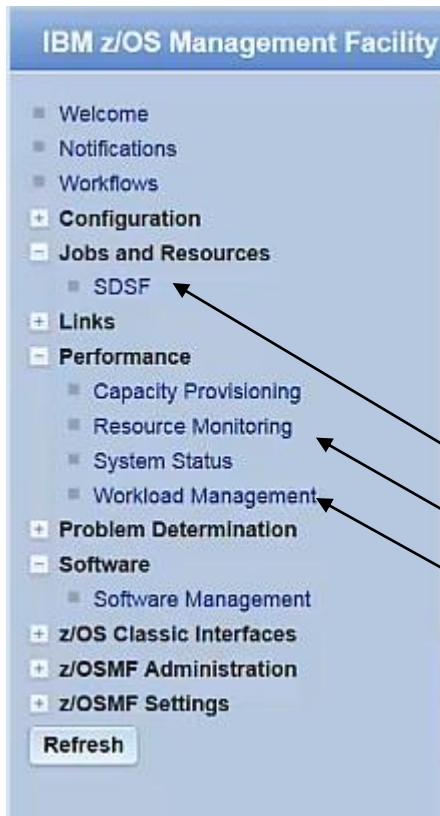


↔
HTTP(S)



DEMO: z/OSMF simplifies previously complex administrative tasks

z/OSMF navigation bar



Without z/OSMF...

1. Find WLM screen and open
2. Find where definitions are saved, or extract from data sets
3. Figure out tranClass for the Liberty transactions
4. Find classification rules in WLM for this type of server in the CB SubSystem
5. View the classification rules for the CB SubSystem to find Service Class
6. Back out of rules and go into Service Classes
7. Bring up the appropriate service class

.....

With z/OSMF...

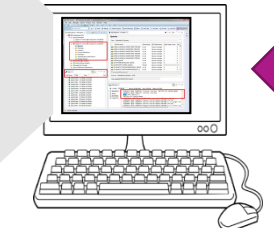
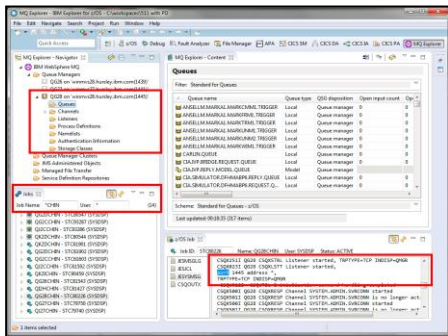
1. Point and click on SDSF in navigation sidebar
2. Point and click on Resource Management...
3. Point and click on WLM ...

.....

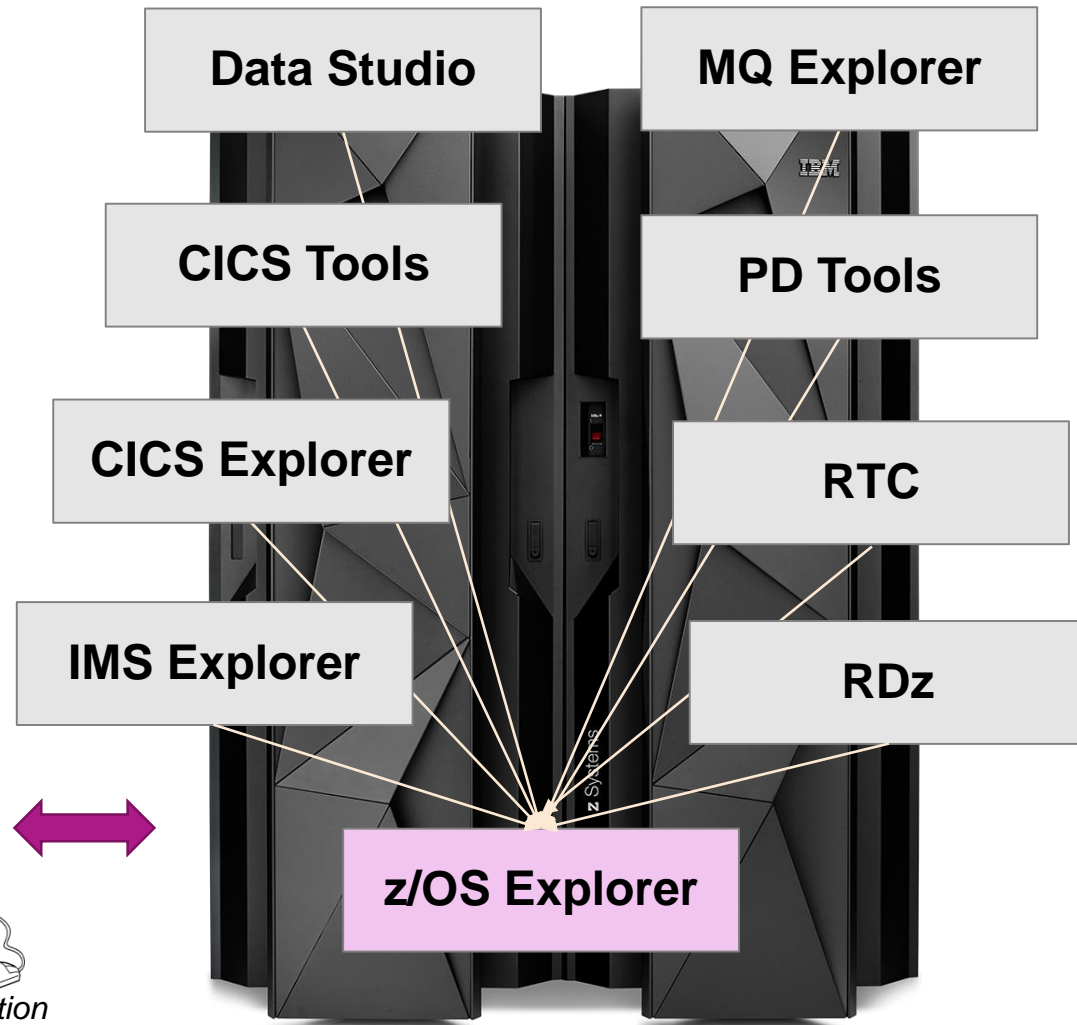
IBM Explorer for z/OS (z/OS Explorer) is a container application providing additional rich administrative tools

- Runs on a workstation; common base for many z/OS tools
- Foundation for a workbench of plug-ins with which to develop/test z/OS applications and manage related sub-systems
- Extendable to accommodate user's roles and responsibilities using Eclipse-based plug-ins

MQ Explorer plug-in in z/OS Explorer – showing Queues and Jobs



Eclipse workstation



For example, CICS Explorer eases CICS management

- View and control the CICS runtime and its resource definitions
- Easily create and manage CICS regions, tasks, files, transactions, events, etc.

CICS Explorer is especially useful when managing across a CICSplex (CICS Parallel Sysplex)

The screenshot displays the IBM CICS Explorer application window. The interface is divided into several panes:

- Left Pane:** Shows the CICS Explorer tree structure for server EGCM, including CICSplex Repositories and Task Control Block (TCB) modes used for a specific transaction (MAIL).
- Top Center Pane:** A table listing CICS resources with columns for Name, Version, Create Time, Change Time, Description, and Status. Resources listed include PHIL, RLINK, RSLEEP, RSTART, and CSLEEP.
- Bottom Center Pane:** A bar chart titled 'Properties' showing 'Time (seconds)' on the y-axis and 'Transaction ID (number of transactions)' on the x-axis. The chart compares three transactions: PTS1 (196), PTS1 (804), and PTS1 (4).
- Right Pane:** A 'Queues' view showing a list of queue names, types, and QSG details. An arrow points from the text 'Because it's Eclipse-based...' to this pane.

Because it's Eclipse-based, other tools can be integrated into the same view (MQ Explorer)

Additional GUI-based tools enable efficient management of the entire enterprise

Tivoli Enterprise Portal

Navigate among objects

The screenshot displays the Tivoli Enterprise Portal interface with several monitoring components:

- Navigator:** A tree view on the left for navigating through system objects like 'MVS Operating System' and 'Address Space Overview'.
- Monitor CPU usage:** A 3D bar chart showing CPU usage for various jobs, with a legend for TCB, SRB, IFA, zIIP, and zIIP on CP Percent.
- Central Storage Frame Count:** A bar chart comparing Central Frame Count (yellow) and Fixed Frame Count (blue) across different jobs.
- Address Space Counts:** A table summarizing system counts.
- Address Space CPU Utilization Summary:** A detailed table of job CPU usage.
- Fixed Storage:** A bar chart showing storage usage categorized as Low Fixed (Mb), Extended Fixed (Mb), and Large Fixed (Mb).

Address Space Count	Started Task Count	Batch Job Count	TSO User Count	APPC Count	Total Enclave Count	Active Enclave Count	Inactive Enclave Count
68	60	0	0	8	7	1	6

Job Name	Step Name	Proc Step	Type	SvcClass	SvcClass Period	ASID	JESJOBID	CPU Percent	TCB Percent	SRB Percent
WLM	WLM	IEFFPROC	STC	SYSTEM	1	0X000A		0.9	0.9	0.0
MASTER			STC	SYSTEM	1	0X0001	STC02191	0.0	0.0	0.0
PCAUTH	PCAUTH		STC	SYSTEM	1	0X0002		0.0	0.0	0.0
RASP			STC	SYSTEM	1	0X0003		0.0	0.0	0.0
TRACE	TRACE		STC	SYSTEM	1	0X0004		0.0	0.0	0.0
DUMPSRV	DUMPSRV	DUMPSRV	STC	SYSTEM	1	0X0005		0.0	0.0	0.0
XCFAS	XCFAS	IEFFPROC	STC	SYSTEM	1	0X0006		0.0	0.0	0.0
GRS	GRS		STC	SYSTEM	1	0X0007		0.0	0.0	0.0
SMPDSE	SMPDSE		STC	SYSTEM	1	0X0008		0.0	0.0	0.0
CONSOLE	CONSOLE		STC	SYSTEM	1	0X0009		0.0	0.0	0.0
ANTMAIN	ANTMAIN	IEFFPROC	STC	SYSTEM	1	0X000B		0.0	0.0	0.0

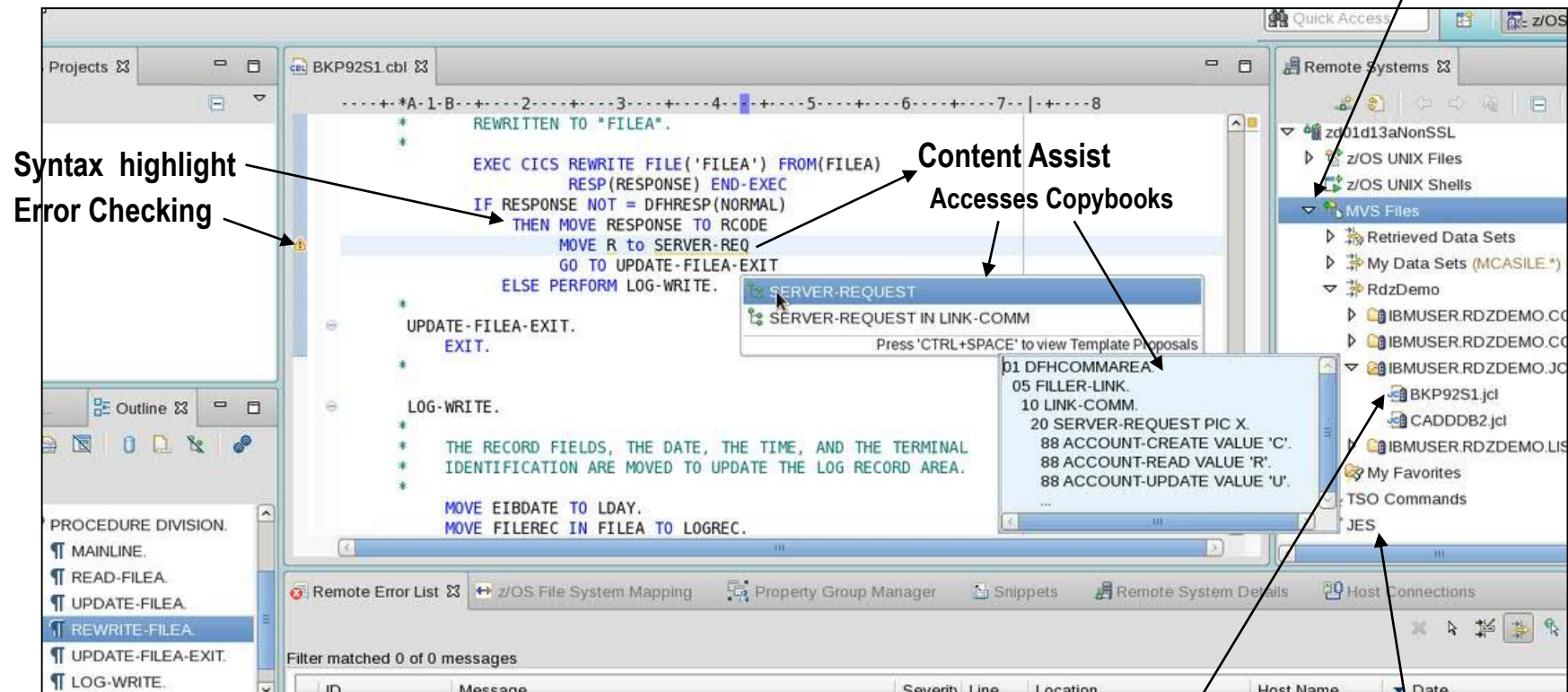
Monitor central storage frame count and fixed storage

View address space CPU utilization

Developers use familiar, workstation-based tools for mainframe application development – Rational Developer for z (RDz)

- Supports all major languages (COBOL, PL/I, ASM, C/C++, Java)
- Supports all major runtimes (IMS, CICS, Batch, USS, DB2, WAS, Linux, Cloud)
- Web Services/JSON functionality, plugins for code analysis, debugging, and more

Edit host files and members, filtered file sets, or work disconnected



Syntax highlight
Error Checking

Content Assist
Accesses Copybooks

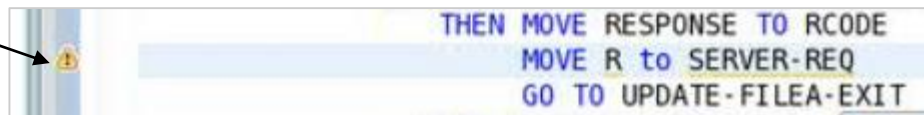
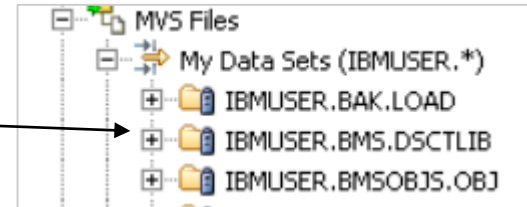
Outline view presents COBOL structure

Edit/Sub JCL

View JES output

DEMO: RDz has features which make COBOL development much easier

- Members and partitioned data sets look familiar – like files and folders!
- Double-click to open a z/OS member or Linux file
- Error icons assist in finding problems



- Use local syntax checking – saves MIPS costs!
- Use content-assist to quickly complete variable names and other statements



- Search for strings in files
- Edit JCL and submit – while the code window is still open!

Grow and enhance the skills set of development teams through use of multi-faceted, integrated tools

- Features in RDz enable cross-pollenization of development skills
- RDz makes it easy for Java developers to also contribute to COBOL applications
- Build for z/OS, for Linux on z, for a cloud of Linux on z servers

Use the Remote System Explorer to see Projects on z System

Switch to Projects to edit COBOL files

Switch to the Java perspective to edit Java files

```

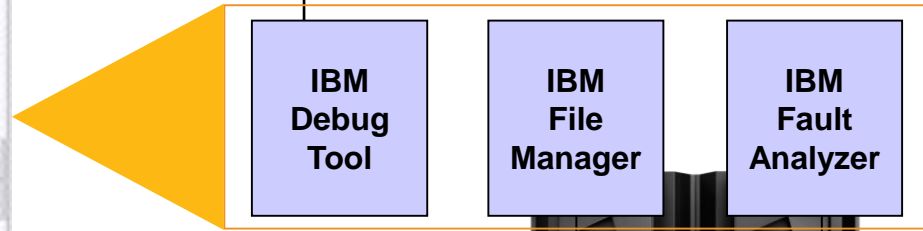
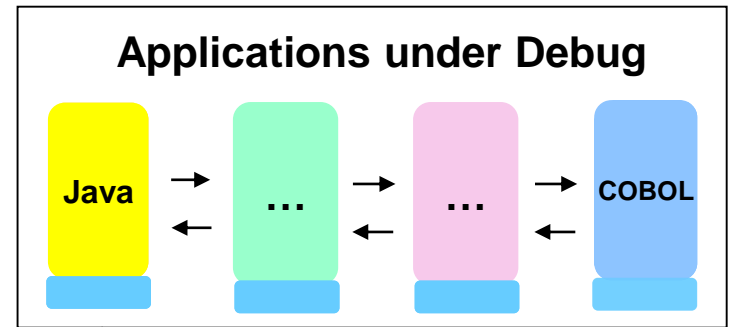
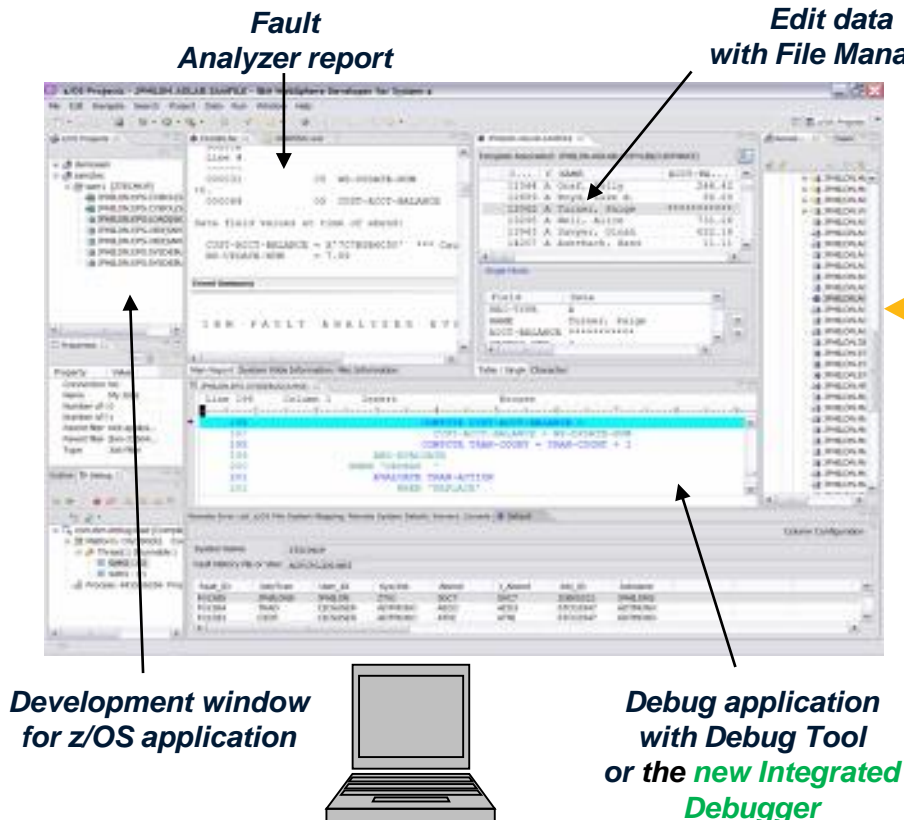
package sof;
import java.io.File;

public class SimpleCopy2 {
    public static final String TEMP_FILE = "io.tmp";
    public static final int BUFFER_SIZE = 4096;

    public static void main(String[] args) throws IOException {
        // ...
    }
}
    
```

Mainframe Problem Determination Tools (PDT) are integrated into the RDz workstation development environment

- Access PDT tools when running in connected mode
- Easily debug and step through multi-tier applications

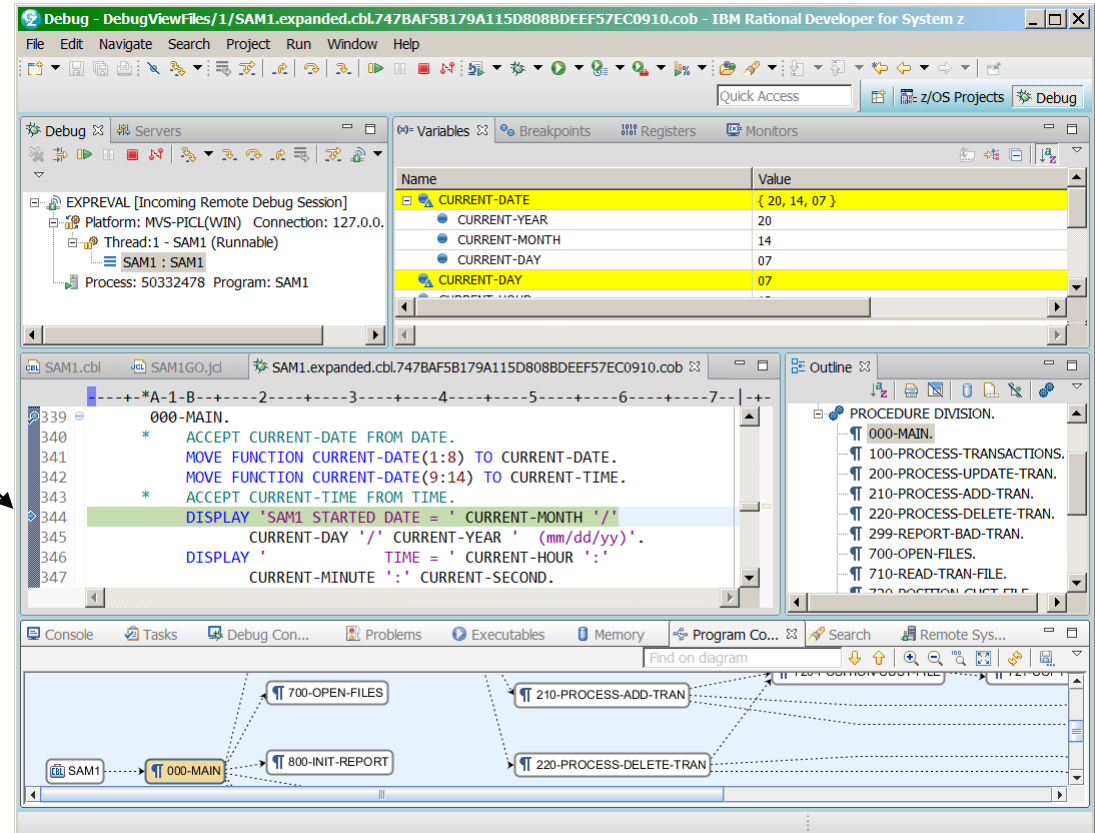


- End-to-end debug
- Edit VSAM data
- Analyze ABEND logs!

DEMO: Debugging with the RDz Integrated Debugger has never been easier

A problem report comes in...

1. Submit JCL to automatically open the Debugger Perspective
2. Allow the program fail (abend)
3. Step through code, view variables, set breakpoints, use the outline view to navigate
4. Find the problem and set a breakpoint there
5. Resubmit the job, fix the problem and see that the program runs to completion



Developers easily view execution statistics for a program using the Code Coverage feature of the Integrated Debugger

- See which lines of code are executed and which are not
- Remove dead, unexecuted code
- Easy and straightforward to use
 1. Modify the JCL
 2. Add "CC" to the ENVAR statement
 3. Resubmit the JCL

```
//***** ADDITIONAL RUNTIME JCL HERE *****/  
//CEEOPTS DD *  
  ENVAR("AQE_STARTUP_KEY=CC EXPREVAL")  
//AQEV4LST DD DISP=SHR, DSN=IBMUSER.RDZDEMO.LISTING
```

4. The code coverage summary report will open...

DEMO: Code Coverage summary report uses color coding to make finding unexecuted code easy

Code Coverage Report (Line)

Code Coverage Summary

Code coverage report (analyzed at Jan 17, 2015 4:33:04 AM, generated at Jan 17, 2015 4:33:05 AM)

Element	Coverage	Covered	Total
SAM1	57%	98	171
SAM1	57%	98	171
SAM1.expanded.cbl	57%	98	171
SAM1	57%	98	171

1. When development is done, run the Code Coverage tool to scan for unexecuted code

2. Green indicates code is executed; Red indicates code is not executed

```

-----+*A-1-B--+-----2-----+-----3-----+-----4-----+-----5-----+-----6-----+-----7-----+-----8
|
| 100-PROCESS-TRANSACTIONS.
|   PERFORM 710-READ-TRAN-FILE.
|
|   IF WS-TRAN-EOF NOT = 'Y'
|     COMPUTE NUM-TRAN-RECS = NUM-TRAN-RECS + 1
|     MOVE 'Y' TO WS-TRAN-OK
|     IF TRAN-KEY < WS-PREV-TRAN-KEY
|       MOVE 'TRANSACTION OUT OF SEQUENCE' TO ERR-MSG-DATA1
|       MOVE SPACES TO ERR-MSG-DATA2
|       PERFORM 299-REPORT-BAD-TRAN
  
```

Businesses reap the benefits of modernizing with RDz



- With RDz, UBS produced **better quality code** that led to fewer deployments onto test environments
 - **Standard interfaces** that allowed them to follow a DevOps strategy toward continuous testing
-



- Significantly **raised developer productivity** by implementing RDz, Enterprise COBOL, and Enterprise PL/1
 - Planning, budgeting and forecasting now done much **more efficiently**
-



- By deploying IBM Rational Solution for Collaborative Lifecycle Management (including RDz), TSYS successfully moved to **agile software development**
- **Accelerated the delivery of business value** while reducing the risks associated with software development

Rational Developer Traveler will enable browser-based z/OS development from mobile devices as well as desktops

- Experimental technology from Rational
- Edit/Compile/Run enterprise applications using a Web browser
- No content stored locally

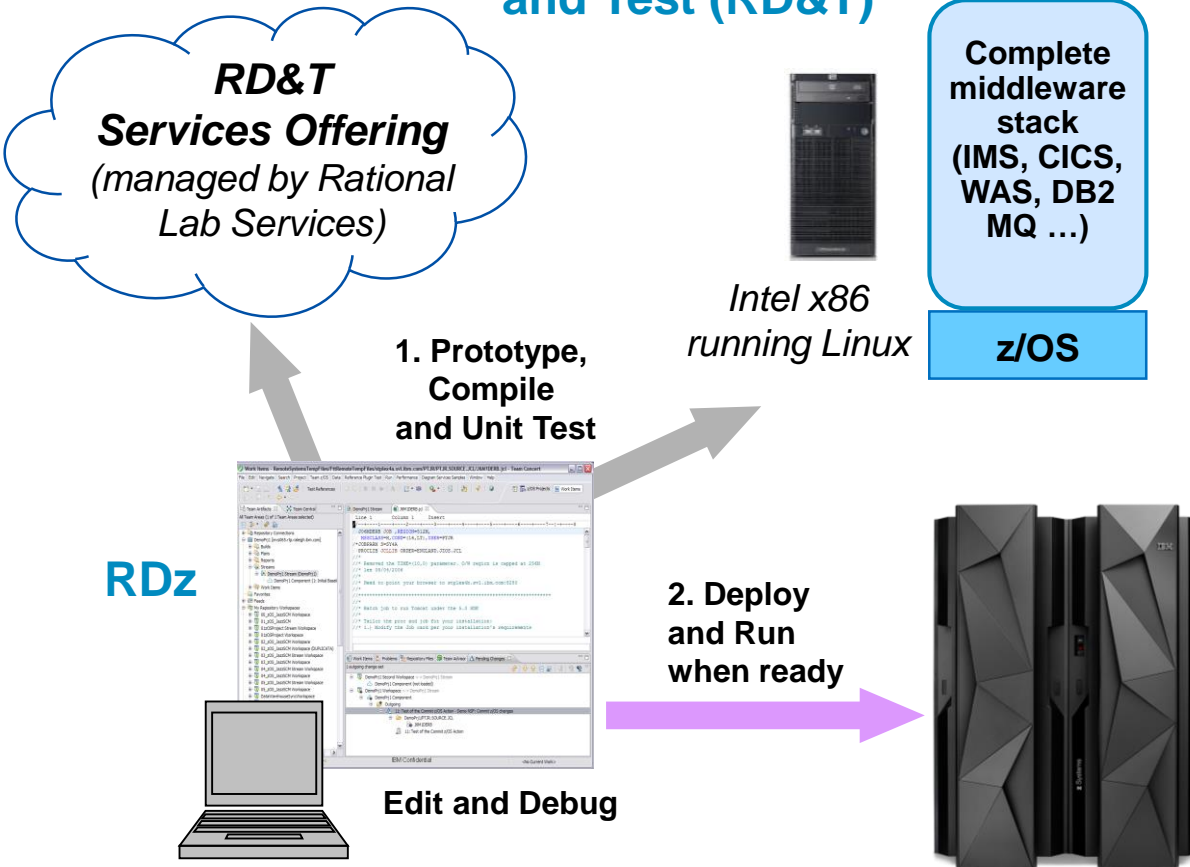
The screenshot displays the Rational Developer Traveler web interface for editing a JCL file. The interface includes a browser window at the top, a navigation menu, and a main editing area. On the left, there is a 'Navigable outline view of code' showing a tree structure of the JCL components. The main area shows the JCL code with a 'Warnings and errors in margin' column on the left side of the code lines. On the right side, there are 'References become live hyperlinks' pointing to specific datasets mentioned in the code. At the top right of the editing area, there are buttons for 'Save' and 'Submit JCL', with an annotation 'Save and submit JCL, find referenced datasets' pointing to them. The bottom of the interface shows the version 'IBM Rational Developer Traveler V1.0.1 (20140224-1503)' and a 'FAQ | Ask a Question' link.

Visit the IBM Rational Developer Traveler Community on IBM developerworks



To reduce mainframe costs and simplify operations, perform agile compilation and unit testing off-platform

Rational Development and Test (RD&T)



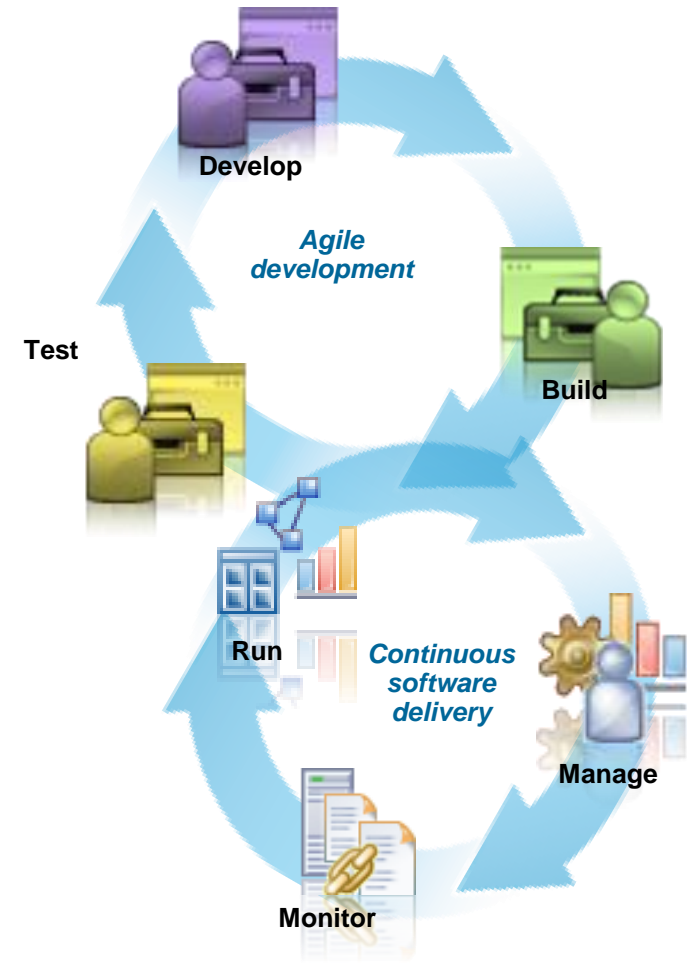
- Compile and Unit Test *off* the mainframe
 - Reduce MIPS costs
 - Eliminate delays
 - No interruptions to mainframe production
- RD&T desktop server runs z/OS and all mainframe software
 - Cloud-based services offering also available
- Stack is continuously updated to emulate the latest releases of z Systems hardware and software

Today, digital business necessitates a DevOps approach for continuous development and operations on z Systems

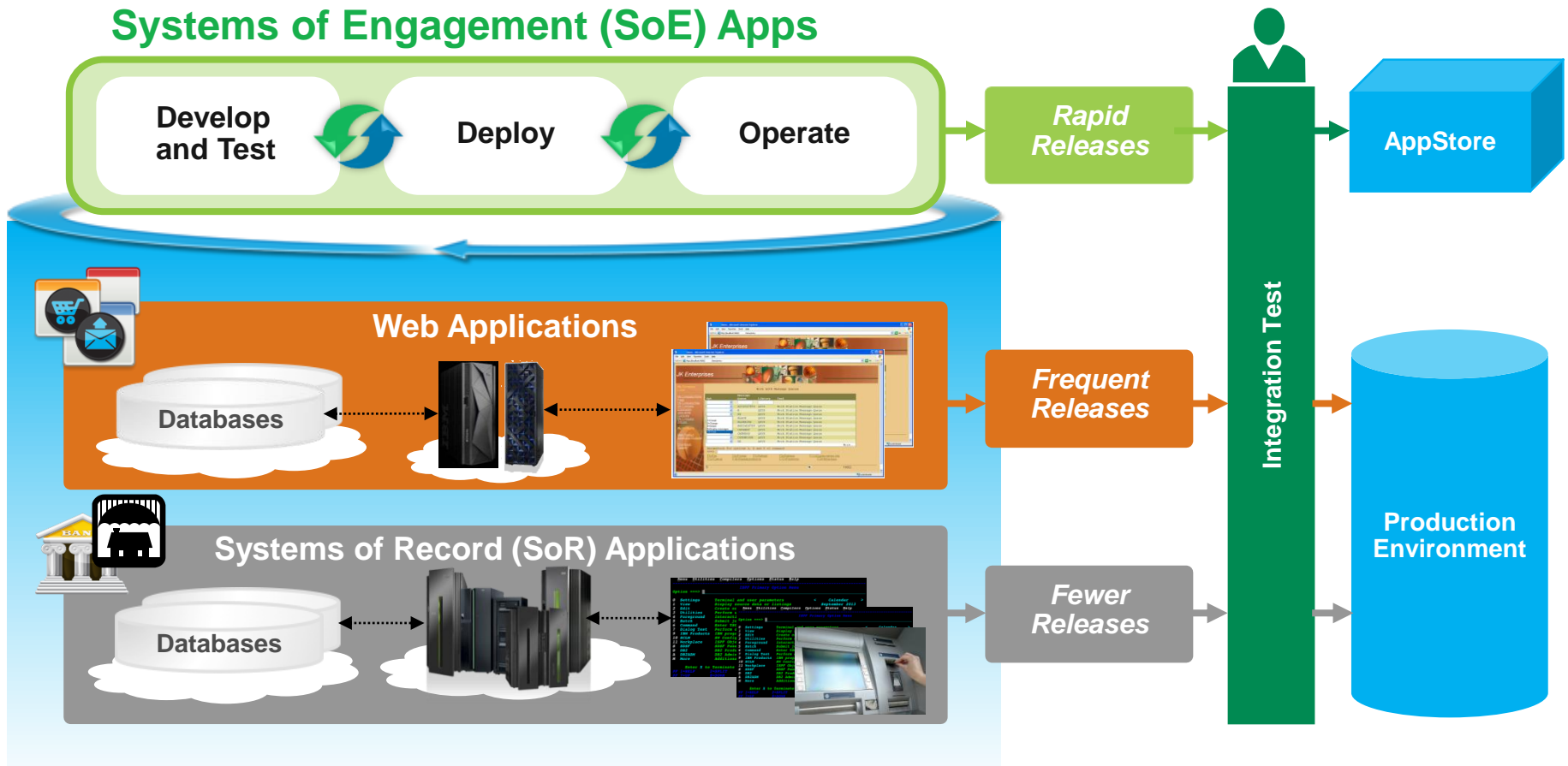
Today, customers expect better product quality and shorter release cycles. Businesses must meet this challenge, while keeping costs low

DevOps:

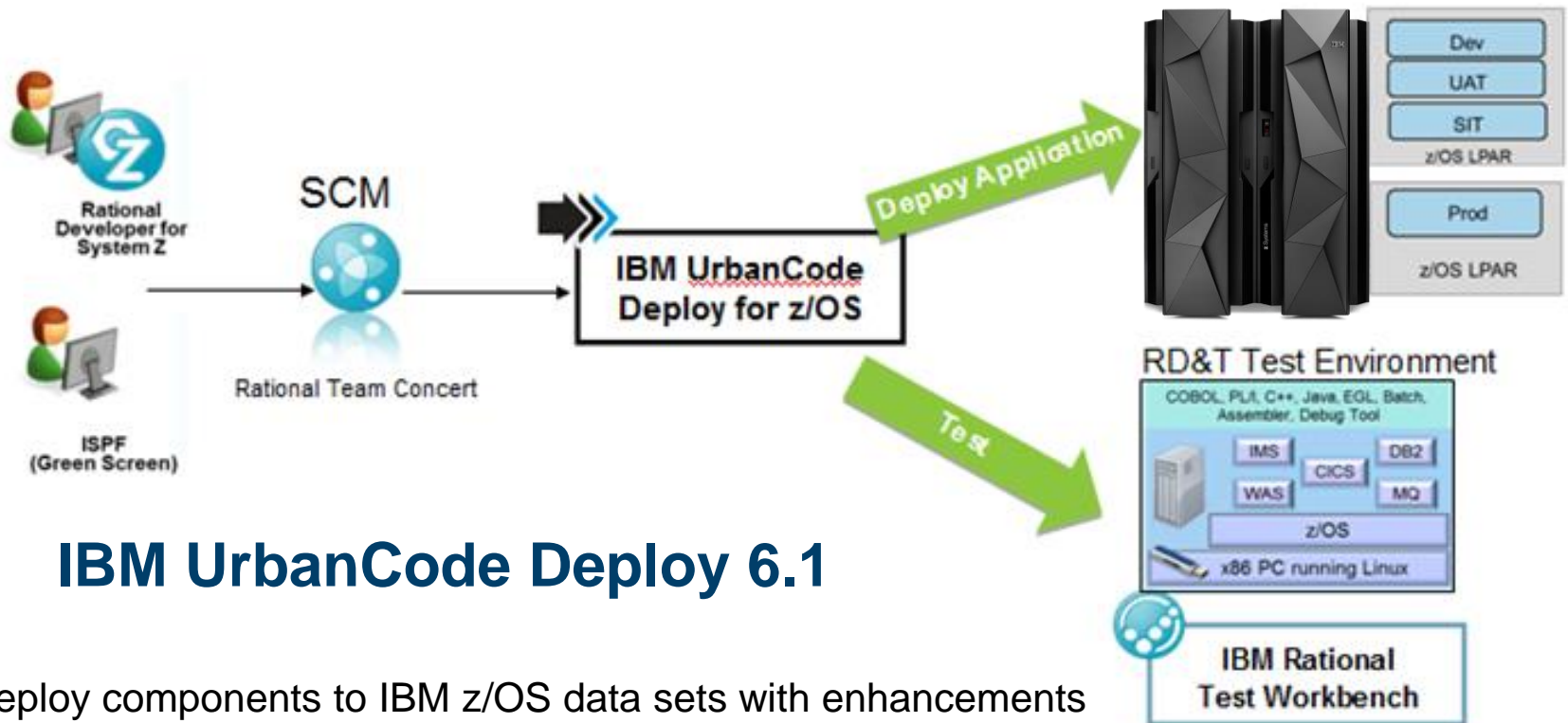
- A process that addresses this challenge
- Unites Development and Operations around a continuous and agile delivery model
- Enables Testers to have production-like environments
- Ensures an integrated view to govern and manage end-to-end continuous delivery pipeline



DevOps tools manage and coordinate mobile, cloud and mainframe deployments



Save costs by automating DevOps deployment and testing on back-end Systems of Record



IBM UrbanCode Deploy 6.1

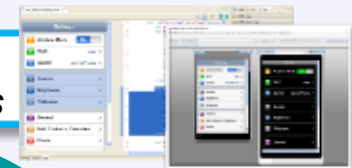
- Deploy components to IBM z/OS data sets with enhancements to display partitioned data set members in component versions
- Set up artifact repositories in agent relays that cache downloaded artifacts
- Use IBM Rational Test Workbench to drive testing while temporarily simulating missing components

Rational tools offer many DevOps capabilities for mobile apps with enterprise systems

- Rational Test Workbench
- IBM MobileFirst Platform
- IBM DevOps Services for Bluemix
- Rational Application Developer
- IBM UrbanCode Deploy
- Rational Developer for the Enterprise

Accelerate mobile application development

Construct, debug, and test mobile and Web applications



Refactor and extend existing logic as mobile-consumable services



Through the Academic Initiative, IBM is working to train new mainframe developers and administrators

- Since its inception in 2003, the program has grown significantly benefiting schools, students, and clients
- Market place demand for enterprise systems resources over the last decade has remained strong
- Our clients have expressed continued interest in expanding the program to ensure a healthy ecosystem

<http://www.ibm.com/university/systemz>

Professional Connections
9 Communities

Corporate Engagement
360+ companies actively recruiting

Job Candidates
Over 4,200 Job Seekers

Growth
64K+ Students
1,000+ Schools
in 70 countries

Program Investment
\$10M+ over
in 10 years



IBM also sponsors Master the Mainframe – a contest to grow high school and university talent worldwide

A three-part contest of increasing difficulty offered to students around the world



2014 Master the Mainframe
World Championship
New York City

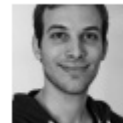
43 students from **23** countries



Yong-Siang Shih - 1
Score: 3407
National Taiwan University
Taiwan



Rijnard van Tonder - 2
Score: 3329
Stellenbosch University
South Africa



Philipp Egli - 3
Score: 3186
University of Brighton
United Kingdom



Mugdha Kadam - 4
Score: 3031
University of South Florida
United States

<http://www.ibm.com/systems/z/education/academic/masterthemainframe/>

68,000+

Participants
since 2005!

Use the IBM z Systems Job Connector to find needed skills



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Welcome to the IBM z Systems Job Connector!

The IBM z Systems platform is at the heart of what organizations everywhere depend upon to drive enterprise level cloud, mobile, and analytic solutions - all with unmatched security. The IBM z Systems Job Connector website has been designed to support employers and candidates interested in filling/finding enterprise computing jobs that require skills and familiarity with IBM z Systems mainframe technology. Start your z connections right here today!

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- ▶ Access Your Recruiter Account

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IBM zIQ – Can you go five minutes

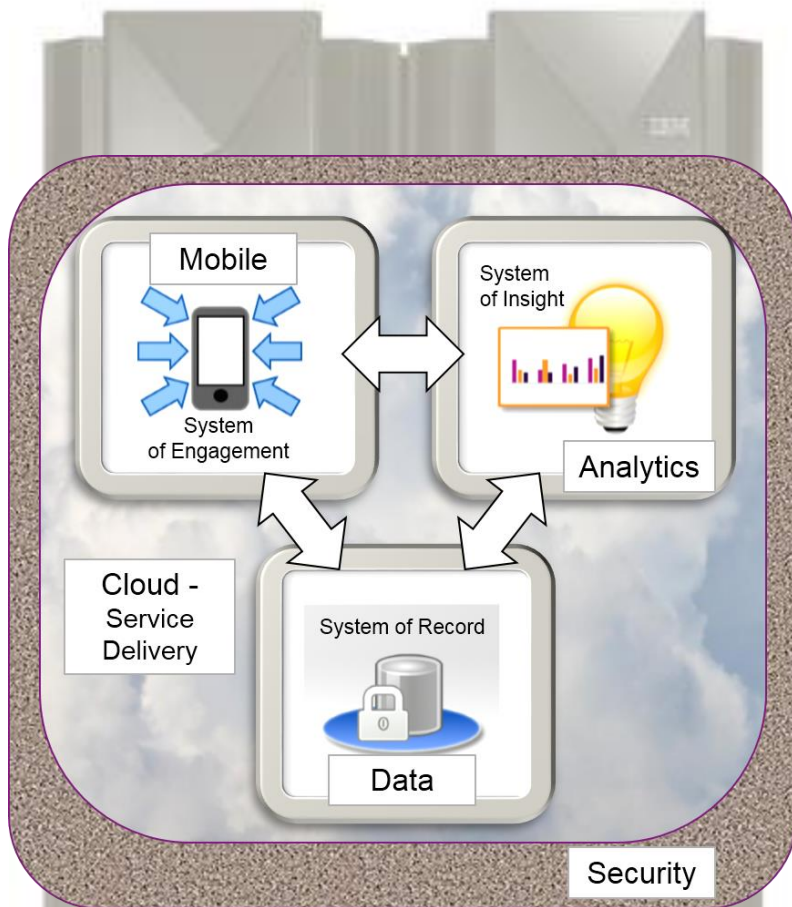


Manages **80%** of all corporate data

Enables the majority of enterprise transactions

0:00 / 0:51 YouTube

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Easy-to-use, GUI-based administrative tools

z/OSMF
z/OS Explorer

Rich, familiar development tools

Rational Developer for z
Rational Development & Test

Worldwide university training programs

Academic Initiative
Master the Mainframe

4,200+

Academic Initiative graduates seeking jobs!