

# Positioning Your Enterprise for Cloud, Analytics and Mobile Computing

Easy and agile development and administration  
for cloud, analytics and mobile computing



# Sessions in this track

1. Positioning your enterprise for cloud, analytics and mobile computing  
*Break (15 minutes)*
2. The mainframe and mobile computing: A perfect match  
*Break (15 minutes)*
3. Scoring fast and winning big with analytics on z Systems  
*Lunch (60 minutes)*
4. Implementing hybrid clouds with z Systems  
*Break (15 minutes)*
5. **Easy and agile development and administration for cloud, analytics and mobile computing**  
*Break (15 minutes)*
6. Building the business case 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

new accounts  
over last four years

12%

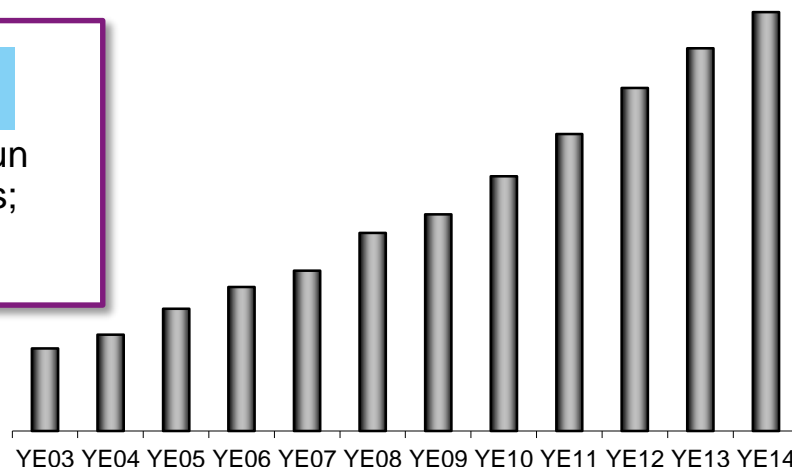
growth in  
installed IFL  
MIPS (YTY)

7,600+

ISV applications run  
on IBM z Systems;  
650 new apps  
added in 2014

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

Total Installed Capacity



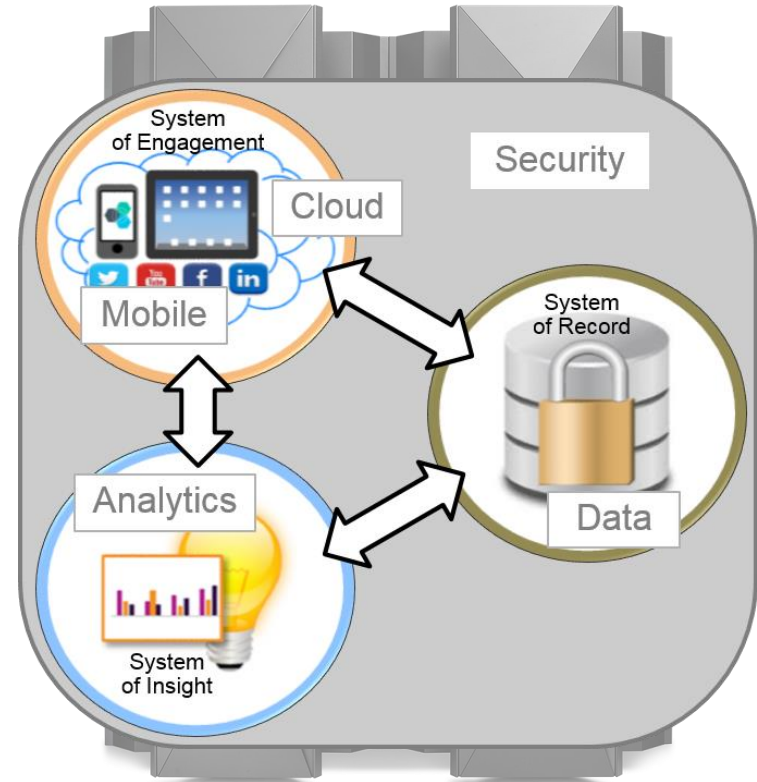
***It's important for businesses to keep their pipelines for new, skilled z Systems talent full!***

# IBM is committed to helping businesses find and keep new z Systems staff

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



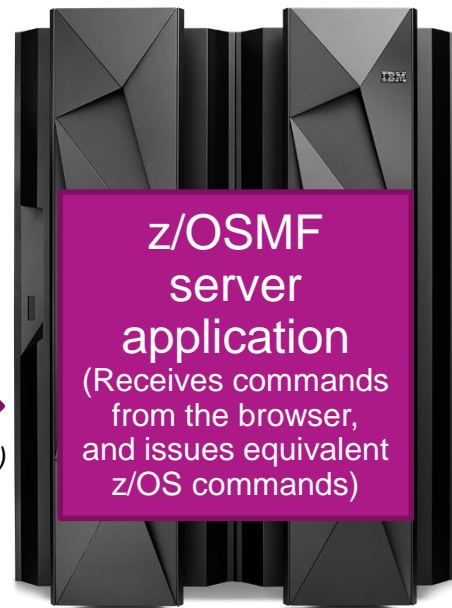
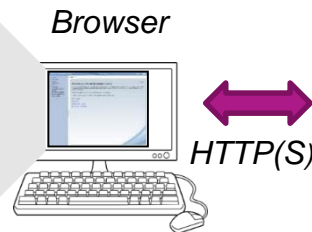
# IBM z/OS Management Facility (z/OSMF) is a modern, browser-based console...

*...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



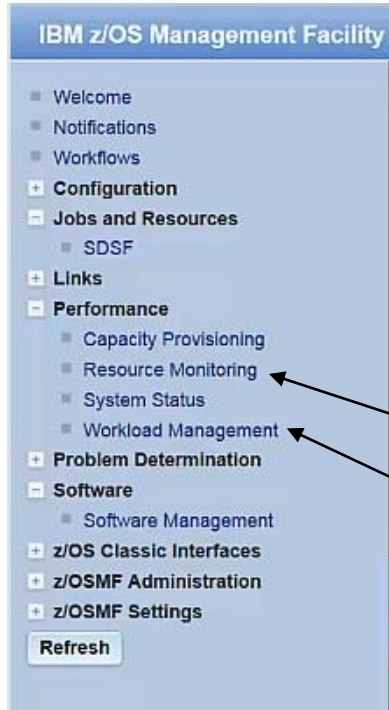
z/OSMF



Competitive Project Office

# DEMO: Just in! An email that online banking isn't meeting Service Level Agreements...

## z/OSMF navigation bar



## Without z/OSMF, finding the problem can be laborious

- Find WLM screen, open it, search for where definitions are saved or extract them from data sets...
- Figure out the transaction class for the transactions...
- Search to find the rules in WLM for this type of server, then search the rules to find the service class...
- Back out of rules in WLM, and go into Service Classes. Search for and open up the appropriate service class...
- .....

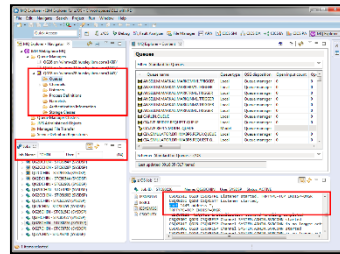
## With z/OSMF, the task is much simpler

- Click Resource Monitoring to examine all workload response times. Immediately identify which workload is at fault
- Click link to go directly to appropriate Service Class in WLM. Workload settings are immediately obvious.
- Click another link to navigate to the appropriate Policy and increase the percentage

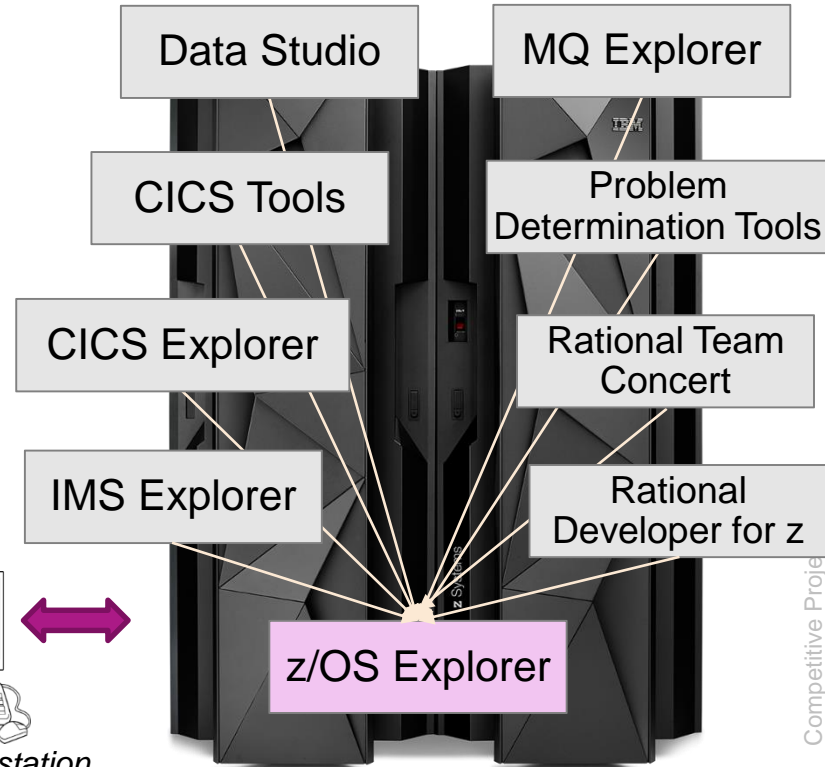
# IBM Explorer for z/OS is an extensible application providing additional rich administrative tools

- 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.
- Easily manage across an entire CICS Parallel Sysplex
- Because it's Eclipse-based, other tools can be integrated into the same view (MQ Explorer)

The screenshot displays the IBM CICS Explorer interface. The main window is titled 'IBM CICS Explorer' and shows a tree view on the left with 'CICS Explorer' expanded to show 'CICSXP1 (6/6)' and 'DUMMY907 (0/1)'. The central pane shows 'TASKID(000049C) under TRANSID (MAIL) in Region IYDZE08' with a list of TCB Modes Used. The right pane shows 'Transaction(MAIL) in All Regions' with a table of resources used and a bar chart of response times. The bottom right pane shows 'Queues' with a list of queue names and types.

Name	Version	Create T...	Change T...	Description	Status
PHLL	1	09-Jun-20...	09-Jun-20...		ENA
RLINK	1	29-Nov-2...	29-Nov-2...		ENA
RSLEEP	1	22-Nov-2...	22-Nov-2...		ENA
RSTART	1	24-Nov-2...	24-Nov-2...		ENA

Queue name	Queue type	QSG di...
IYK3Z09A.INIT.QUEUE	Local	Queue
IYK3Z09A.REQUEST.QU...	Local	Queue
IYK3Z09A.RESPONSE.Q...	Local	Queue
IYK3Z15A.INIT.QUEUE	Local	Queue
IYK3Z15A.REQUEST.QU...	Local	Queue
IYK3Z15A.RESPONSE.Q...	Local	Queue
IYK3Z16A.INIT.QUEUE	Local	Queue
IYK3Z16A.REQUEST.QU...	Local	Queue
IYK3Z16A.RESPONSE.Q...	Local	Queue
KESHARP.ATEST.KS15...	Local	Queue

Transaction ID	Response time (seconds)
PTS1 (196)	~0.1
PTS1 (804)	~0.8
PTS1 (4)	~0.4

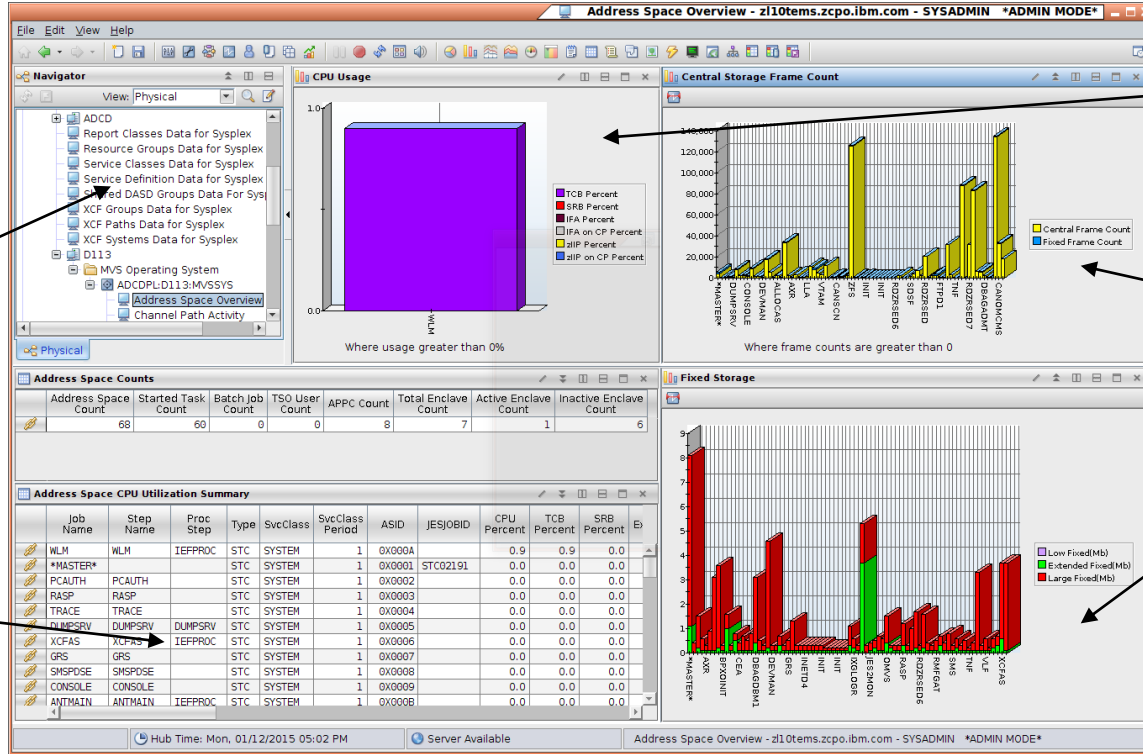


# Additional GUI-based tools enable efficient management of the entire enterprise

Tivoli Enterprise Portal

Navigate among objects

View address space CPU utilization



Monitor CPU usage

Monitor central storage frame count and fixed storage

Competitive Project Office

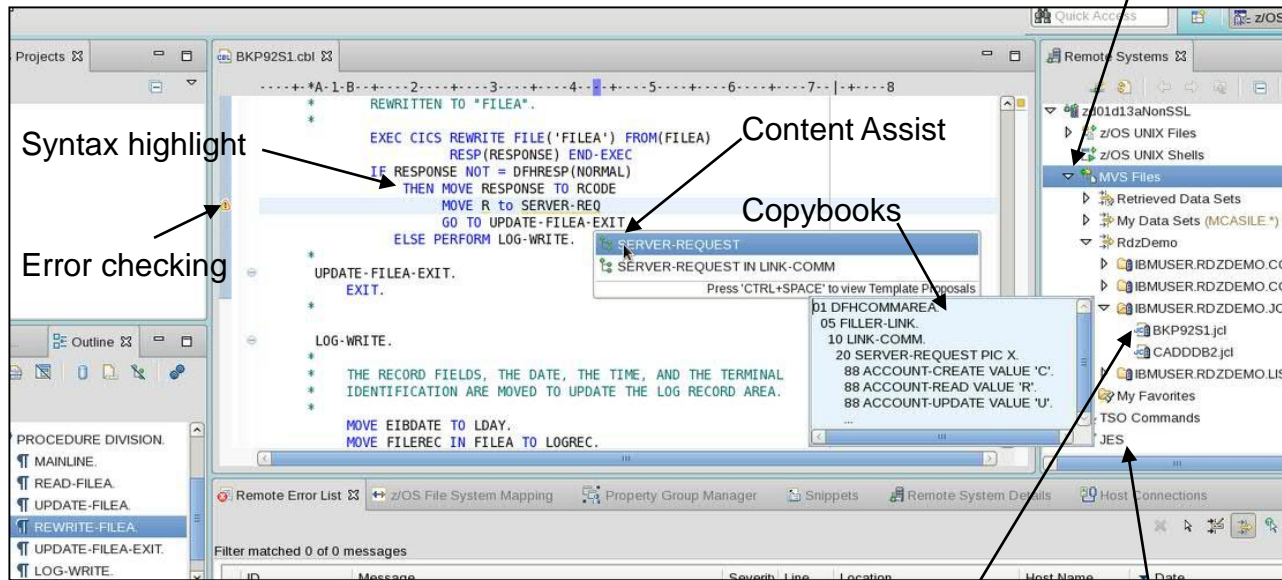


# Developers use familiar, workstation-based tools for mainframe application development

- 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

## Rational Developer for z (RDz)

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



Syntax highlight

Error checking

Content Assist

Copybooks

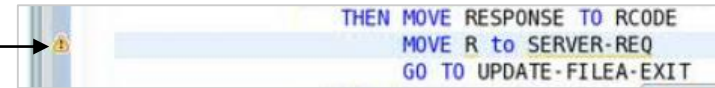
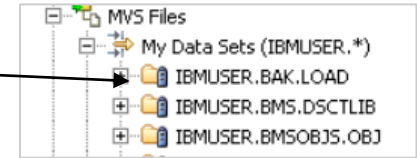
Outline view presents COBOL structure

Edit/Submit JCL

View JES output

# DEMO: RDz makes 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 with multi-faceted, integrated tools

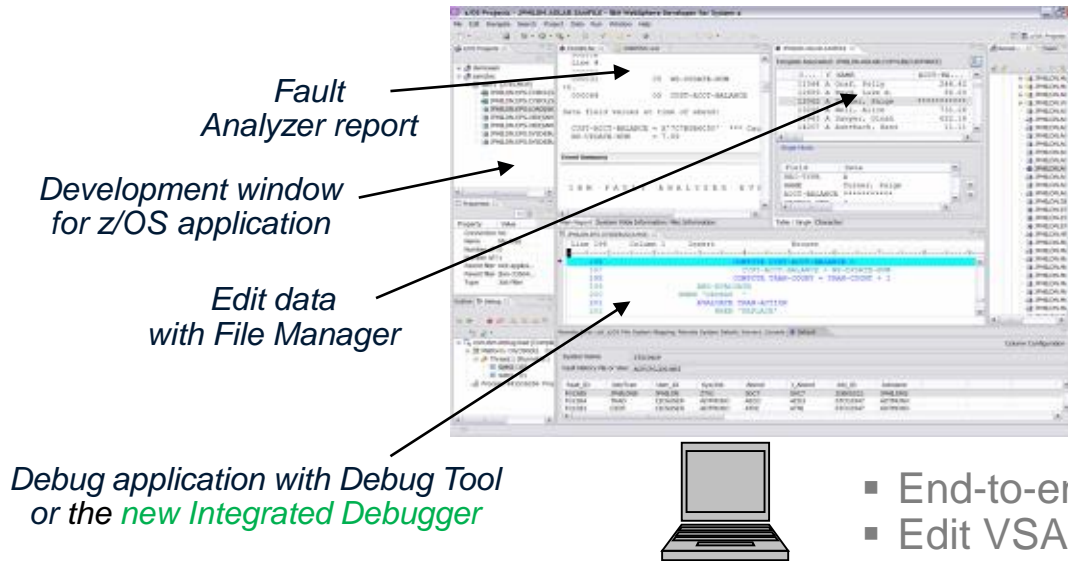
- Features in RDz enable cross-pollination of development skills
- RDz makes it easy for Java developers to also contribute to COBOL applications
- Build for z/OS, for Linux on z, for a cloud of Linux on z servers, etc.

The image displays three overlapping screenshots of the IBM Rational Developer for System z (RDz) interface, illustrating different development perspectives:

- Remote System Explorer:** The leftmost screenshot shows the 'Remote System Explorer' perspective. It features a tree view on the left with 'z/OS UNIX Shells' and 'MVS Files'. A red box highlights the text: "Use the Remote System Explorer perspective to see Partition Data Sets on z Systems".
- z/OS Projects:** The middle screenshot shows the 'z/OS Projects' perspective. It displays a project tree for 'SOF\_ZOS\_Project' and a code editor showing COBOL code. A red box highlights the text: "Switch to the z/OS Projects perspective to edit COBOL files".
- Java:** The rightmost screenshot shows the 'Java' perspective. It displays a project tree for 'SOFJavaProject' and a code editor showing Java code. A red box highlights the text: "Switch to the Java perspective to edit Java files".

# Mainframe Problem Determination Tools are integrated into the RDz development environment

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

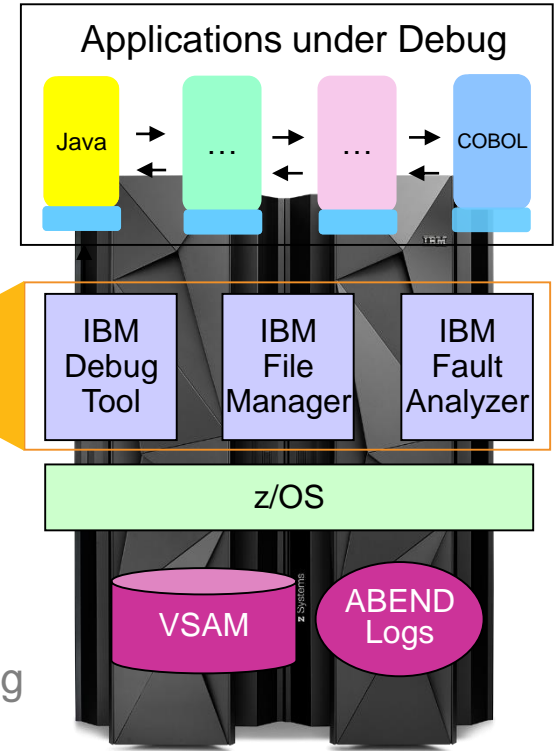


Fault Analyzer report

Development window for z/OS application

Edit data with File Manager

Debug application with Debug Tool or the new Integrated Debugger

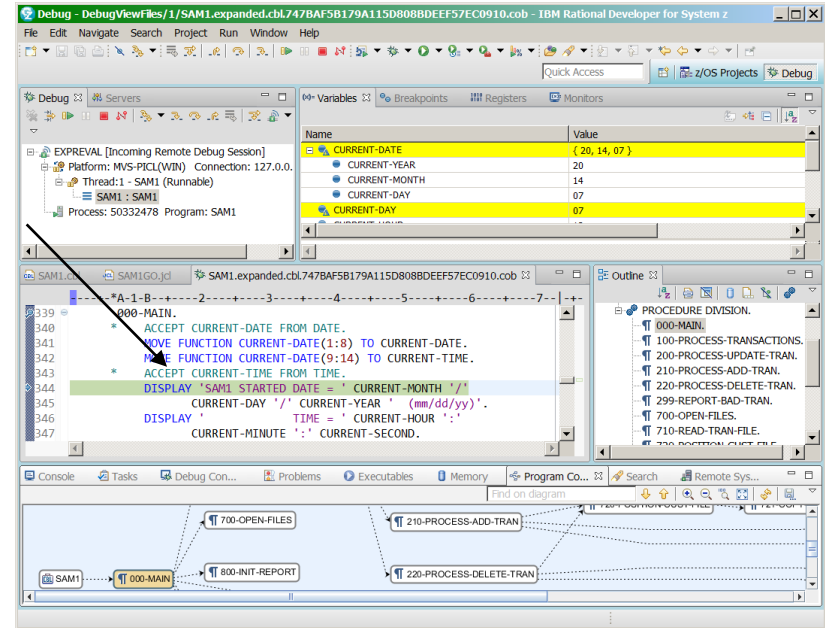


- End-to-end debug
- Edit VSAM data
- Analyze ABEND logs!

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

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

*A problem report comes in...*



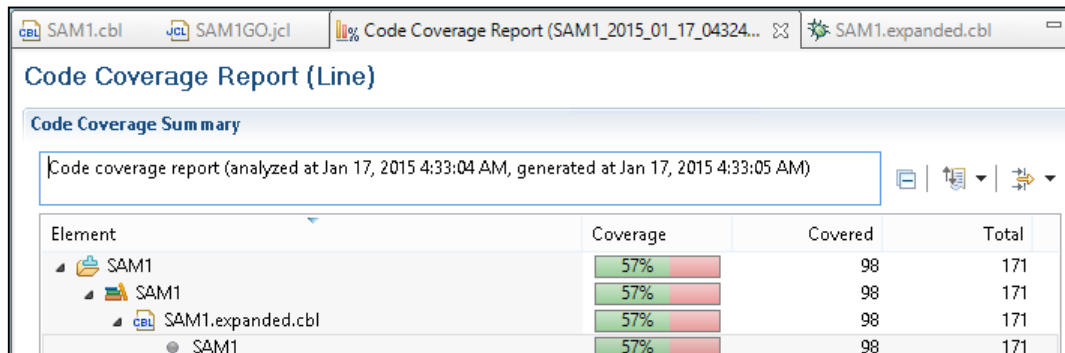
# Developers easily view execution statistics for a program using the Code Coverage feature

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

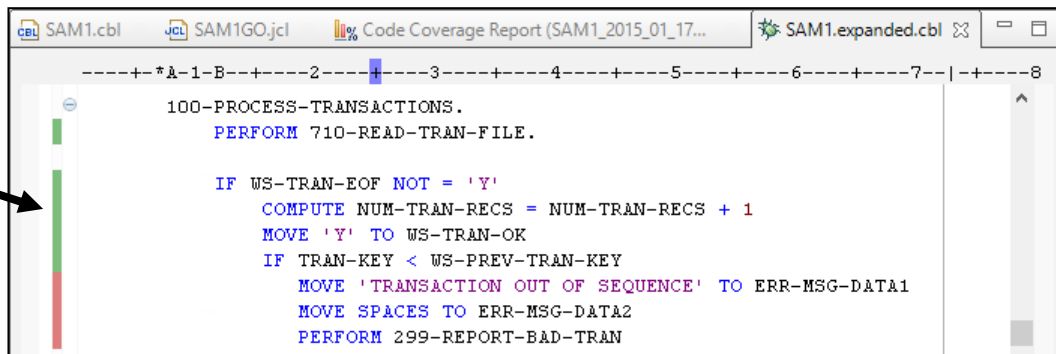
```
//***** ADDITIONAL RUNTIME JCL HERE *****  
//CEEOPPTS DD *  
  ENVAR("AQE_STARTUP_KEY=CC EXPREVAL")  
//AQEV4LST DD DISP=SHR,DSN=IBMUSER.RDZDEMO.LISTING
```

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

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





# Businesses reap the benefits of modernizing with RDz



- Produced **better quality code** that led to fewer deployments onto test environments
  - Implemented standard interfaces that enabled a **DevOps** strategy toward continuous testing
- 



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



- Successfully moved to **agile development** methodology with IBM Rational Solution for Collaborative Lifecycle Management
- **Accelerated the delivery of business value** while reducing the risks associated with software development

# Rational Developer Traveler enables 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

Visit the IBM Rational Developer Traveler Community on IBM developerworks



Save and submit JCL, find referenced datasets

Warnings and errors in margin

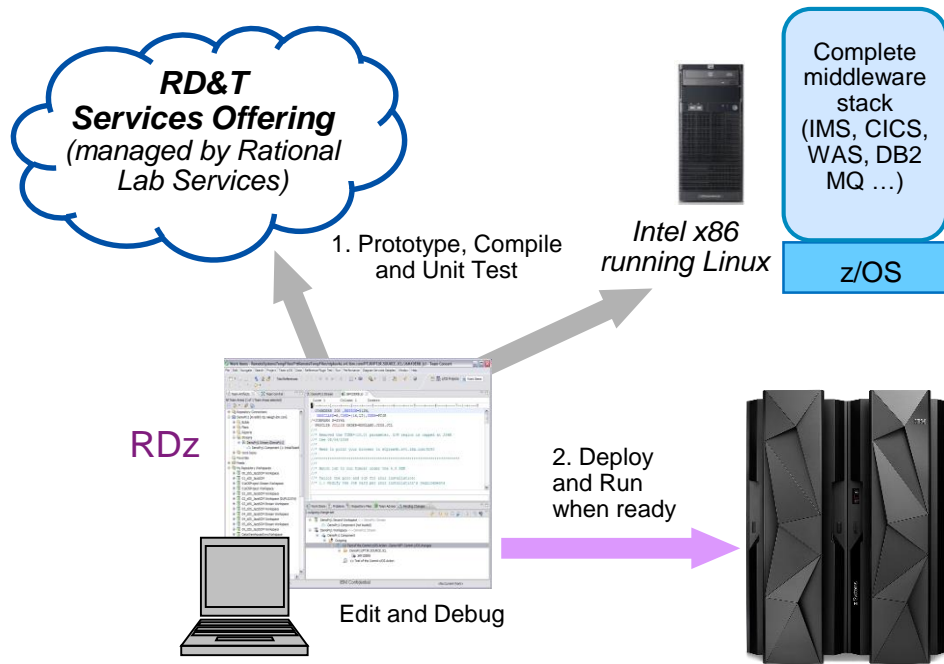
References become live hyperlinks

Navigable outline view of code

```
1 / RDTXPP JOB 'sample',CLASS=O,MSGCLASS=5,NOTIFY=&SYSUID.
2 / PROCLIB 3CLTLE ORDER=(RDT,RTUTIL,RDTPROC)
3 / DDPARM 1=1,1=50
4 /*
5 /* Delete/Allocate the VSAM dataset
6 /*
7 / CREATE EXEC PGM=IDCAMS
8 / SYSTN DD *
9 DELETE USER26.IQVTCAR.HSTFILE -
10 PURGE
11 DEFINE CLUSTER -
12 (NAME(USER26.IQVTCAR.HSTFILE) -
13 INDEXED -
14 RECSZ(80 80) -
15 KEYS(16 6) -
16 CYLINDERS(2))
17 /*
18 /SYSPRINT DD SYSOUT=*
19 /*
20 /* Compile the source code
21 /*
22 /COB EXEC COBCC
23 /SEPARATE=NOADY,NOOVI,NOHARE,NONAMBER,QUOTE,SEQ,XREF,VBREF,DUMP,'LIB'
24 /SYSTN DD DSN=&SYSUID.,SANDBOX.SAMPLE.COBOL(IQVTCARA),DISP=SHR
25 /SYSLIB DD DSN=&SYSUID.,SAMPLE.COPY,DISP=SHR
26 /SYSLIN DD DSN=&SYSUID.,SANDBOX.SAMPLE.OBJ(IQVTCARA),DISP=SHR
27 /CEEDUMP DD SYSOUT=*
28 /SYSPRINT DD SYSOUT=*
29 /*
30 /* Link (bind) the application
31 /*
32 /LINK EXEC PGM=IEWBLTN,COND=(8,LT,COB,CPPLE)
33 /SYSLIN DD DSN=&SYSUID.,SAMPLE.OBJ(IQVTCARA),DISP=SHR
34 /SYSDUMP DD DSN=&SYSUID.,SAMPLE.LOAD(IQVTCARA),DISP=SHR
35 /SYSLIB DD DSN=CEE.SCEEKED,DISP=SHR
36 /SYSPRINT DD SYSOUT=*
37 /*
38 /* Run the application
39 /*
40 /GO EXEC PGM=IQVTCARA,COND=(8,LT,LINK)
41 /STEPLIB DD DSN=&SYSUID.,SAMPLE.LOAD,DISP=SHR
42 /*
43 /COPYRTR DD DSN=USER26.IQVTCAR.HSTFILE,DISP=SHR
44 /LOCCODE DD DSN=COBOL.V4R2W0.SIGYSAPP(IQVTCARA),DISP=SHR
45 /UPDTMANS DD DSN=COBOL.V4R2W0.SIGYSAPP(IQVTCARA),DISP=SHR
46 /SYSDUMP DD SYSOUT=*
47 /UPRINT DD SYSOUT=*
```

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

## Rational Development and Test (RD&T)



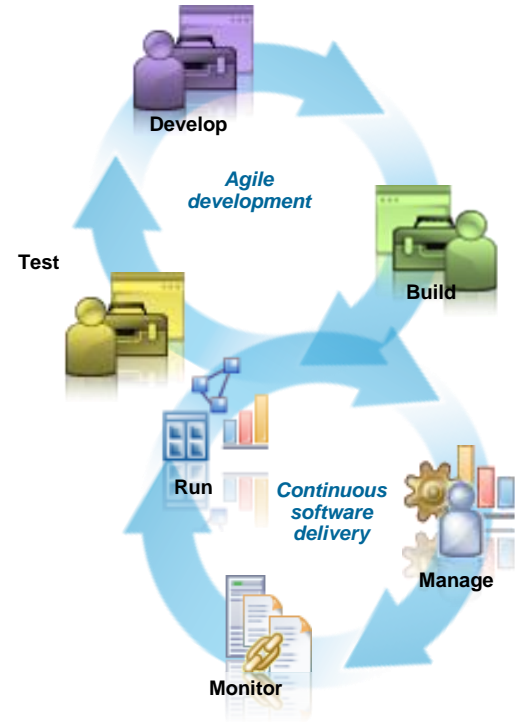
- Compile and Unit Test *off* the mainframe
  - Reduce MIPS costs, eliminate delays
  - No interruptions to mainframe production
- RD&T desktop server runs z/OS and all mainframe software
  - Cloud-based services offering also available
- Stack is continuously updated to emulate the latest releases of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

# Digital business necessitates a DevOps approach for continuous development and operations

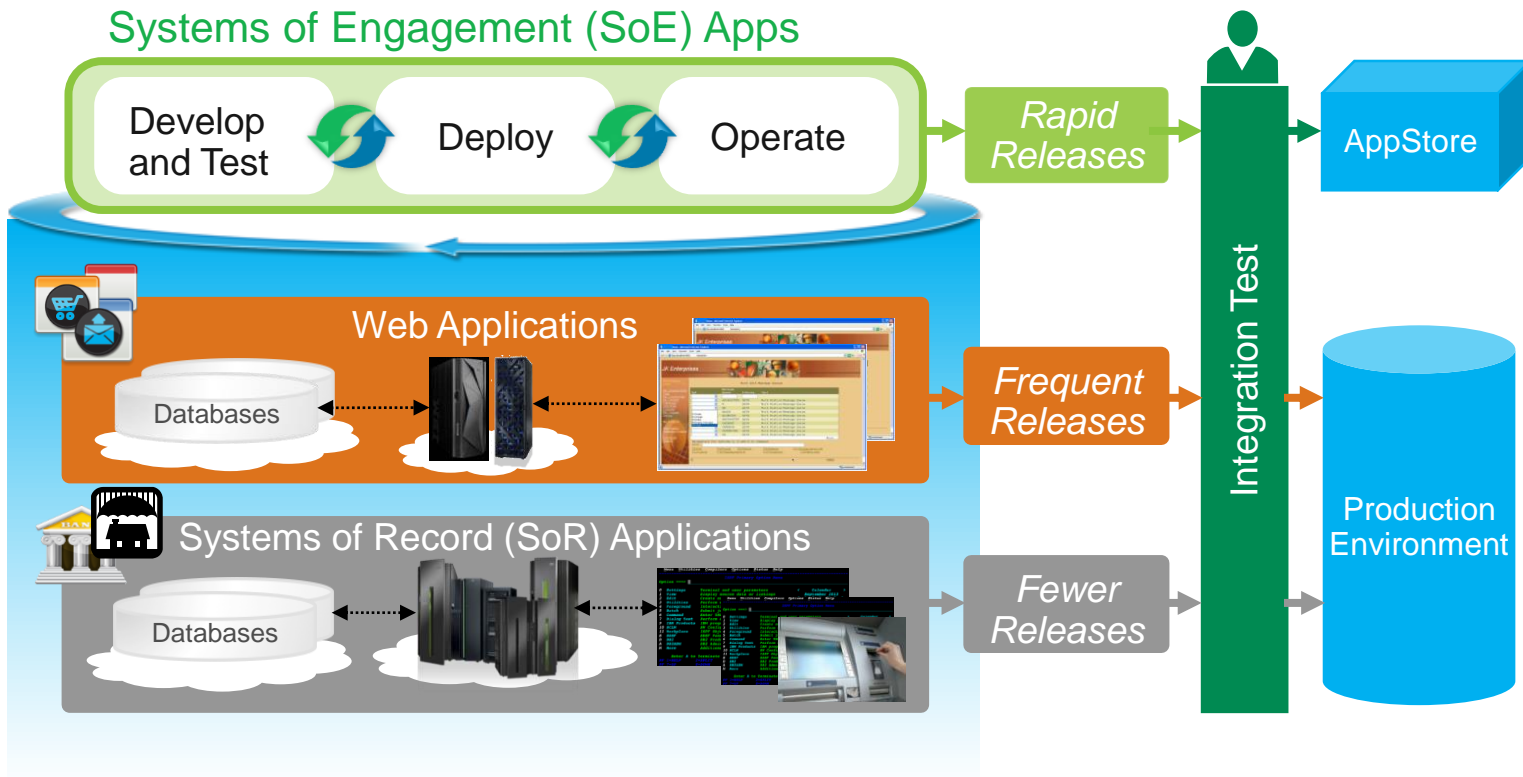
Today, customers expect **better product quality** and **shorter release cycles**. Businesses must meet this challenge, while **keeping costs low**

## 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

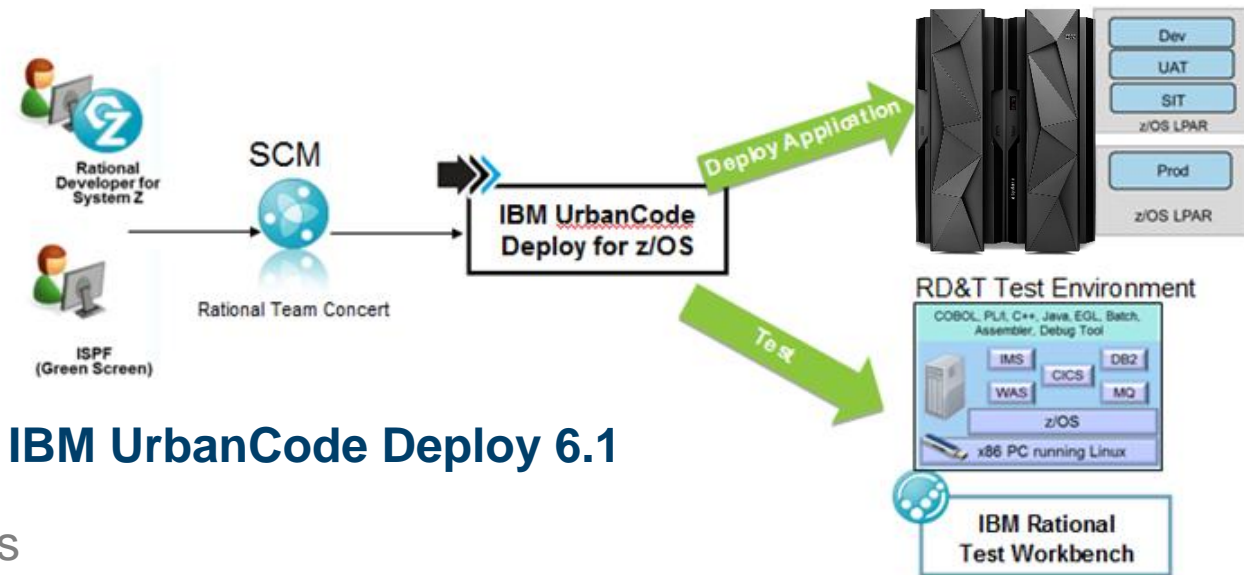


# DevOps tools manage and coordinate mobile, cloud and mainframe deployments



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

- 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



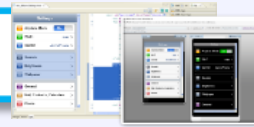
## IBM UrbanCode Deploy 6.1

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

Rational Test Workbench  
IBM MobileFirst Platform  
IBM UrbanCode Deploy  
Rational Developer for the Enterprise

Accelerate mobile application development

Construct, debug, and test  
mobile and Web applications



Design

Code

Deploy

Test



Refactor and extend existing logic  
as mobile-consumable services

Continuous Delivery

Open Lifecycle and Service Management  
Integration Platform

Jazz



# With the Academic Initiative, IBM is working to develop and train new mainframe skills

- 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>

**Program Investment**  
\$10M+ over  
in 10 years



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



**Job Candidates**  
Over 4,200  
Job Seekers



**Corporate Engagement**  
360+ companies  
actively recruiting



**Professional Connections**  
9 Communities



Competitive Project Office



# The Academic Initiative is also partnering to offer mainframe-focused MOOCs...

*...Massive Open Online Courses*

**MARIST**

“An Introduction to Enterprise Computing”

<https://mooc.marist.edu/web/ecc>



**SYRACUSE UNIVERSITY**

“Enterprise Computing Strategies”

<http://ischool.syr.edu/contact/forms/ecsmooc.aspx>



“Introduction to Linux”

<https://www.edx.org/course/introduction-linux-linuxfoundationx-lfs101x-2>

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



**68,000+**

Participants  
since 2005!

2014 Master the Mainframe World  
Championship New York City

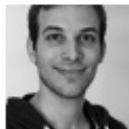
**43** students from **23** countries



**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

Coming soon, the “2016 z Systems  
Master the Mainframe World Championship”

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

# Use the IBM z Systems Job Connector to find needed skills



<http://systemzjobs.com>

## 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!

### Employers

- ▶ Post a Job
- ▶ View Resumes
- ▶ Products and Pricing
- ▶ Access Your Recruiter Account

### Job Seekers

- ▶ Search Jobs
- ▶ Post a Resume
- ▶ Set up an Email Job Alert
- ▶ Access Your Job Seeker Account

Keyword Search:

Go

[Advanced Search](#)

### Featured Jobs

#### Office Manager/EA

New York, NY  
MarketShare

#### Mainframe Systems Programmer

Harrisburg, PA  
PHEAA



# IBM is committed to helping businesses find and keep new z Systems staff

## 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!

