

IBM z Systems – Redefining Digital Business

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



Agenda

1. Positioning your enterprise for cloud, analytics and mobile computing
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**
6. Building the business case for cloud, analytics and mobile computing
Wrap up and Q&A

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

318

new accounts
over last four years

13%

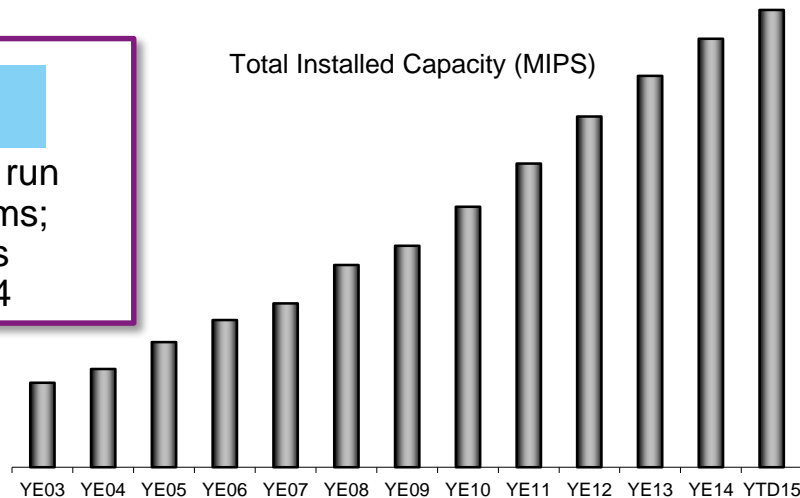
growth in
installed IFL
MIPS (YTY)

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 (MIPS)



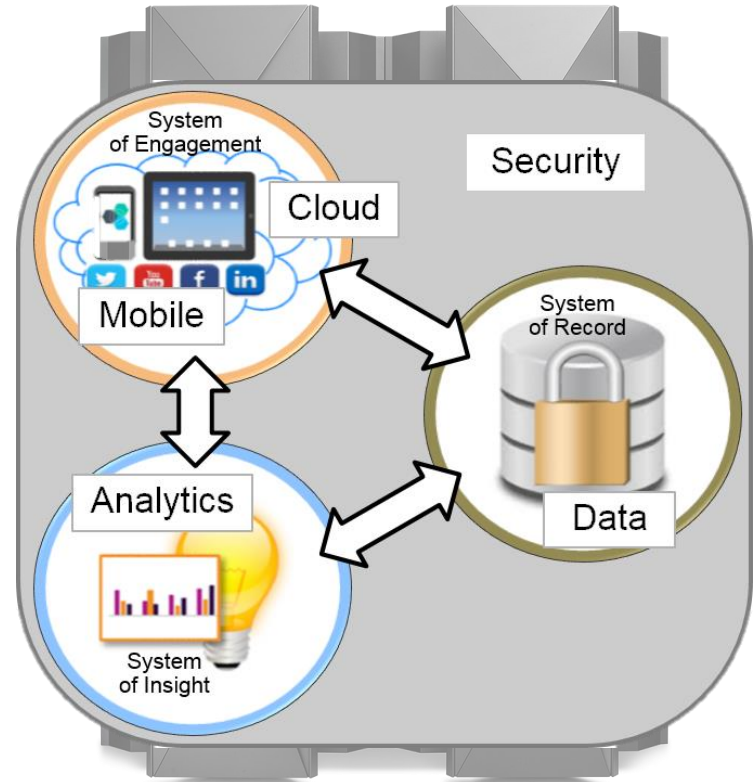
It's important for businesses to keep their pipelines for new, skilled z Systems talent full!

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



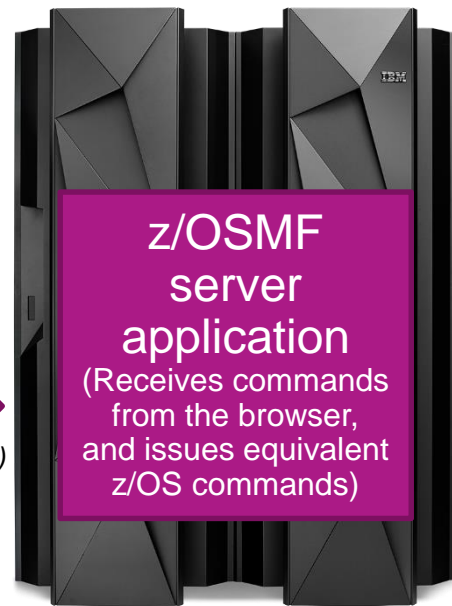
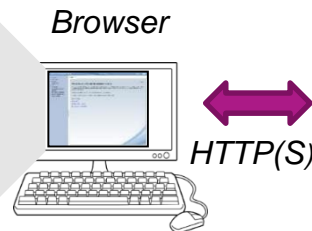
IBM z/OS Management Facility (z/OSMF) is a modern, browser-based console...

...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



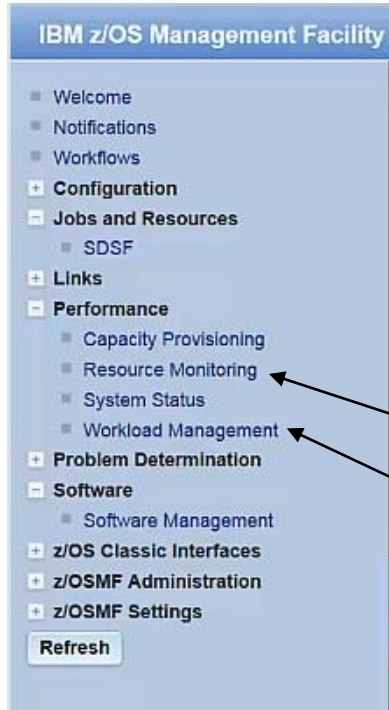
z/OSMF



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...
-

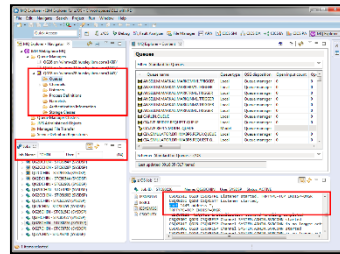
With z/OSMF, the task is much simpler

- 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

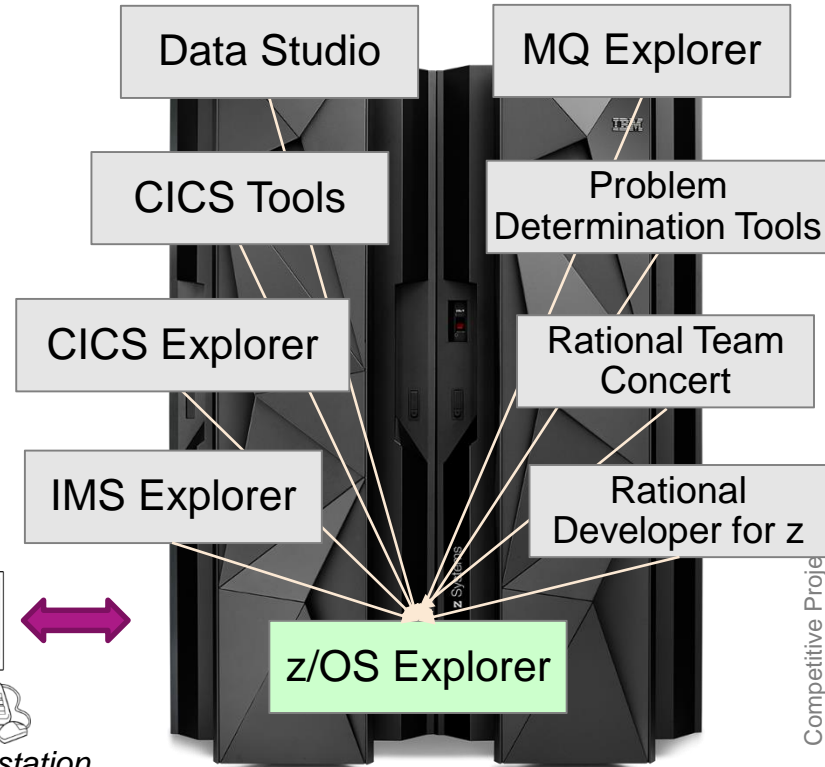
IBM Explorer for z/OS is an extensible application providing additional rich administrative tools

- 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 application interface. The main window is titled 'IBM CICS Explorer' and contains several panes:

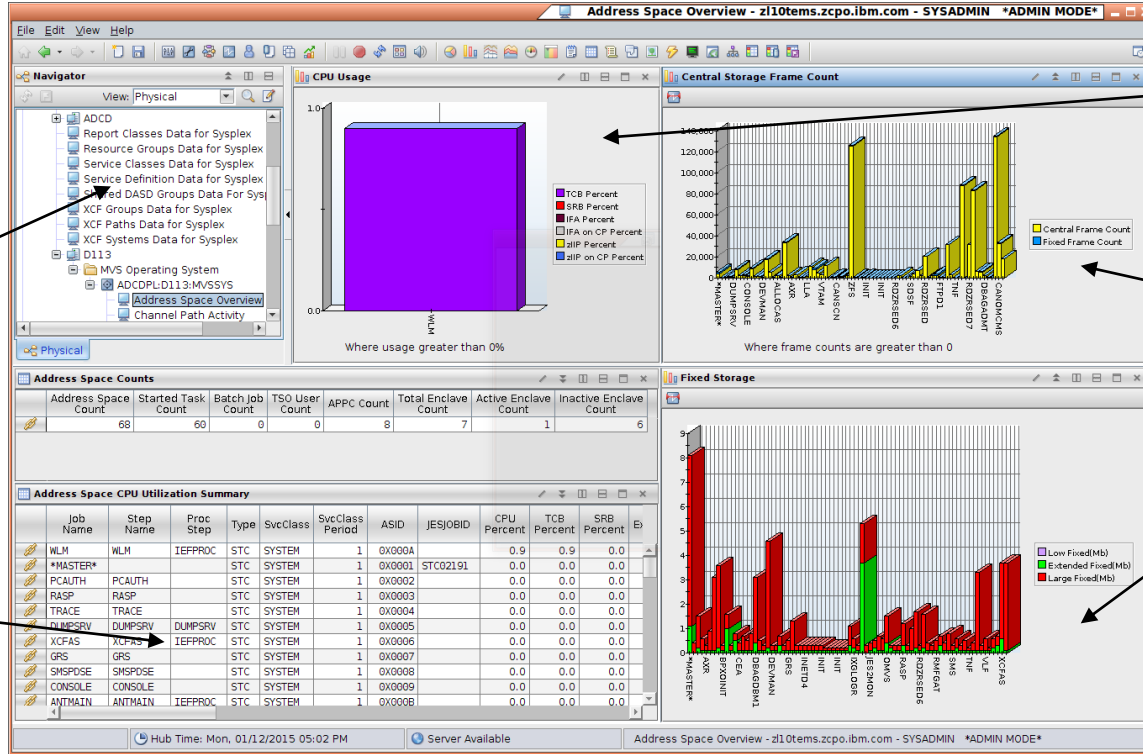
- Left Pane:** Shows a tree view of CICS resources. A tree item 'CICS Explorer' is expanded to show 'CICSEXP1 (6/6)' and 'DUMMY907 (0/1)'. Below this, 'CICSplex Repositories' and 'Command Flow' are visible. A task control block for 'MAIL' is shown with a list of commands like 'Start of trans: QR', 'Getmain STC QR', etc.
- Top Center Pane:** Displays a table of CICS resources. The table has columns for Name, Version, Create T..., Change T..., Description, and Status. Resources listed include PHLL, RLINK, RSLERP, and RSTART.
- Bottom Center Pane:** Shows a 'Transaction(MAIL) in All Regions' view. It includes a 'Resources used' section with a tree view of resources like CSQ4VD0, CSQ4VD1, CSQ4VD2, and CSQ4VD3. Below this is a 'Properties' pane for 'Applied: IVYUZZC20, Resource: PTS1'.
- Right Pane:** Titled 'Queues', it shows a list of queue names, types, and QSG details. Queues listed include IVK3Z09A.INIT.QUEUE, IVK3Z09A.REQUEST.QU..., IVK3Z09A.RESPONSE.Q..., IVK3Z15A.INIT.QUEUE, IVK3Z15A.REQUEST.QU..., IVK3Z15A.RESPONSE.Q..., IVK3Z16A.INIT.QUEUE, IVK3Z16A.REQUEST.QU..., IVK3Z16A.RESPONSE.Q..., and KESHARP.ATEST.KS15....
- Bottom Right Pane:** A bar chart titled 'MI2 Response time' showing response times for transactions PTS1 (196), PTS1 (804), and PTS1 (4). The y-axis is 'Time (seconds)' ranging from 0 to 1. The x-axis is 'Transaction ID (number of transactions)'. The bars show response times of approximately 0.25, 0.75, and 0.5 seconds respectively.

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

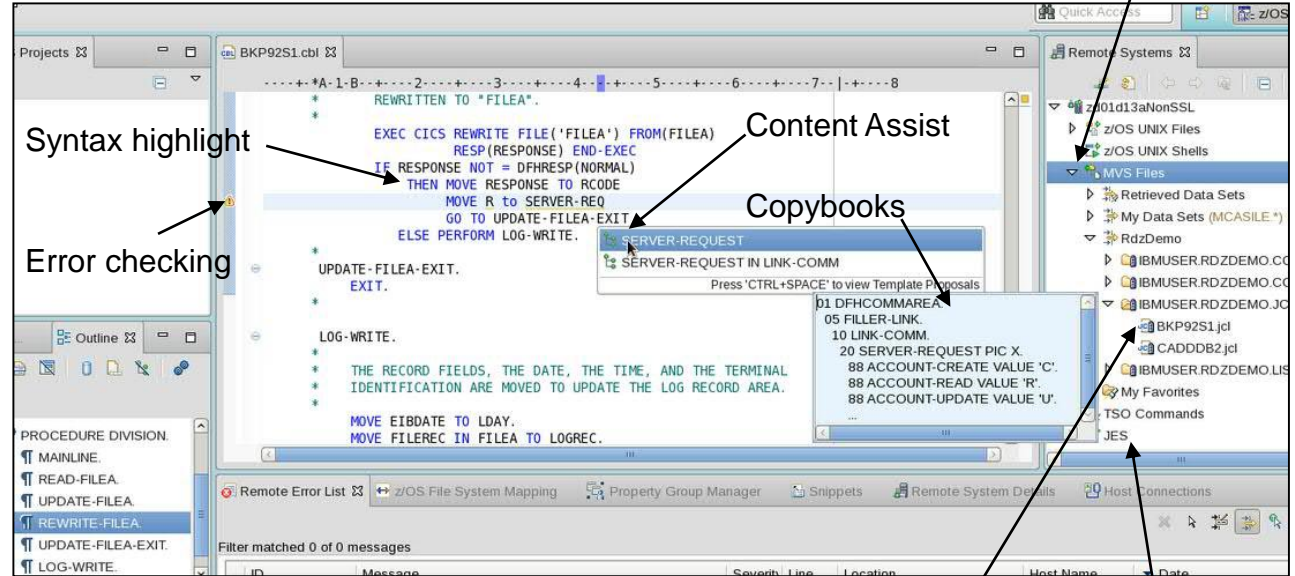


Developers use familiar, workstation-based tools for mainframe application development

- 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



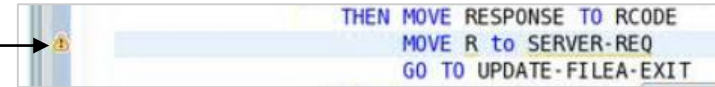
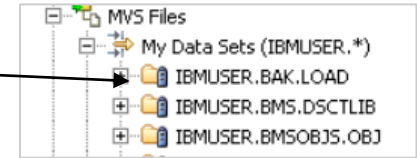
Outline view presents COBOL structure

Edit/Sub 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 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 displays a tree view of '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 tree view of 'z/OS P' projects, including 'SOF_ZOS_Project' and 'CICS_LoanApp'. 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 tree view of 'SOF JavaProject' and 'SimpleCopy2.java'. A red box highlights the text: "Switch to the Java perspective to edit Java files".

The Java code editor shows the following code:

```
package sof;

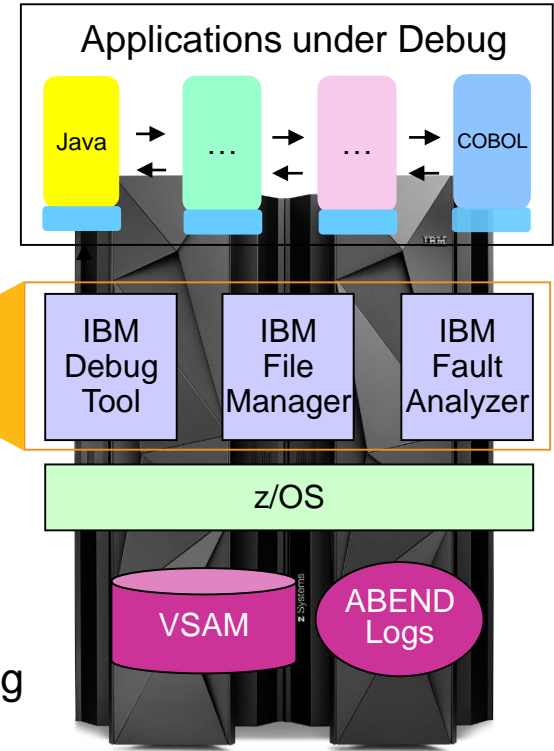
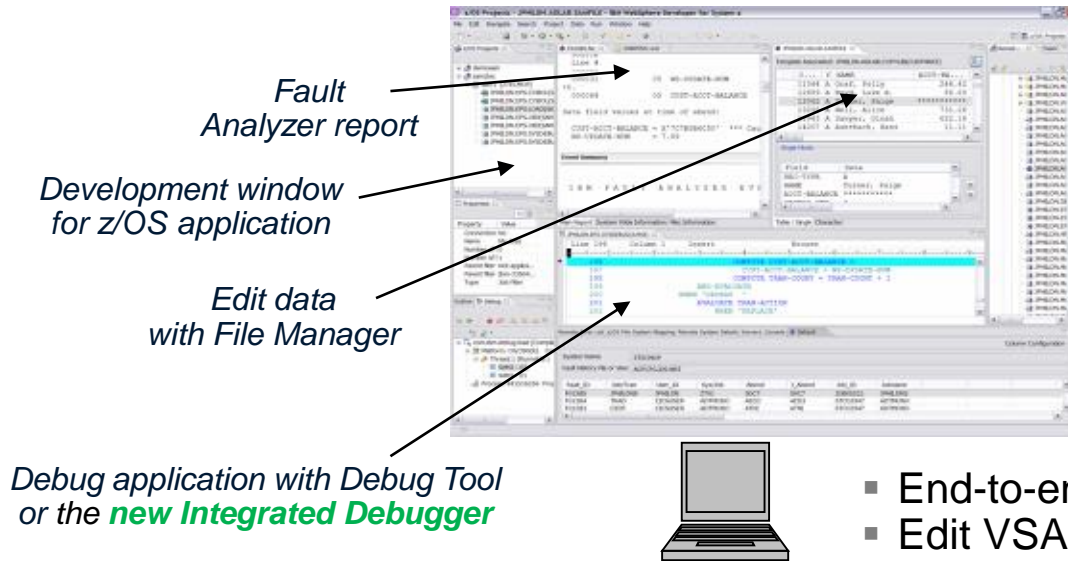
import java.io.File;

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 are integrated into the RDz development environment

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

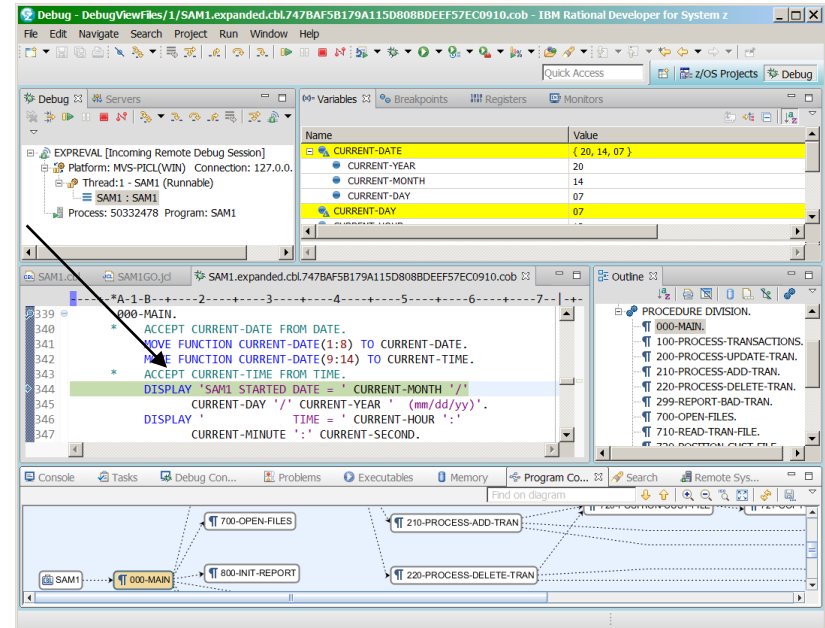


- End-to-end debug
- Edit VSAM data
- Analyze ABEND logs

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

1. Submit JCL to automatically open the Debugger Perspective
2. Step through code, view variables, set breakpoints, use the outline view to navigate
3. Allow the program fail (abend)
4. Find the problem, make a change, step back before the abend
5. See that the program runs to completion

A problem report comes in...



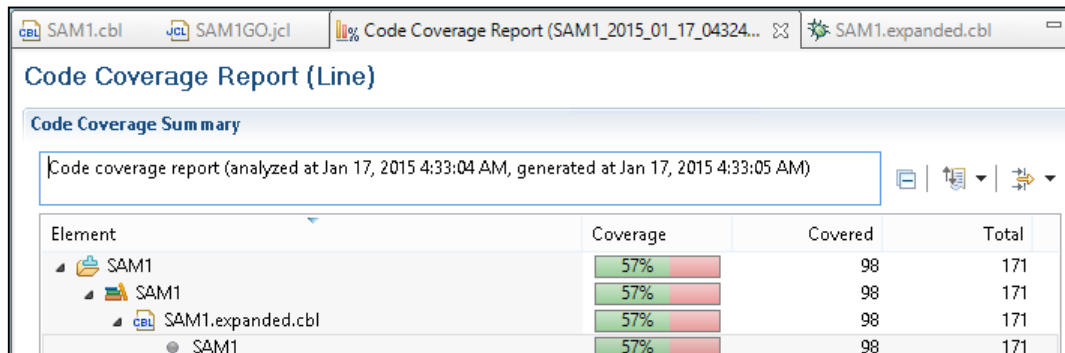
Developers easily view execution statistics for a program using the Code Coverage feature

- 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...

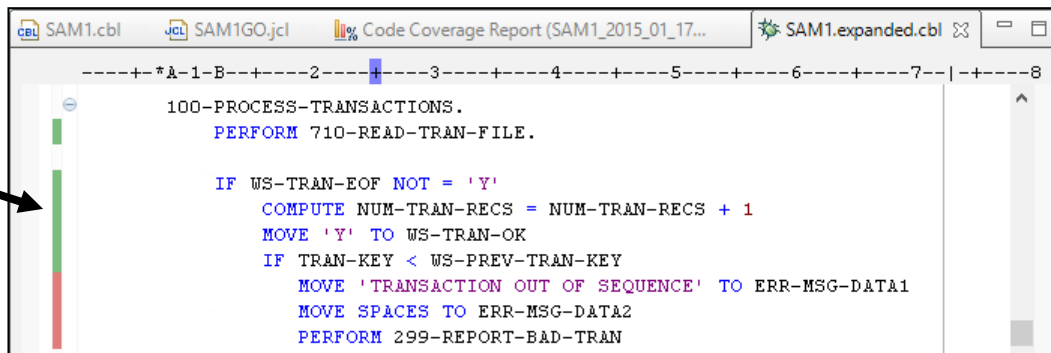
```
//***** ADDITIONAL RUNTIME JCL HERE *****  
//CEEOPPTS DD *  
  ENVAR("AQE_STARTUP_KEY=CC EXPREVAL")  
//AQEV4LST DD DISP=SHR,DSN=IBMUSER.RDZDEMO.LISTING
```

DEMO: Code Coverage summary 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



Optimizations make building and deploying integrated, modern applications on z13 easy

- Java 8 applications are enhanced with SMT on z13
 - Up to **50%** improvement in throughput compared to Java 7 on zEC12
 - Application serving with SSL clear key can see up to **2x** improvement in throughput per core vs. Java 7 on zEC12
 - Encrypt data using clear key in **half** the time and reduce CPU time by **one third** compared to using Java 7.1 on zEC12.
- Cloud application deployments with IBM Cloud Manager with OpenStack are standardized and automated using patterns

12 patterns
for key z Systems
portfolio

WAS Network Deployment
WAS Liberty
ODM Decision Server
ODM Decision Center
Integration Bus
DB2

Business Process Server
Business Process Center
Business Monitor
WebSphere Portal
WebSphere MQ
MobileFirst Platform

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

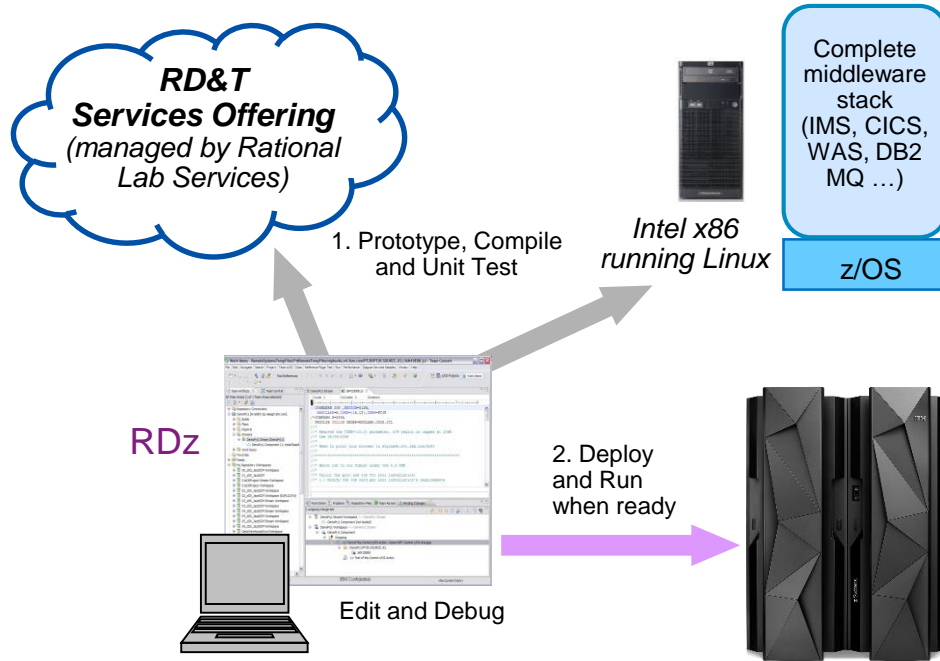
Visit the IBM Rational Developer Traveler Community on IBM developerworks



The screenshot displays the Rational Developer Traveler web interface. On the left is a 'Navigable outline view of code' showing a tree structure of the project files. The main area is a code editor with a 'Warnings and errors in margin' on the left side. The code is JCL (Job Control Language) for a sample application. A 'References become live hyperlinks' feature is shown where the code references datasets like 'MSGLCLASS=MSGLCLASS' and 'MSGLCLASS=MSGLCLASS', which are highlighted in blue. A 'Save and submit JCL, find referenced datasets' button is visible at the top right of the code editor. The interface is titled 'Submit JCL - USER26.SANDBOX.SAMPLE.JCL(CARACLG) - (Sending Request)'. The bottom of the page shows 'IBM Rational Developer Traveler V1.8.1 (20140221-1303)' and 'FAQ | Ask a Question'.

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

Rational Development and Test (RD&T)



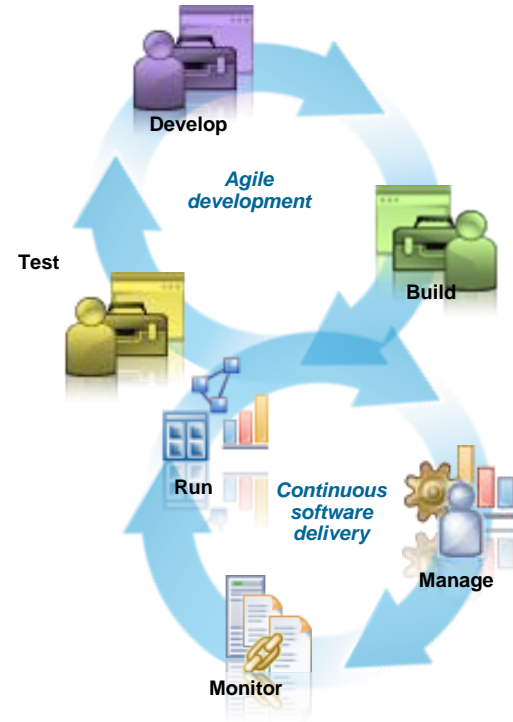
- Compile and Unit Test *off* the mainframe
 - Reduce MIPS costs, eliminate delays
 - No interruptions to mainframe production
- RD&T desktop server runs z/OS and all mainframe software
 - Cloud-based services offering also available
- Stack is continuously updated to emulate the latest releases of z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

Digital business necessitates a DevOps approach for continuous development and operations

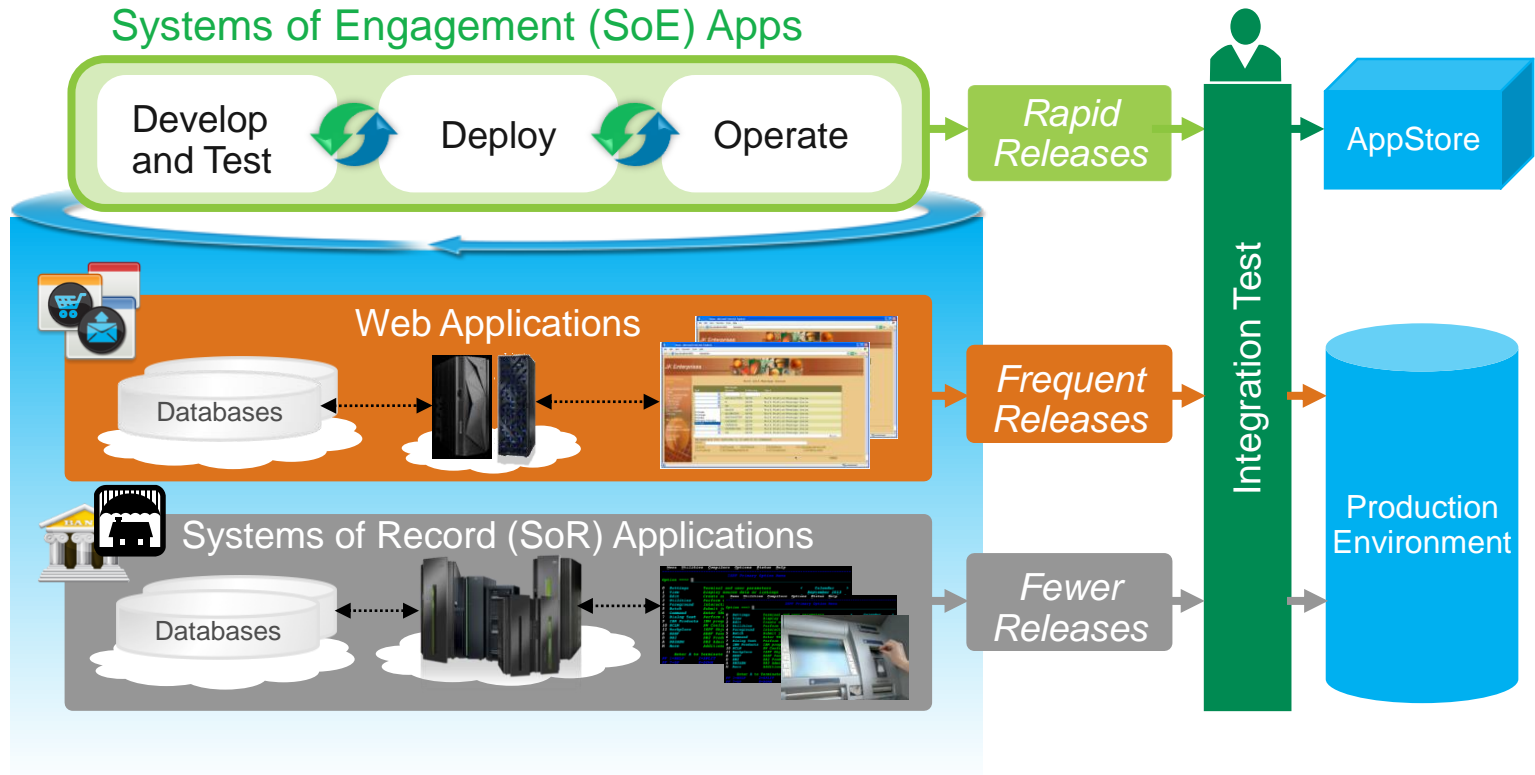
Today, customers expect **better product quality** and **shorter release cycles**. Businesses must meet this challenge, while **keeping costs low**

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

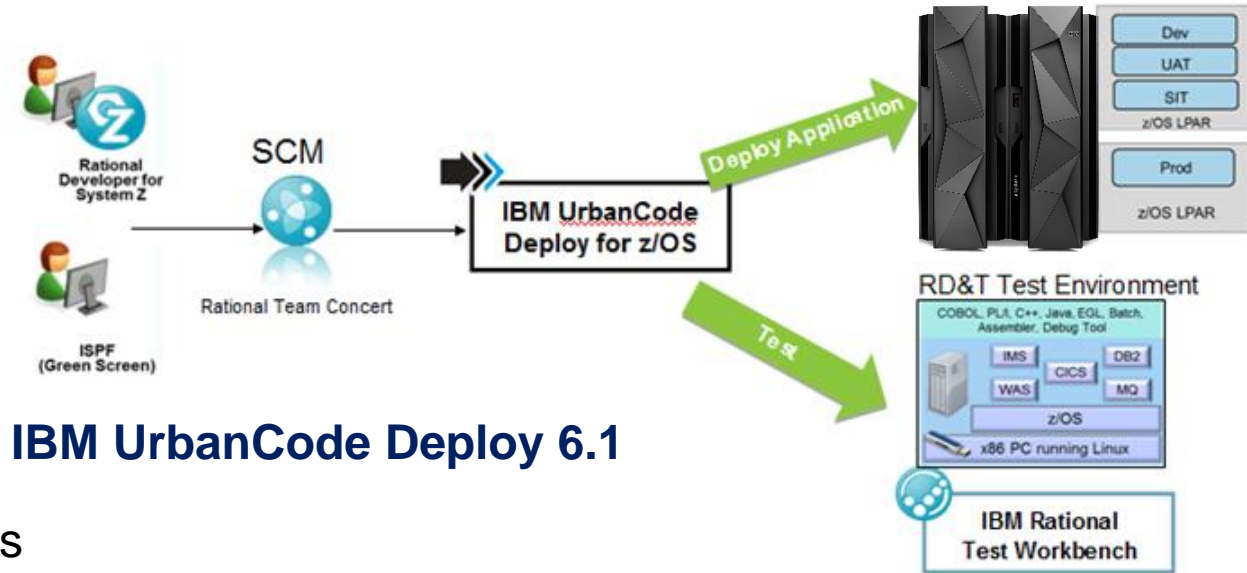


DevOps tools manage and coordinate mobile, cloud and mainframe deployments



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

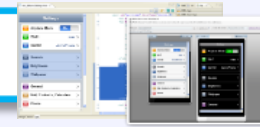


Rational tools offer many DevOps capabilities for mobile apps with enterprise systems

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



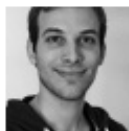
Yong-Siang Shih - 1

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:

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Office Manager/EA

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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!

