The Gold Standard for Enterprise Computing

Mainframe Skills – The Myth and the Reality

There's a perception of a mainframe skills shortage…

- … which might discourage companies from deploying new workload on the platform
- … or lead others to consider moving off the mainframe altogether

…Let's looks at the facts and try to understand the real picture

Three things to keep in mind

1. **Numerous indicators show mainframe usage continuing to grow for the foreseeable future**
2. **IBM has made considerable investment in intuitive, GUI-based tools for mainframe administration and development**
3. **IBM continues to invest heavily in development of mainframe skills for the next generation**

Mainframe usage is growing and is projected to continue

Finally, despite regular declarations that "the mainframe is dead," the research shows this has never been further from the truth. In reality, the mainframe is working harder than ever. Almost two-thirds of respondents (62 percent) are now using mainframe applications, which were initially designed to perform back-end functions, to now support external-facing services, such as e-commerce (chart 9). This is putting added pressure on the mainframe and, in turn, increasing MIPS. This is evidenced by the fact that 68 percent of respondents believe that the increase in mobile applications is driving higher MIPS usage (chart 10).

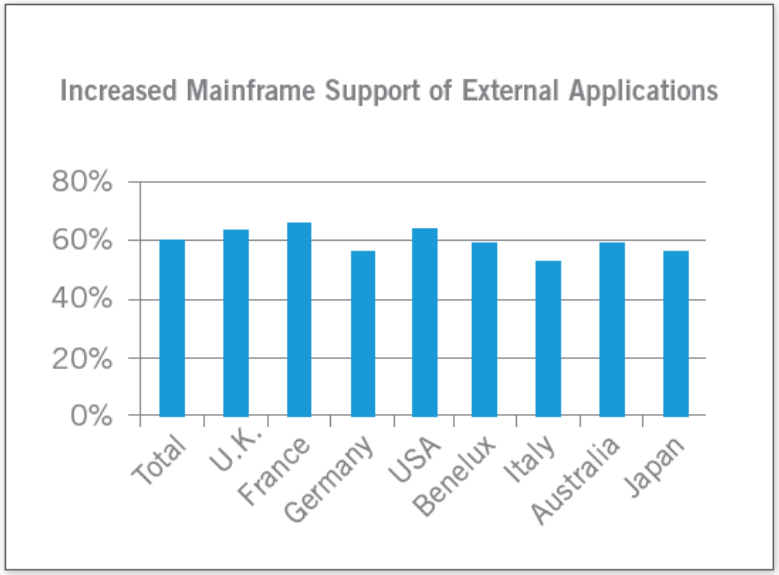


Chart 9: 62 percent of companies are using their mainframes to support external applications, such as online banking.

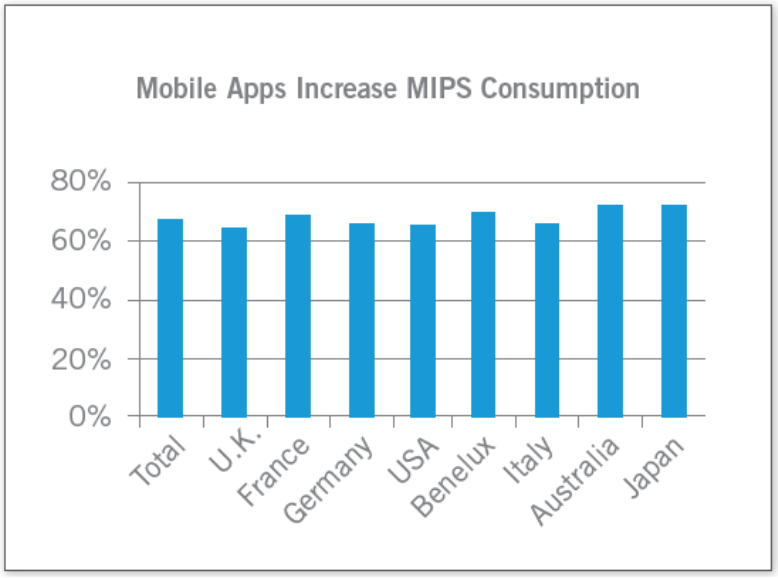
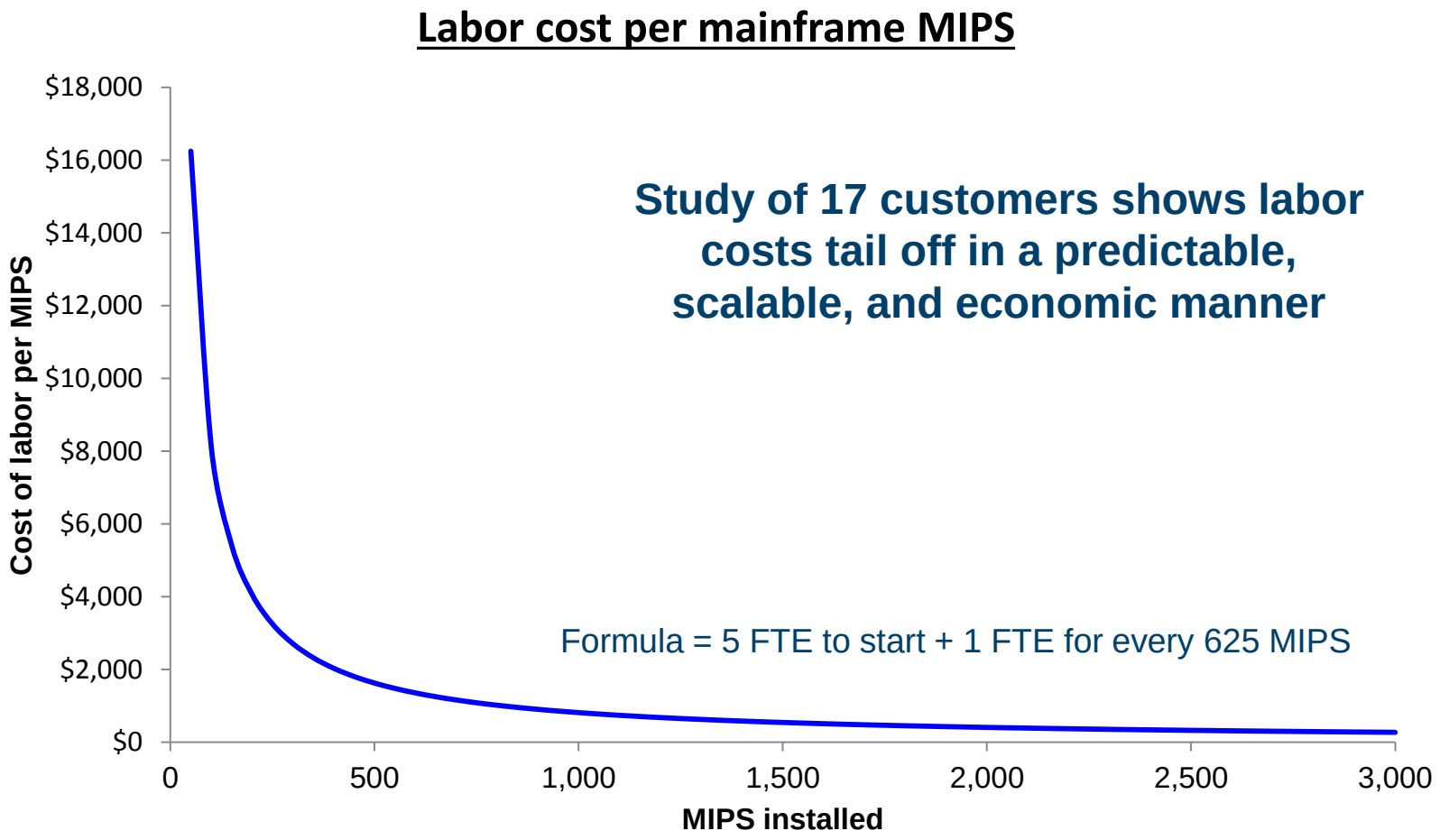


Chart 10: 68 percent of respondents believe that the increase in mobile applications is driving higher MIPS usage.

Compuware commissioned Vanson Bourne to study the impact of new IT trends and models. In September 2012, the independent research firm interviewed 520 CIOs from large enterprises across a range of industries in the U.S., Europe & Asia.

Eagle studies validate that adding workload to mainframes *reduces* labor cost per unit of work

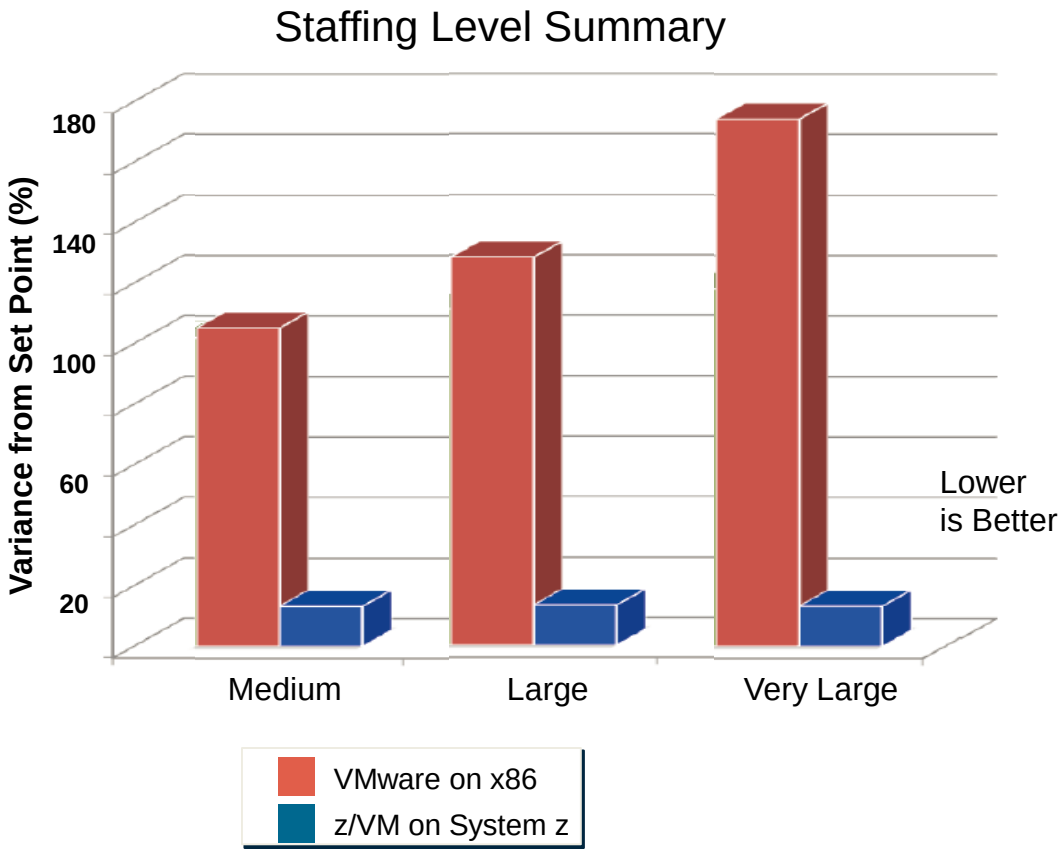


Source: IBM Eagle Team

Independent analysis shows that mainframe administration requirements are typically less than for distributed platforms

Staffing levels required to maintain a “gold standard”:

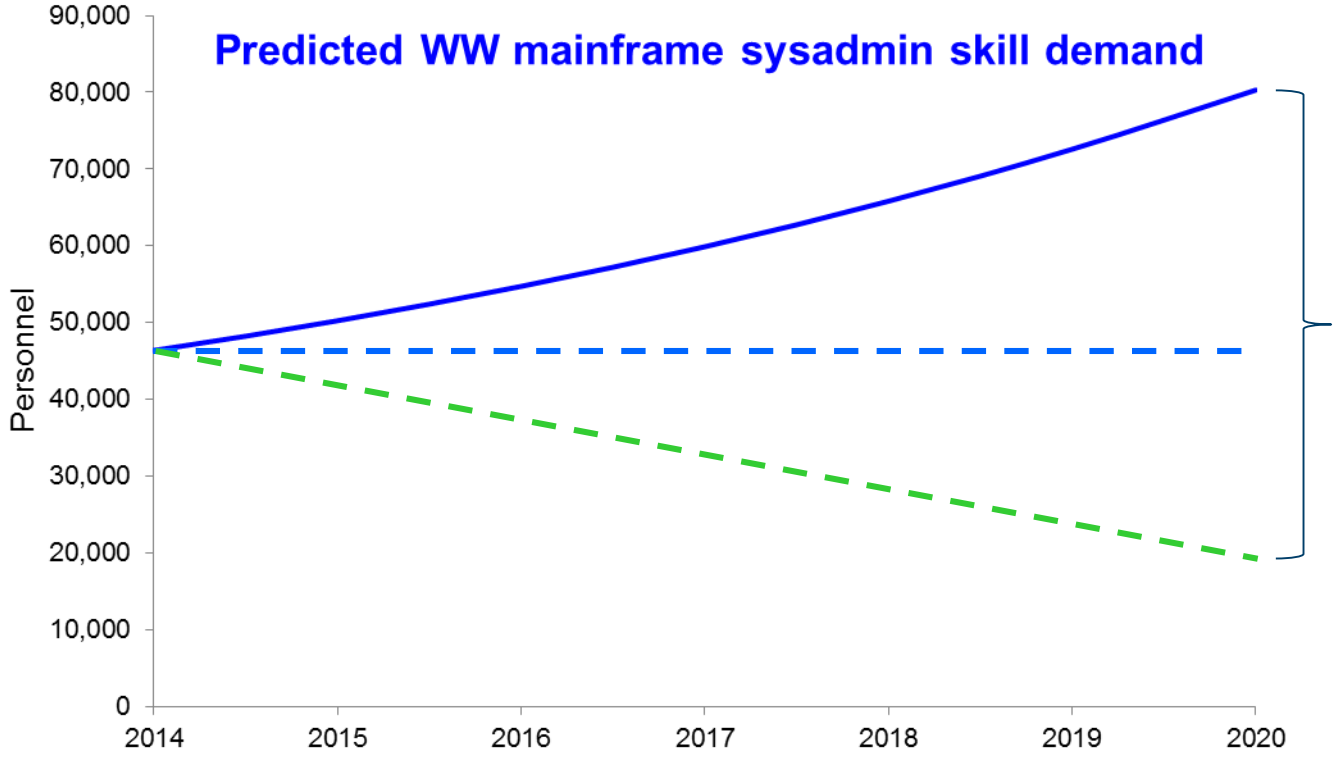
- Normalized to VMWare in Medium sized environment
- Staffing levels for z/VM was as much as 13x smaller



Source: Solitaire Interglobal Ltd., 2013

Estimation of the potential mainframe skills demand over the next six years

- IBM CPO projects 37,200 additional mainframe positions needed WW by 2020
  - Projection based on mainframe MIPS growth from 2005-13
- Some number of today's personnel will retire by 2020, increasing that demand



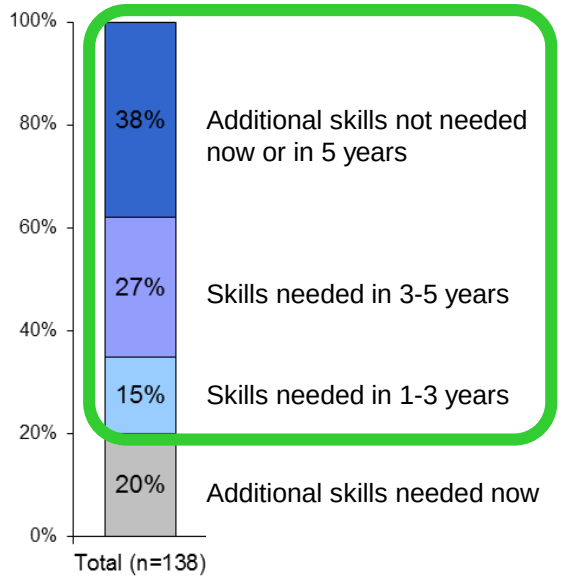
IBM programs such as the Academic Initiative are targeted to meet this demand

(Academic Initiative trains on average 6,400 annually)

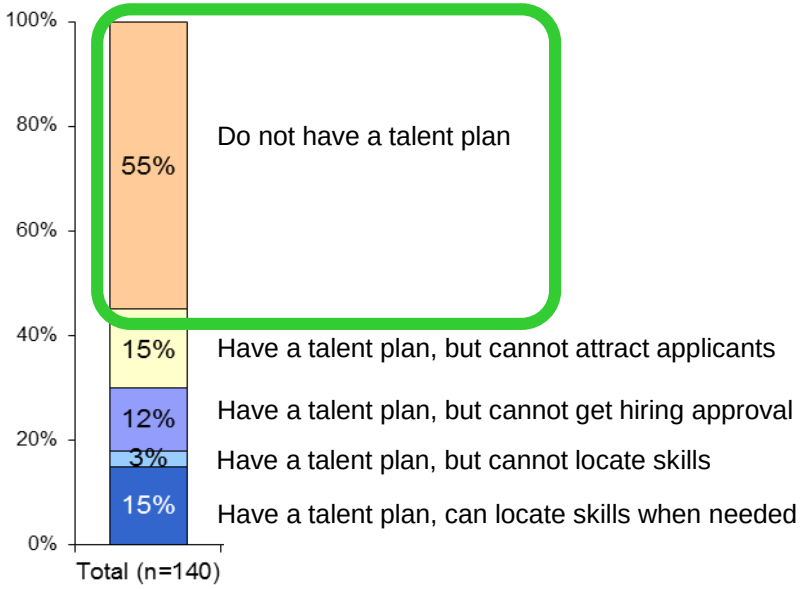
Source: IBM CPO estimations based on IBM data and assuming current productivity levels

Most companies say they are OK now, but many need a talent replenishment plan

80% of System z customers don't have a skills issues now



55% of System z sites don't have a talent plan for mainframe skills



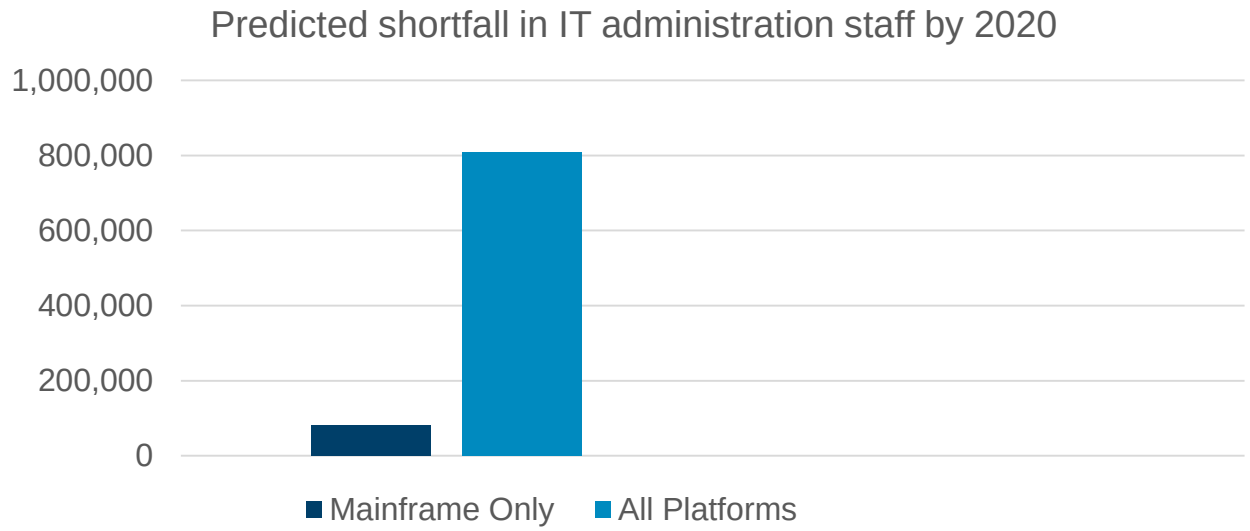
"Right now, it's pretty easy to hire programmers, and if they understand Java I can bring them back to procedural languages like Cobol,"

— David Brown, managing director of BNY Mellon's IT transformation group**

Source: IBM's 2013 System z Tracker

**http://www.computerworld.com/s/article/9225099/Cobol_brain_drain_Survey_results?taxonomyId=154&pageNumber=1

The shortage of mainframe skills projected is only about 10% of a greater problem…



- US government predicts that approximately **810,000** new and replacement administrative personnel will be needed across *all* platforms by 2020

…the requirements for development of an aggressive talent plan should cover all platforms within the data center, and not just the mainframe

Source: US Bureau of Labor Statistics (2013 Occupational Outlook, March 2013); IBM CPO

Three things to keep in mind

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

2. **IBM has made considerable investment in intuitive, GUI-based tools for mainframe administration and development**

3. IBM continues to invest heavily in development of mainframe skills for the next generation

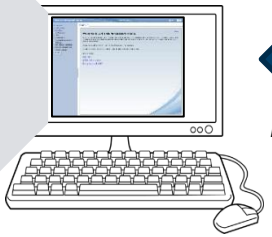
Today, mainframe system administrators use the latest workstation-based tools

IBM z/OS Management Facility (z/OSMF) - a modern, browser-based console for management of day-to-day operations and administration

- 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 (Windows IE Firefox)

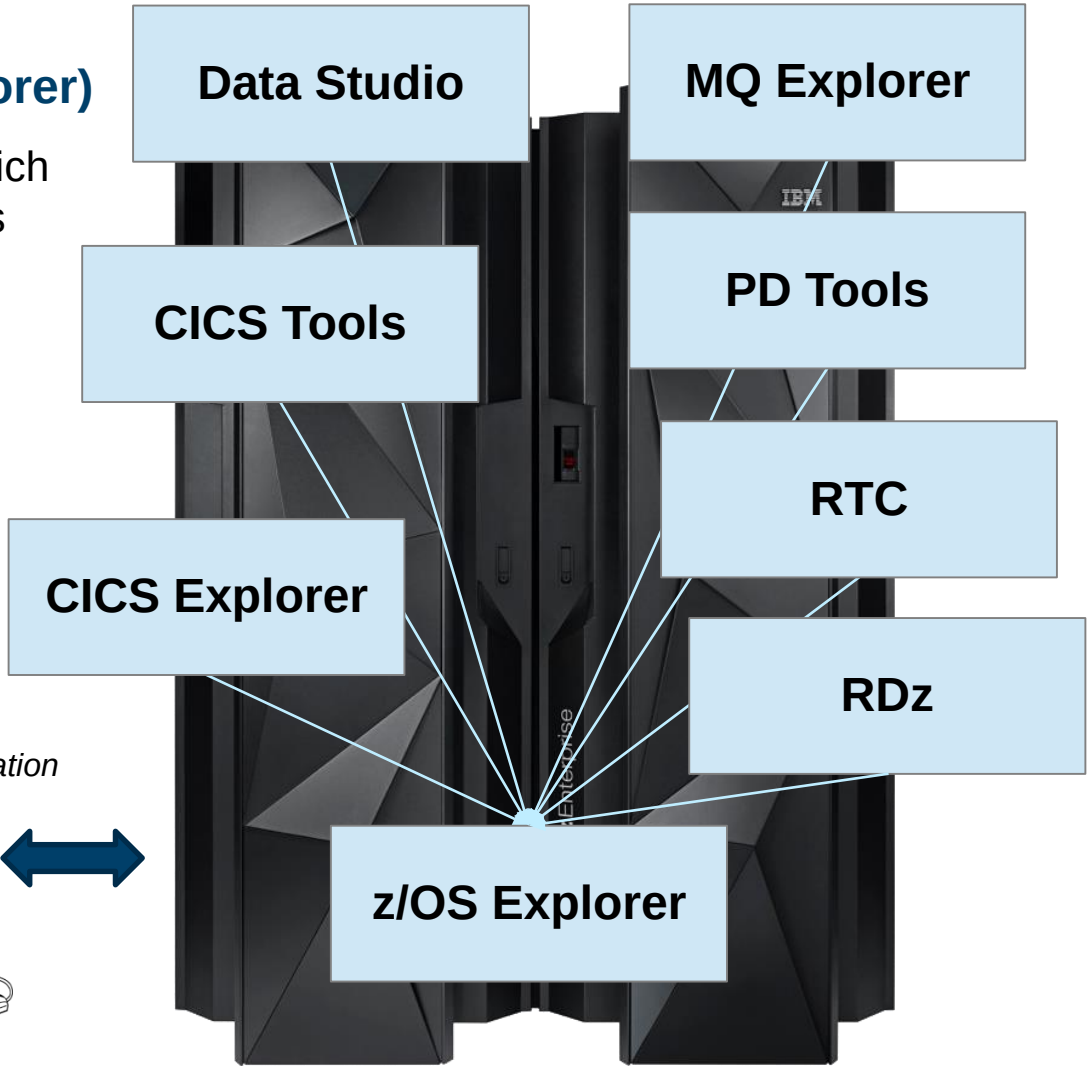


HTTP(S)

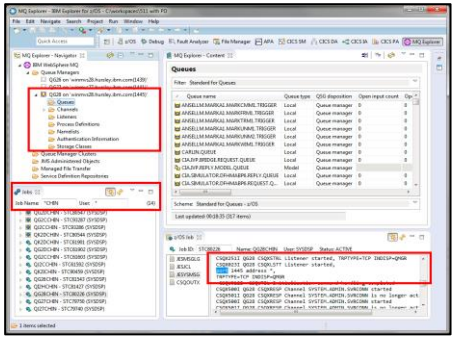
z/OS administrators work from an Eclipse-based integration platform

IBM Explorer for z/OS (z/OS Explorer)

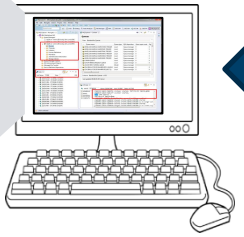
- Provides a single workbench from which to develop, and test z/OS applications and manage related sub-systems
- Common base for many z/OS tools
- Extendable to accommodate user's roles and responsibilities



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

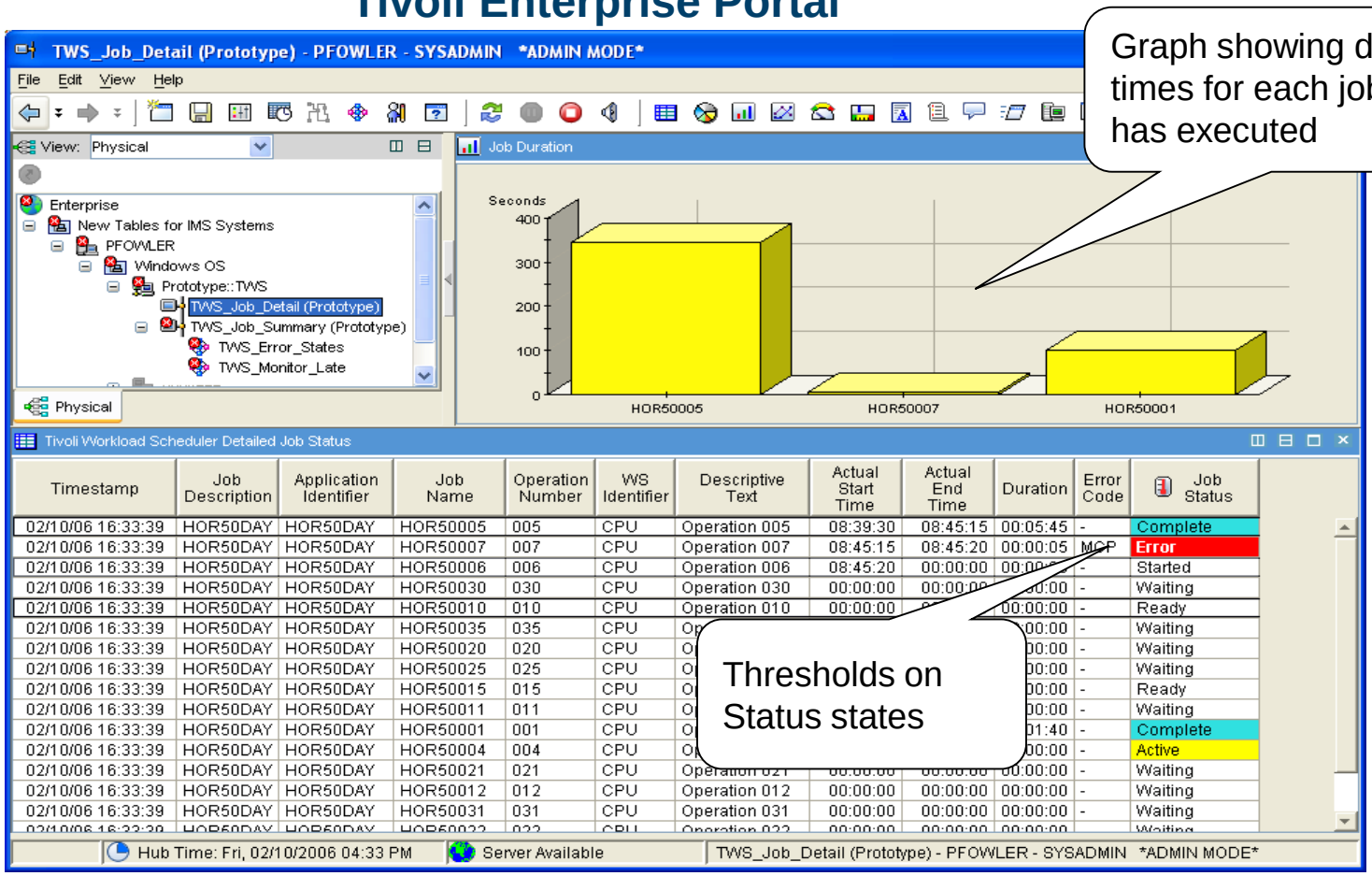


Eclipse workstation



An entire enterprise can be efficiently managed with intuitive, GUI-based capability

Tivoli Enterprise Portal



(Tivoli Enterprise Portal was used in the demos in modules 1 and 4)

COBOL continues to be alive and well!

To what extent do your organization or systems use these programming languages?

Language name	A lot	A little	None
Cobol	48%	16%	37%
JavaScript	41%	41%	19%
Java	39%	40%	22%
C#	26%	25%	50%
VB.net	25%	38%	38%
Visual Basic	22%	49%	30%

Base: 202 IT professionals.
Percentages may not add up to 100 because of rounding.

- See ***"Leaving the Myth business to the ancient Greeks and Romans: COBOL is dead ... seriously?"*** (http://get.syr.edu/news_alt.aspx)

http://www.computerworld.com/s/article/9225099/Cobol_brain_drain_Survey_results?taxonomyId=154&pageNumber=1

Languages should be selected using “fit-for-purpose”

COBOL’s use

- ☑ building mission critical applications in the business logic and data management layers
- ☑ where records are processed and calculated
- ☑ where performance is important in delivering high service levels
  - sub-second response time is needed
- ☑ where you need to get programmers to learn a language quickly and that the resulting code needs to be readable by non-programmers
- ☒ not for the presentation layer where chasing a mouse around a screen is required

Compared to more modern programming languages such as Visual Basic, C#, C++ and Java, how does Cobol rate for these characteristics:

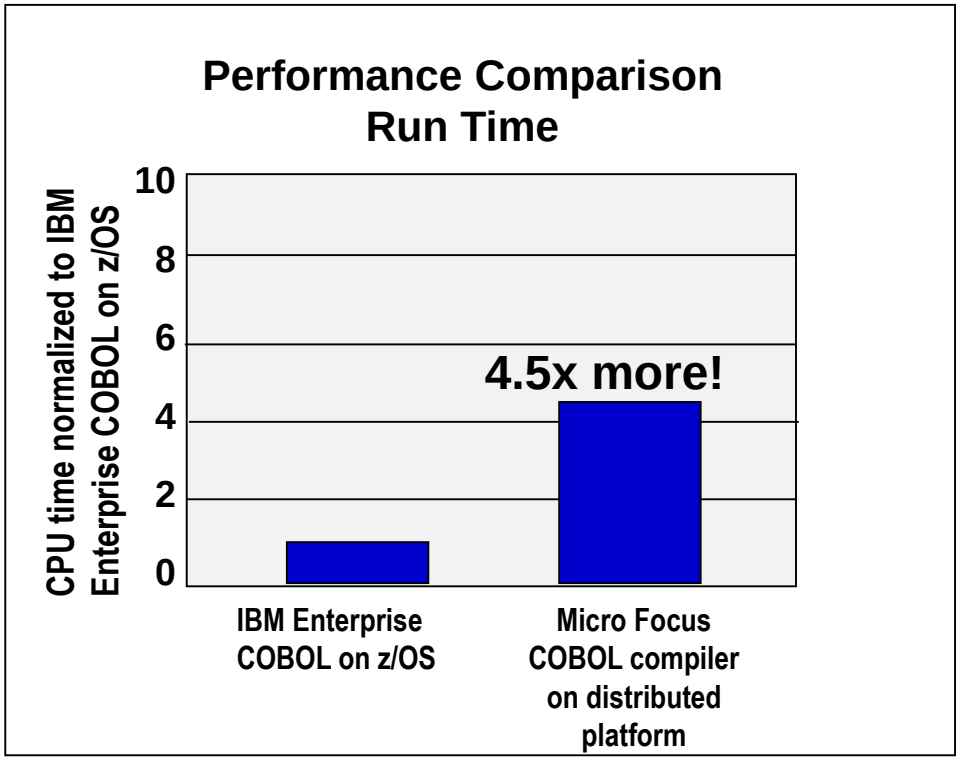
Function	Much better/ Somewhat better	About the same	Worse/ Much worse
Batch processing	82%	12%	4%
Transaction processing	65%	24%	9%
Handling business-oriented features	55%	21%	19%
Run-time efficiency	54%	33%	8%
Security	39%	38%	15%
Reporting	45%	37%	17%
Development cost	39%	32%	17%
Maintenance cost	43%	29%	18%
Ability to hire programmers	13%	25%	55%
Agility	15%	33%	45%

Base: 131 IT professionals

From: http://get.syr.edu/news_alt.aspx?recid=269
http://www.computerworld.com/s/article/9225099/Cobol_brain_drain_Survey_results?taxonomyId=154&pageNumber=2

Jettisoning CICS/COBOL can be problematic, risky and expensive

- Moving applications off the mainframe with a Micro Focus compiler can lead to significant performance issues
- HP (a major rehosting competitor) estimates that 20% of COBOL lines will need to be rewritten under Micro Focus



"COBOL and the mainframe run well together, and that's where I want to keep it."

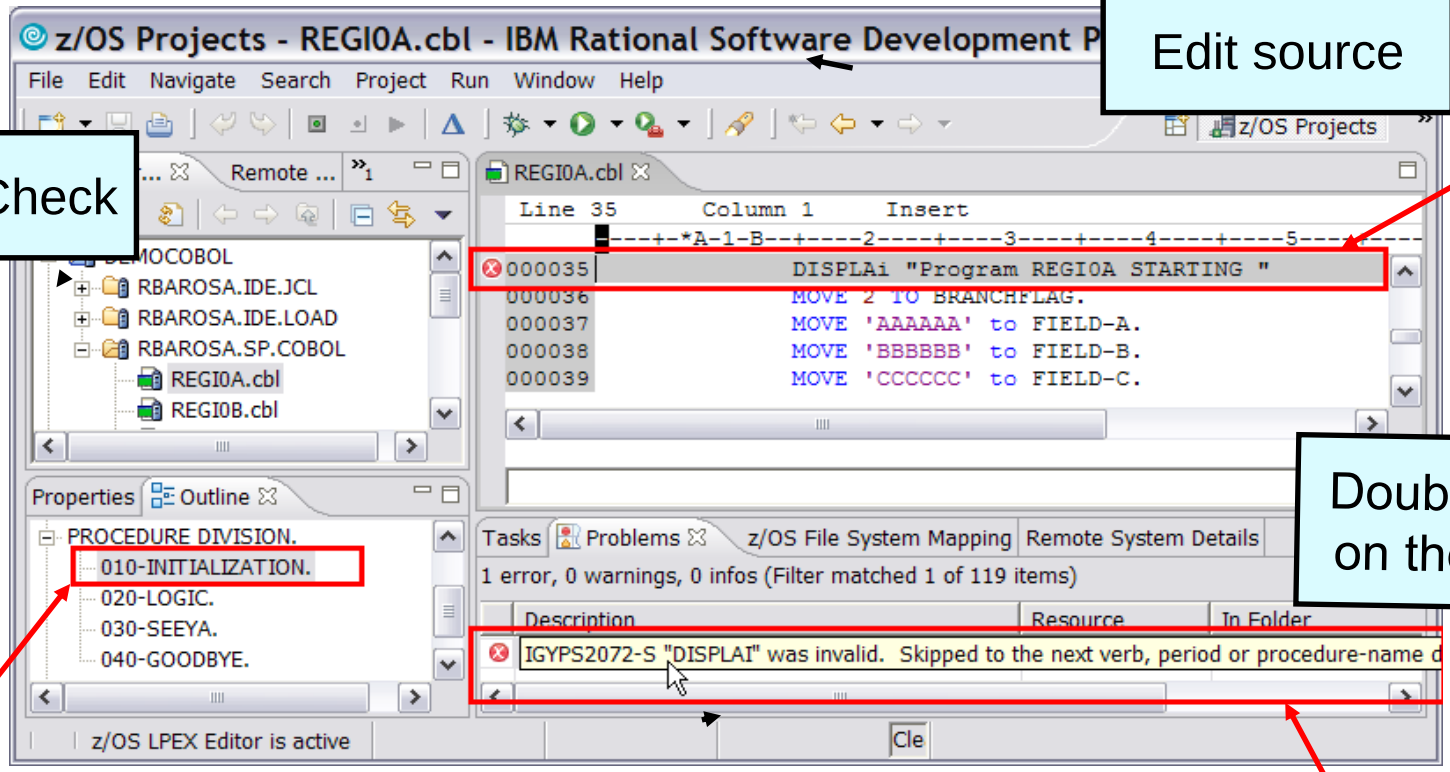
David Brown managing director of the IT transformation group at BNY Mellon

"Millions of users unknowingly activate CICS every day, and if it were to disappear the world economy would grind to a halt."

Phil Manchester, Personal Computer Magazine

Source: IBM CPO

Today, COBOL application development is simplified using Eclipse-based graphical editing tools



Edit source

Syntax Check

Statement in error

Double click on the error

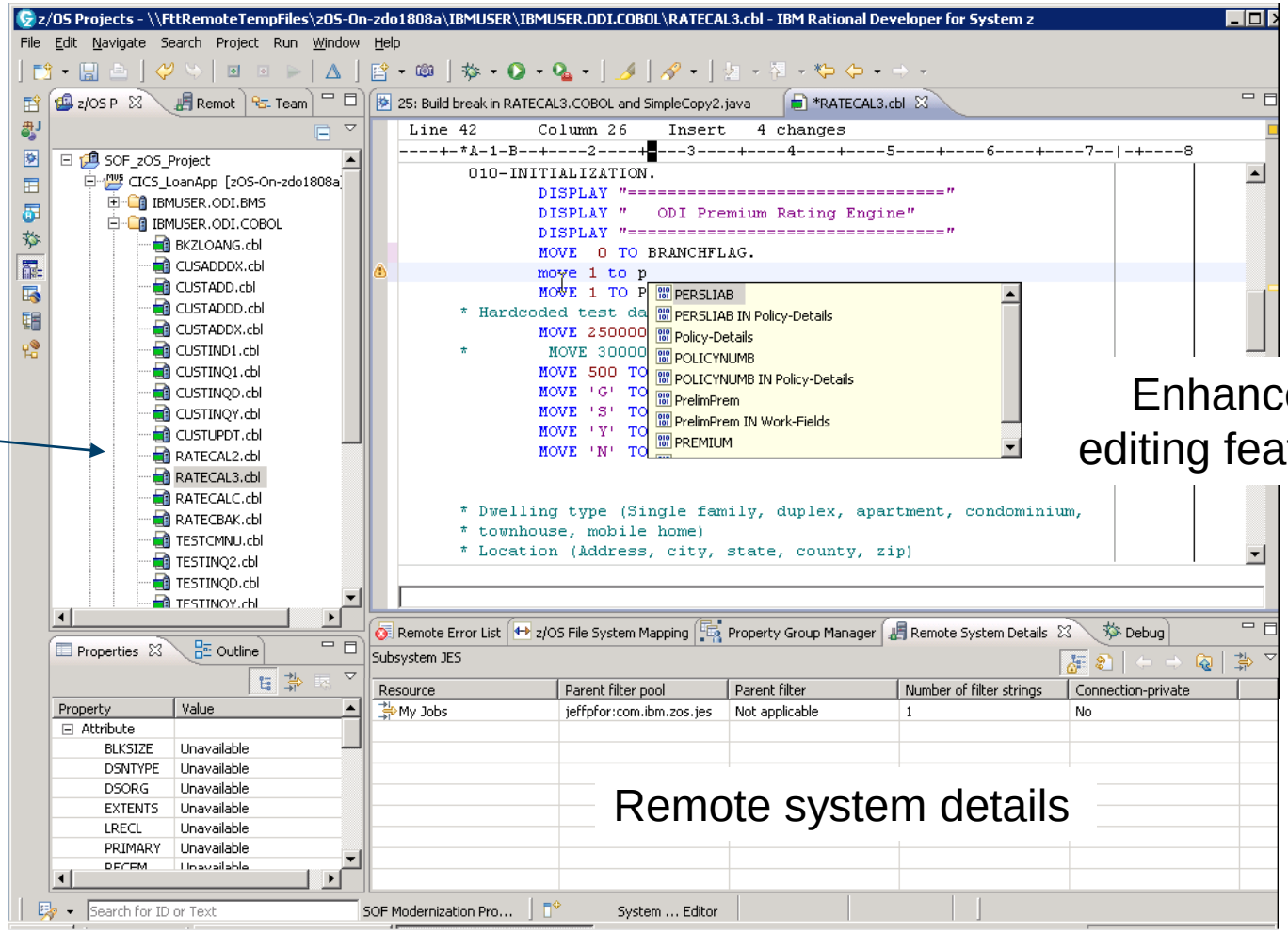
Outline view presents COBOL structure

Rational Developer for System z (RDz)

Error list in Tasks view

DEMO: COBOL development using state-of-the-art Eclipse-based tools

COBOL files

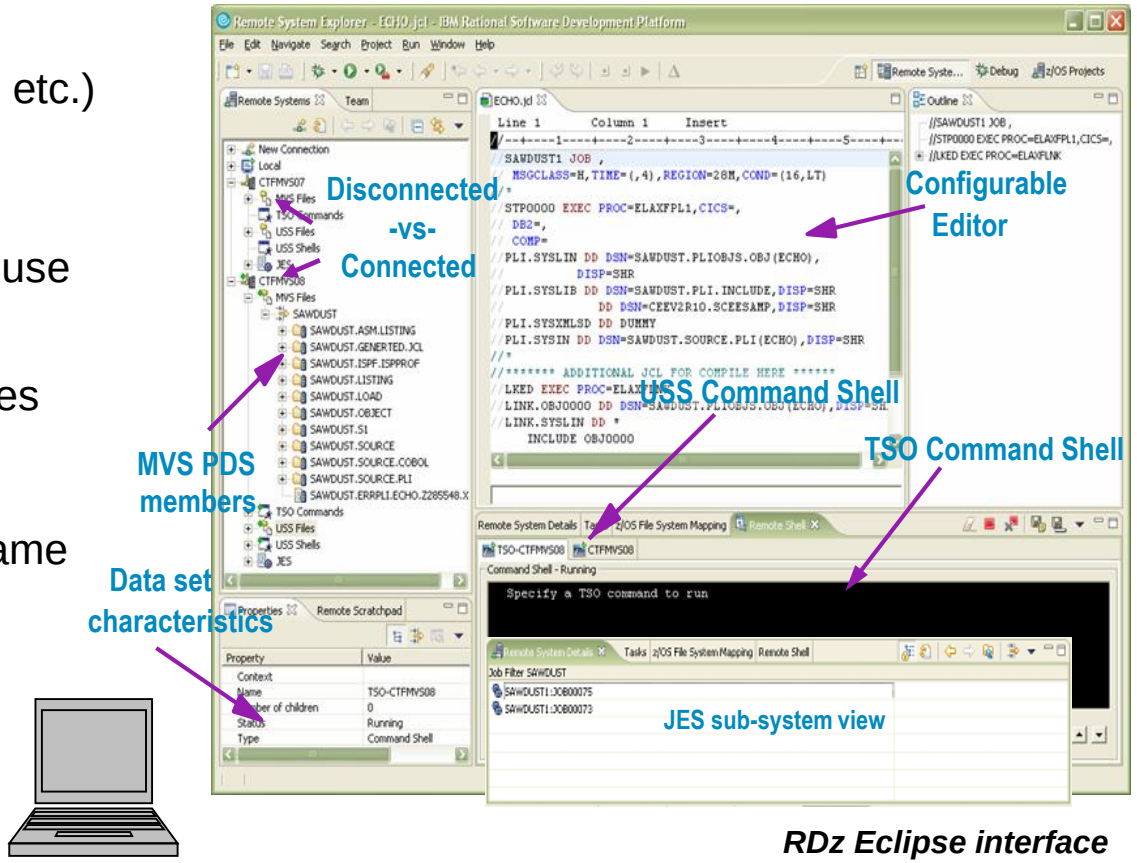


Enhanced editing features

Use a single, rich, integrated interface for all zEnterprise development

Rational Developer for System z

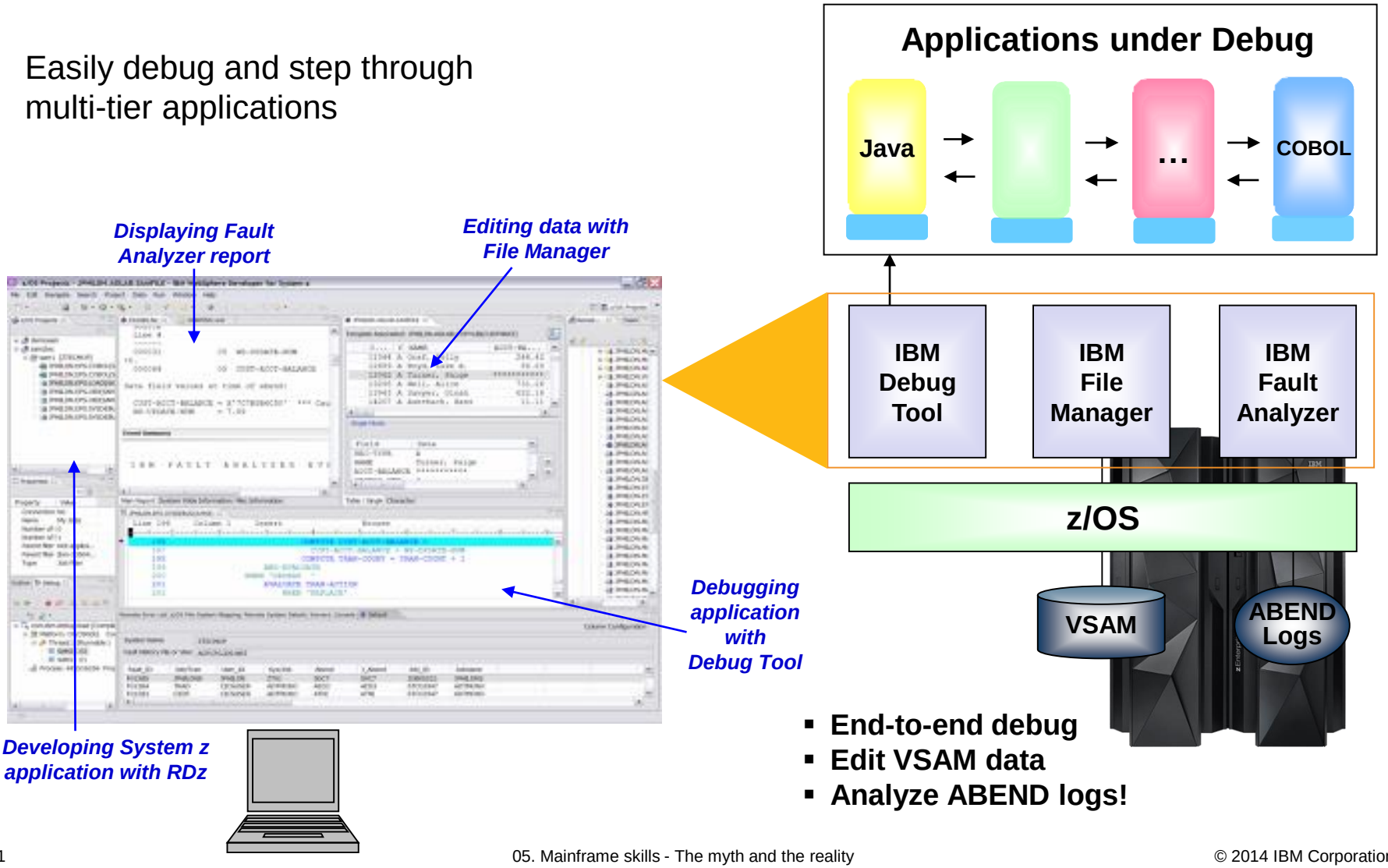
- Supports all mainframe languages (COBOL, PL/I, C/C++, ASM, Java, etc.) and runtimes (CICS, IMS, Batch, USS, DB2, WAS, etc.)
- Fully supports development and reuse of all mainframe assets
- Connected and disconnected modes
  - Connect to z/OS for debug, job generation, etc.
  - Disconnect and reduce mainframe MIPS usage and costs
- Includes Web Services and JSON wrappers



RDz Eclipse interface

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

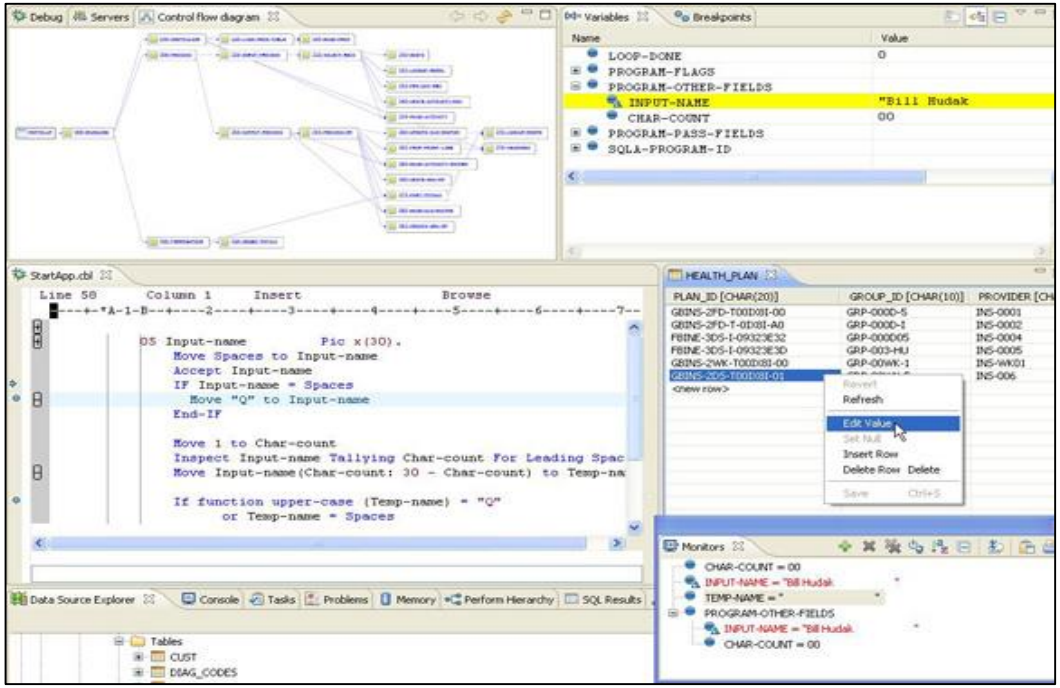
- Easily debug and step through multi-tier applications



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

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

- RDz makes it easy for Java developers to also contribute to COBOL applications
- Features in RDz enable cross-fertilization of development skills
  - Results in more unified team, back-filling capabilities, enabling future growth
  - Reduces overhead and cost of multiple tool sets

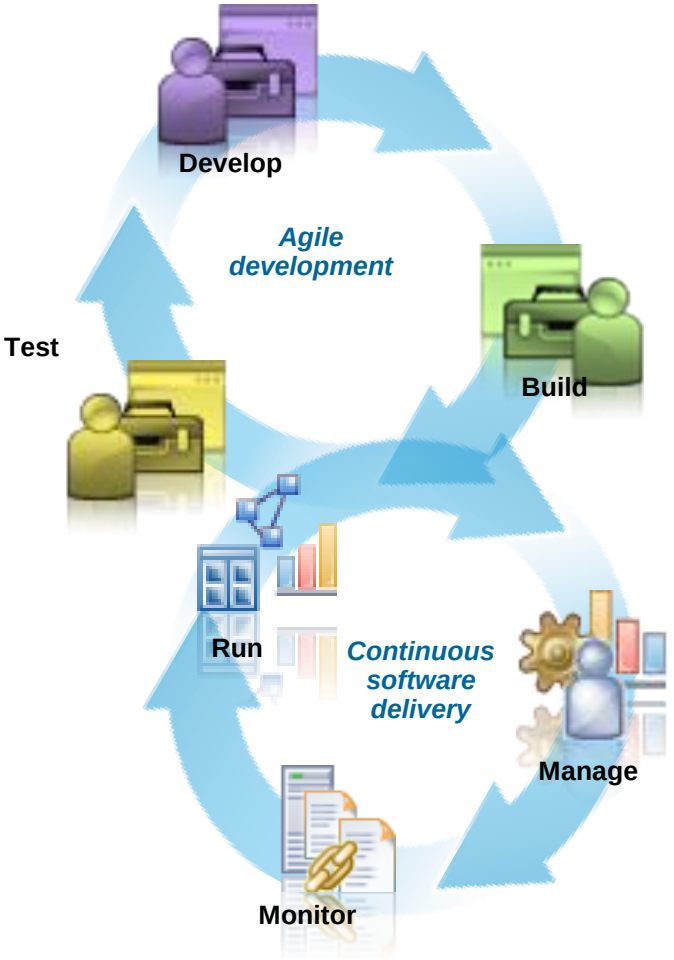


zEnterprise has tools that enable a DevOps approach for continuous development and operations

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 delivery pipeline



Rational solution packages for zEnterprise help to automate the development and testing cycles for DevOps agility

For development teams…

Integrated Solution for System z Development

Rational Developer for System z

Rational Asset Analyzer

Rational Team Concert

Rational Development and Test

For test teams…

Continuous Integration Solution for System z

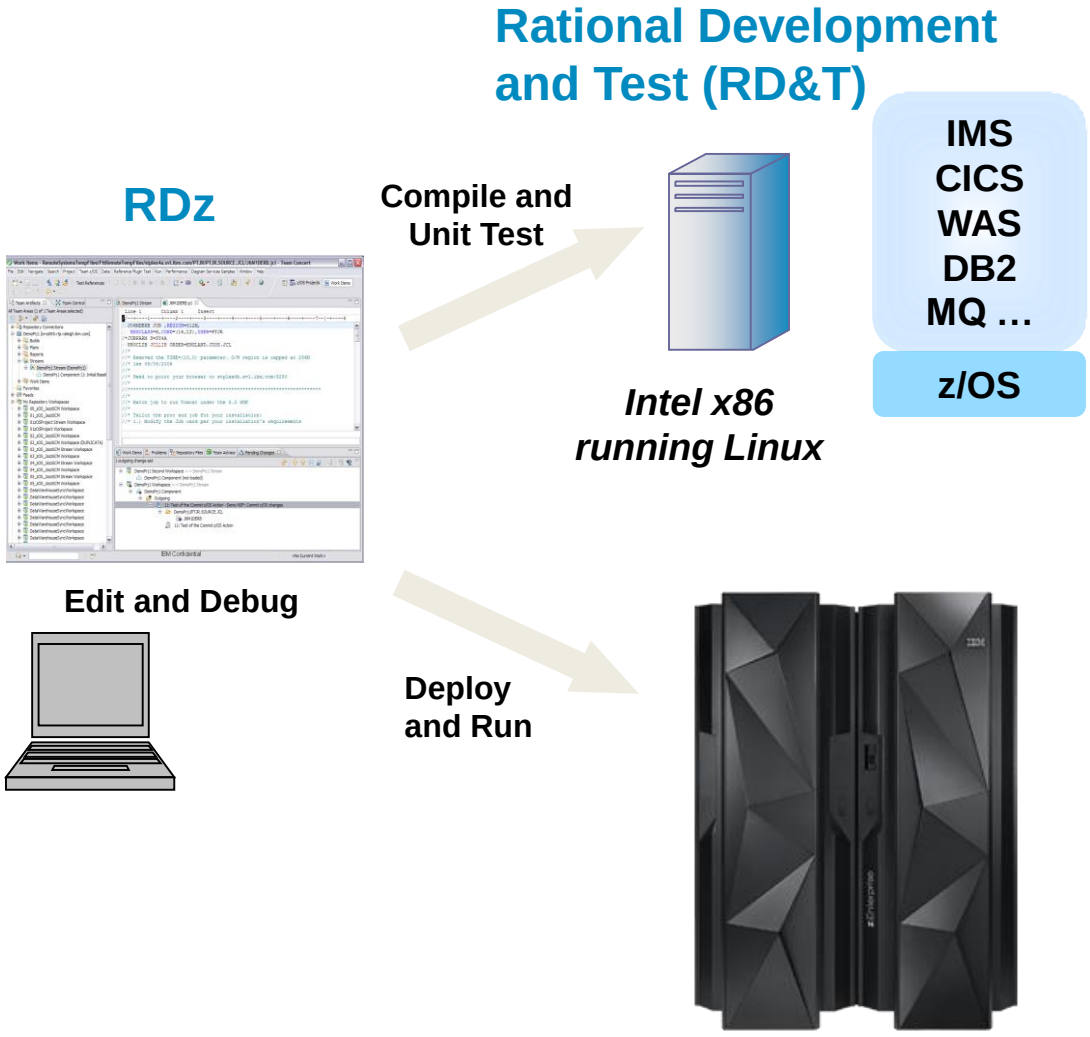
Rational Team Concert

Rational Development and Test

Rational Quality Manager

Rational Test Workbench

Agile compilation and unit test can be done off-platform to reduce costs and simplify operations



No interruptions to mainframe operations

- Compile and Unit Test on an Intel x86 server running Linux
- RD&T server runs z/OS and all mainframe software
- Continuously updated to emulate the latest releases of zEnterprise hardware and software
- Enables developers to rapidly prototype new applications
- Eliminates costly delays by reducing dependencies on operations staff

Using the right tools can yield significant business benefits

Business challenge	Business benefit of Rational Development & Test
Application quality issues	Highest-fidelity environment (vs. simulators provided by competitors)
Cost of mainframe development	Development and Test MIPS can be re-allocated for higher value production workloads
Developer productivity affected by test system availability	More control in hands of developers – reduces dependency on test personnel
Slow time-to-market	Reduces delays, faster debugging, improves testing speed and accuracy
Competitive development costs at scale	Brings System z development and test in line with Unix and Windows
Different skill sets required for mainframe and distributed	Use of a common IDE and processes eliminates need for cross-training – skills are immediately unleashed

Nationwide embraces DevOps to drive continuous delivery across platforms and improve speed to market

50% increase
in software quality
over the last three years

90% on-time delivery
vs. 60% previously

70% decrease
in user downtime

58% of developers moved to industry top quartile in productivity measures

"We're more agile as a business and more responsive to our customers. Collaboration has become an expected part of our culture."

— Steve Farley, Vice President, Application Development Center, Nationwide

Nationwide® On Your Side™

Source: IBM

Three things to keep in mind

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

2. IBM has made considerable investment in intuitive, GUI-based tools for mainframe administration and development

3. **IBM continues to invest heavily in development of mainframe skills for the next generation**

Through the Academic Initiative, IBM is working to train new 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

Program Investment
$10M+ over in 10 years

Growth
64K+Students
Over 1K Schools in 67 countries

Job Candidates
Over 4,200 Job Seekers

Corporate Engagement
360+ companies actively recruiting

Professional Connections
9 Communities

IBM zEnterprise Academic Initiative

Major Academic Institutions and Key Recruiters

Syracuse University	University of Arkansas	Eberhard Karls Universität Tübingen	Moscow Engineering Physics Institute (MEPhI)
Recruiters	**Recruiters**	**Recruiters**	**Recruiters**
Cigna **Compuware** **EMC** **Fidelity** **JP Morgan Chase**	**Baldor** **BB&T** **Dillards** **JB Hunt** **Walmart**	**Daimler** **Dt. Bank** **SAP**	**CROC** **Lusoft** **Rosoboronexport**
ULT	**Tongji University**	**Dalian University of Technology**	**EPSI – l'École d'ingénierie informatique**
Recruiters	**Recruiters**	**Recruiters**	**Recruiters**
HSBC **Tivit**	**China Construction Bank**	**Citi**	**Bull** **Groupama**

Master the Mainframe competition is helping a new generation find opportunity in the mainframe

A three-part contest of increasing difficulty, open to high school and collage students and offered around the world

Patricio Reynaga

A 2010 winner (college)

Comp. Science major from West Texas A&M University, and first year hire at Fidelity Investments as z/OS Systems Prog.

A 2012 winner (high school)

Four-time participant, currently a sophomore majoring in Comp. Science at University of Central Florida

Jovanna Marquez

40 students will be chosen from contests around the world (1,000+ institutions from 67 countries) to compete in New York City

GENERATION z. They will create the future.

Use the Job Board to find needed skills

Welcome to the System z Job Board

Are you looking to hire talented System z professionals?
Are you seeking a career with System z technology?

Then you've found the right place! This web site connects IBM System z clients, partners and businesses with students and professionals seeking System z job opportunities.

Special limited-time offer! Employers who hire a candidate through Systemzjobs.com and agree to publicize their hiring success can receive a voucher to send an employee to an instructor-led online System z course (valued at $1,200). Once you make a connection through Systemzjobs.com, simply send an email to zskills@us.ibm.com to request your voucher. First-come, first-served!

Job Seekers

- **View Job Opportunities**
  Browse the hottest new jobs in the enterprise computing industry.
- **Receive job alerts**
  Set up a job agent so that jobs matching your search will be emailed to you.
- **Create a free account**
  Store job openings and manage your job search through your My Career account.
- **Access your account**
  Log in to your free My Career account.

Employers/Recruiters

- **Post a job**
  Post your System z job here to attract the most qualified candidates from universities and industry.
- **Create a free account**
  Manage your job posts through your My Recruiting account.
- **Access your account**
  Log in to your free My Recruiting account.

http://systemzjobs.com

Every mainframe IT manager should know…

The Academic Initiative!

- Locate schools **teaching enterprise systems to recruit new talent**
- Partner with IBM **to build new skills for your business** **zskills@us.ibm.com**
- Advertise job opportunities **to students and experienced professionals** **systemzjobs.com**
- Use resources **to assist with building employees skills (internal training programs)** **www.ibm.com/systems/z/education/skills_coursematerials.html**
- Build credentials **through the Mastery Test** **www.ibm.com/certify/mastery_tests/ovrZ05.shtml**
- *Online mainframe education* **(certificates)** **www.idcp.org/learnzos.html**
- Stay connected **with through communities and social media. "Like" us on Facebook.**