

DevOps Track 4 – zSummit 2015



How can I shift-left to achieve better business results using Service Virtualization?

IBM Automated Integration Testing - Continuous Testing

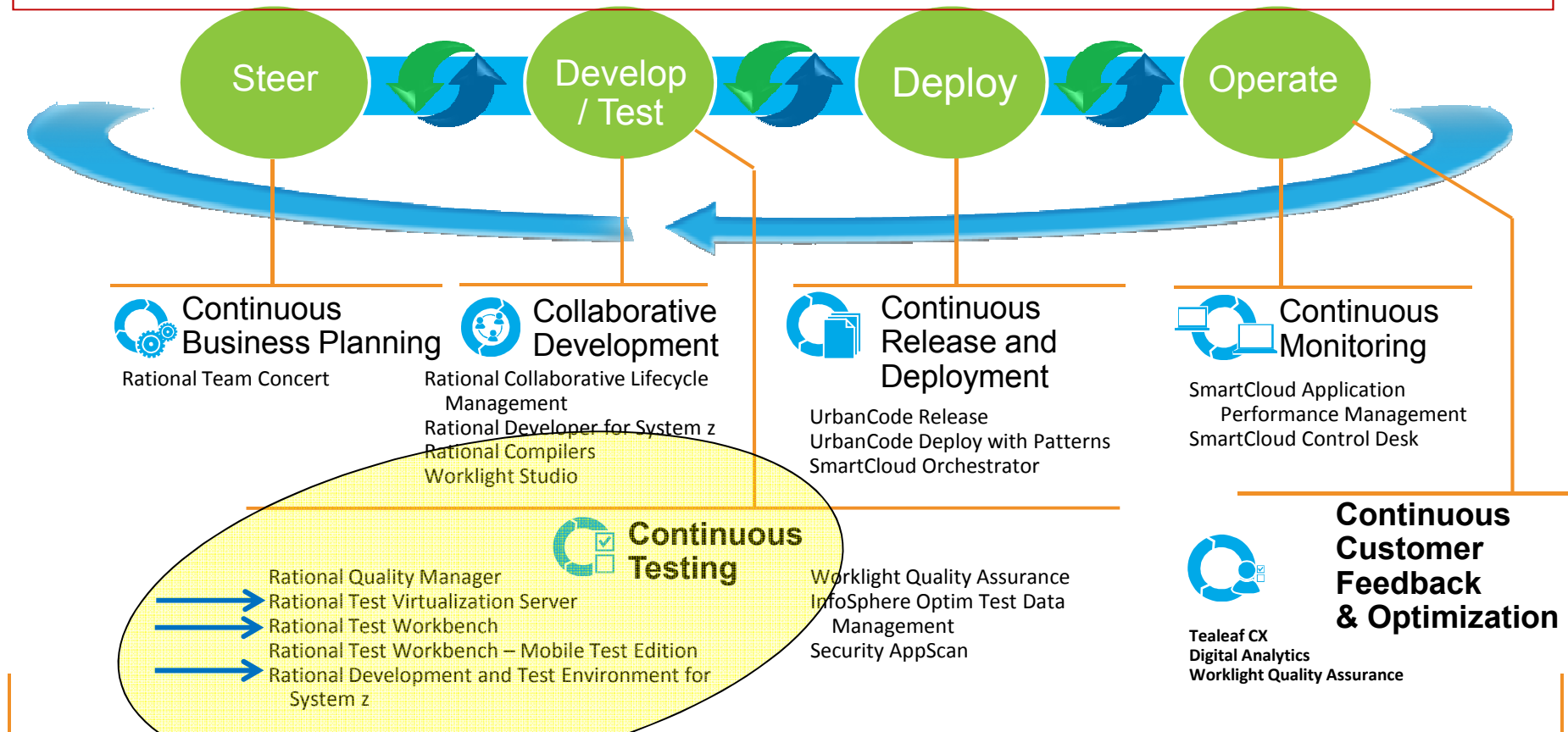
*Rational Development and Test Environment for System z (RD&T)
Rational Integration Tester (RIT)
Rational Test Control Panel (RTCP)*

Spencer Krueger
skrueger@us.ibm.com

Wilbert Kho
wilbert@us.ibm.com

IBM DevOps – Broad set of DevOps capabilities

Address bottlenecks across the application delivery lifecycle



Bluemix DevOps services

Agile planning and tracking Application auto-scaling AppScan mobile analyzer Continuous delivery pipeline Git hosting	Mobile application security Mobile data Mobile quality assurance Monitor & analytics Push	RapidApps (beta) Server-side code Web IDE
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Only 1/10th of an iceberg is above water

Traditional UI Testing:

Waterfall approach

Automated Integration Testing and Service Virtualization:

Tests can bypass the UI and execute beneath the iceberg. Test while your system is being built and at an accelerated rate. Much greater coverage = much greater confidence

Testing the side effects below the water level

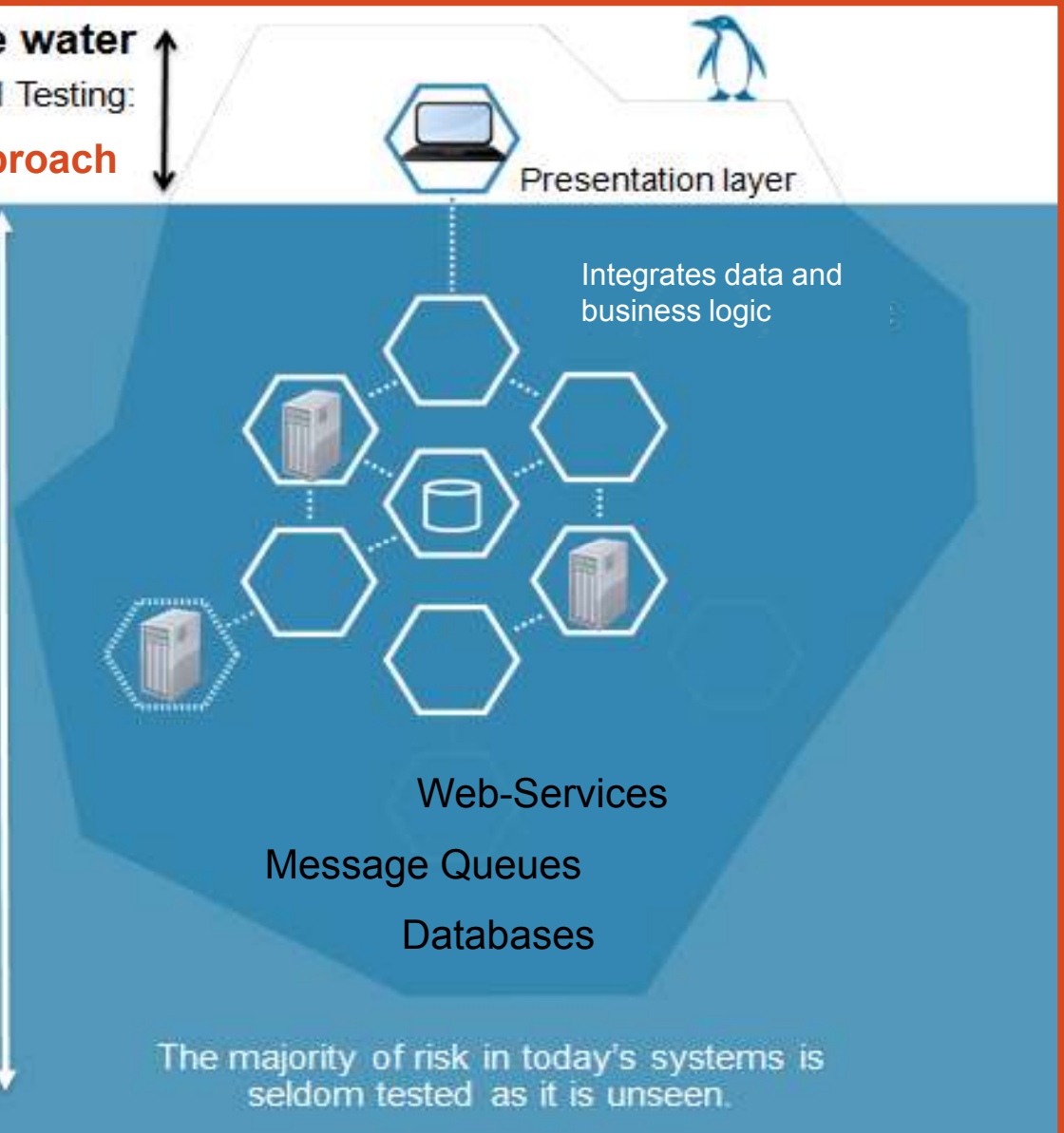
Validating contents:

- Messages sent and received
- Files, databases and log input and outputs

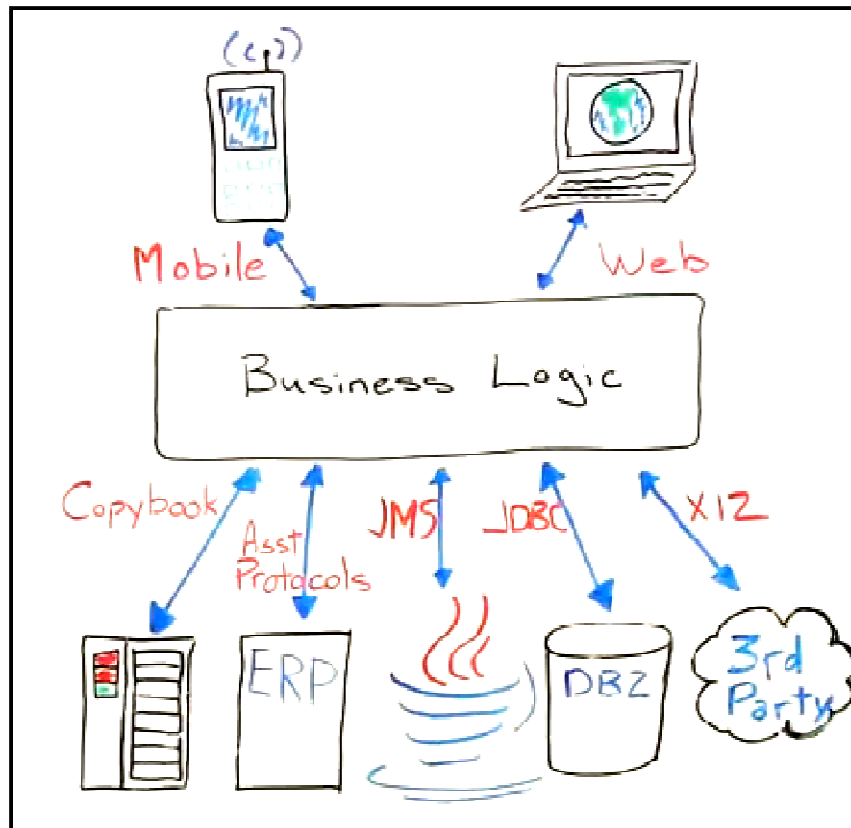
Service virtualization can replace components and databases in complex test scenarios. You can test when environments are unavailable or even before they have been built.

Service virtualization can work with any type of test – manual, automated or performance. It doesn't matter

The majority of risk in today's systems is seldom tested as it is unseen.



Applications are becoming more complex to Test



\$5-30 million investment

Typically required to build a single test lab for a Fortune 500 company. Most have dozens ...

- Increasing expense of standing up complex environments
- Time spent to Build/Replicate systems
- Integration with legacy systems, mobile technology
- Delays caused by lack of system availability: "Ripple-affect"
- Third-party services can be especially costly

30-50% average time

Testing teams spend on setting up test environments, instead of testing

Primary “shortfalls” with current Virtualization Testing solutions...

Test Lab \$\$\$/People

- HW-based virtualization or cloud based resources have provided only a partial savings (20-30%)
- Installation and configuration of software is still very labor intensive
- Certain systems cannot leverage HW virtualization, e.g. costly third party services, proprietary systems

Cycle Time

- Testing new functions still require having an environment available to develop test scripts
- The time wasted waiting for a test environment is severely reducing the ability to do proper acceptance testing

Risk

- Too many “trivial” defects are still found late in the process by Quality Assurance teams

Service Virtualization – *What it Is and Isn't !*

A method to emulate/simulate the behavior of specific components in a heterogeneous multi-tier component-based applications environment. Create and manage API-driven virtualized service "**stubs**", which can be reused across testing teams for integration and various testing scenarios and test suites.

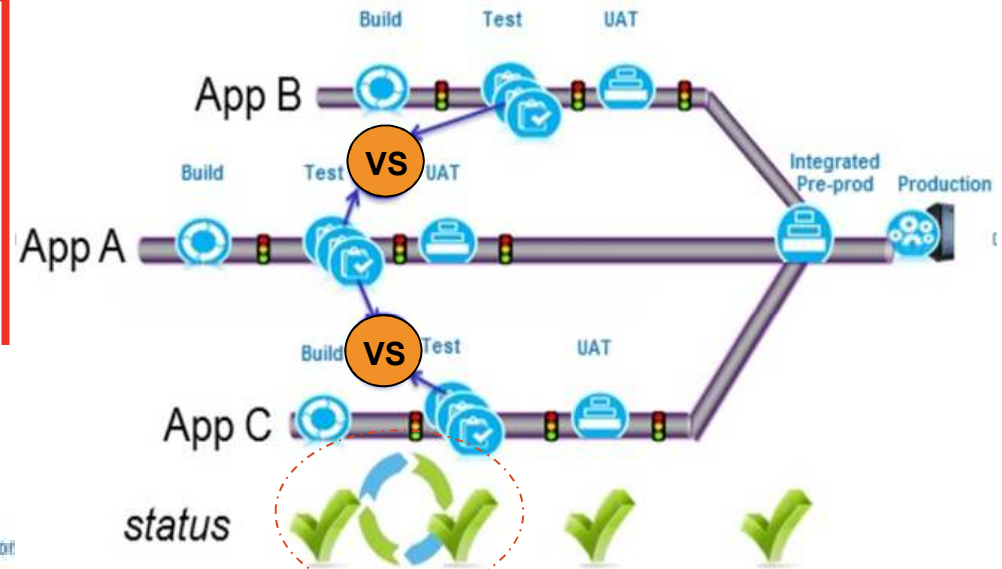
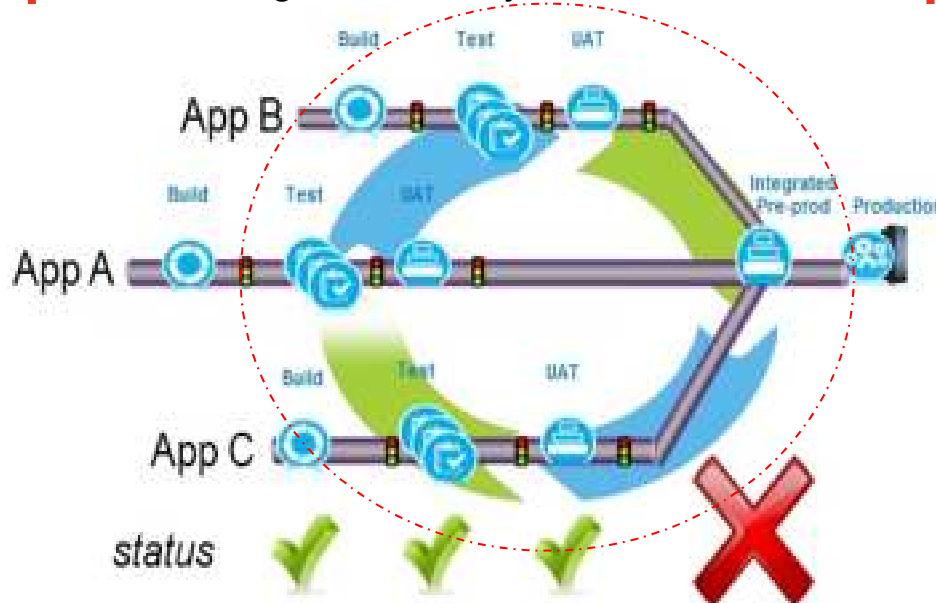
- **Different names/terms...same application intent:**
 - Virtualization...“interchangeable”...Simulation
 - **Test / Application / Service / Stubbing / Mocking**
- **Service Virtualization is NOT hardware or OS virtualization**
 - This is not “VMware”, although we can help customers reduce hardware/software licensing needs
- **Service Virtualization allows you to...*benefits***
 - Eliminate critical development and testing constraints by virtualizing IT resources
 - **“Shifting-Left = Earlier” Development and Testing**
 - Deliver realistic simulated development and test environments at a fraction of the cost
 - Isolate defects "**below the surface**" and drill into their root cause
 - Create automated regression test suites to reduce test cycle time and improve test coverage and quality
 - Drive benefits across the entire application development and test lifecycle

Service/Test Virtualization Enables Early Automated Integration Testing → *Shifts focus to Integration...Earlier!*

The Problem

Dependencies between applications traditionally means that integration testing is:

- Late, putting release schedule at risk
- Bugs detected later, costing more to fix:
*UT \$80 → Build \$240 → QA/ST \$960 → Prod \$7600
- Overall longer release cycle



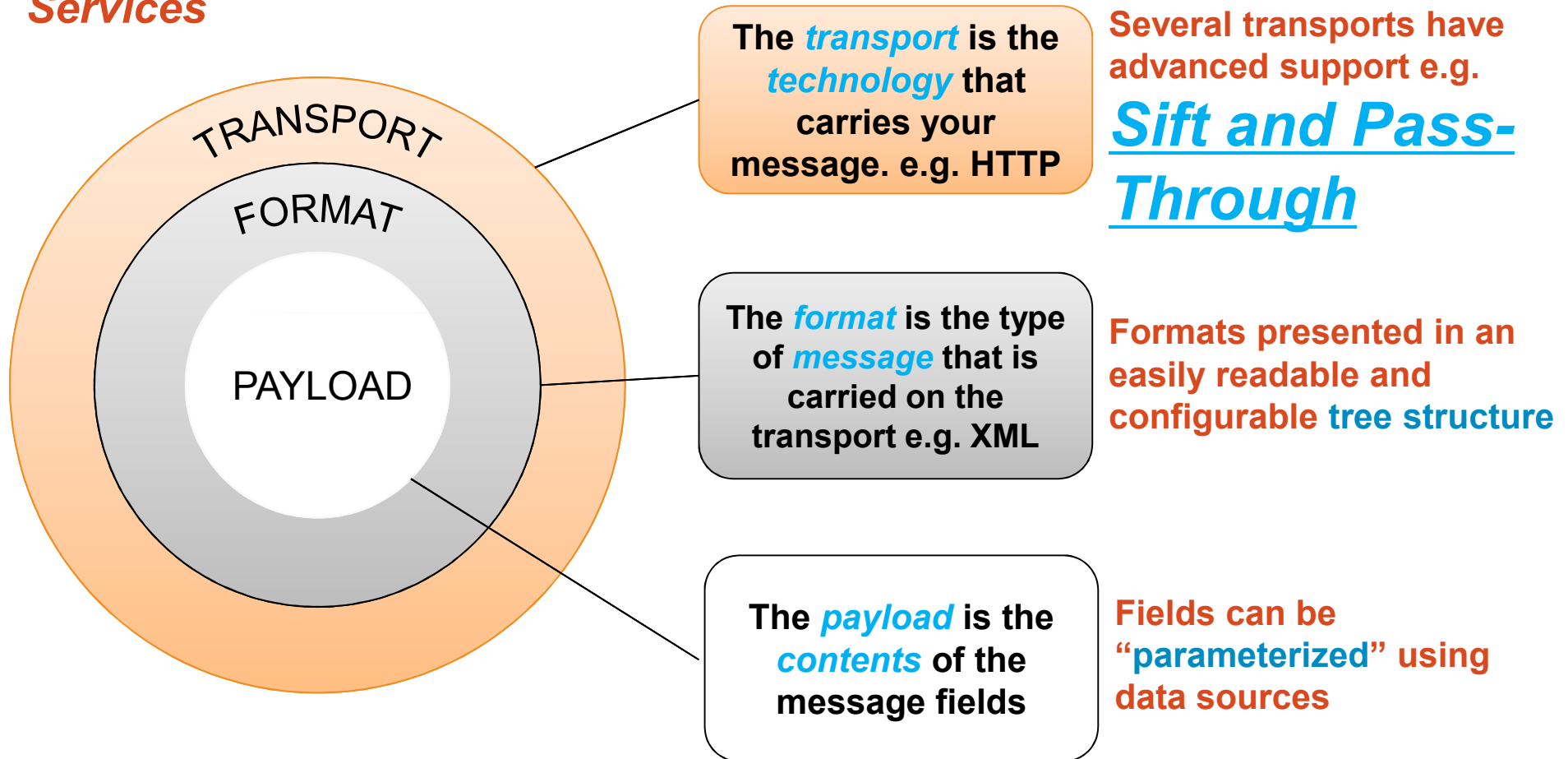
The Shift-Left Approach

- Simulate the production environment
- Test while concurrently building
- Provide "on-demand" parallel integration test environments
- Avoid conflicts for test resources across independent development team efforts

*National Institute of Standards & Technology: Source: GBS Industry standard study

Transports and Formats

The building blocks of an Integration Test using IBM Virtualized Services



Advantages of Sift and Pass-Through

- **Virtual Services don't have to be a full replacement**
 - Only handle the requests that you need; *Real or Virtual or Both*
 - Reduces both complexity and maintenance
- **Failure cases**
 - Allow *selective failure* cases, fail based on request fields
 - Provide or simulate failures that are *hard to recreate*
- **Allows concurrent testing**
 - Users can continue to use the "Real" system, while the Virtual Service serves only a *subset of requests*
- **Filter what the receiving app gets**
 - Virtual Services can be used to *filter-out new capabilities* during development phase using Sift (**simulate features not yet built**)
- **Delay**
 - Can be used to introduce a *delay* in front of real services to *simulate slow performance*

Supporting technologies YOU Depend On!

Protocols, Message formats, and Technologies (not a complete list)

Transport/Protocol

- ActiveMQ
- Email (SMTP, IMAP)
- Files
- FTP/S
- HTTP/S
- WebSphere MQ
- Java RMI
- JMS
- SAP IDoc, BAPI, RFC
- Software AG' s IB & IS
- Sonic MQ
- TCP/IP
- TIBCO Rendezvous, Smart Sockets & EMS
- CICS TG
- CICS IPIC
- IMS Connect

Message Formats

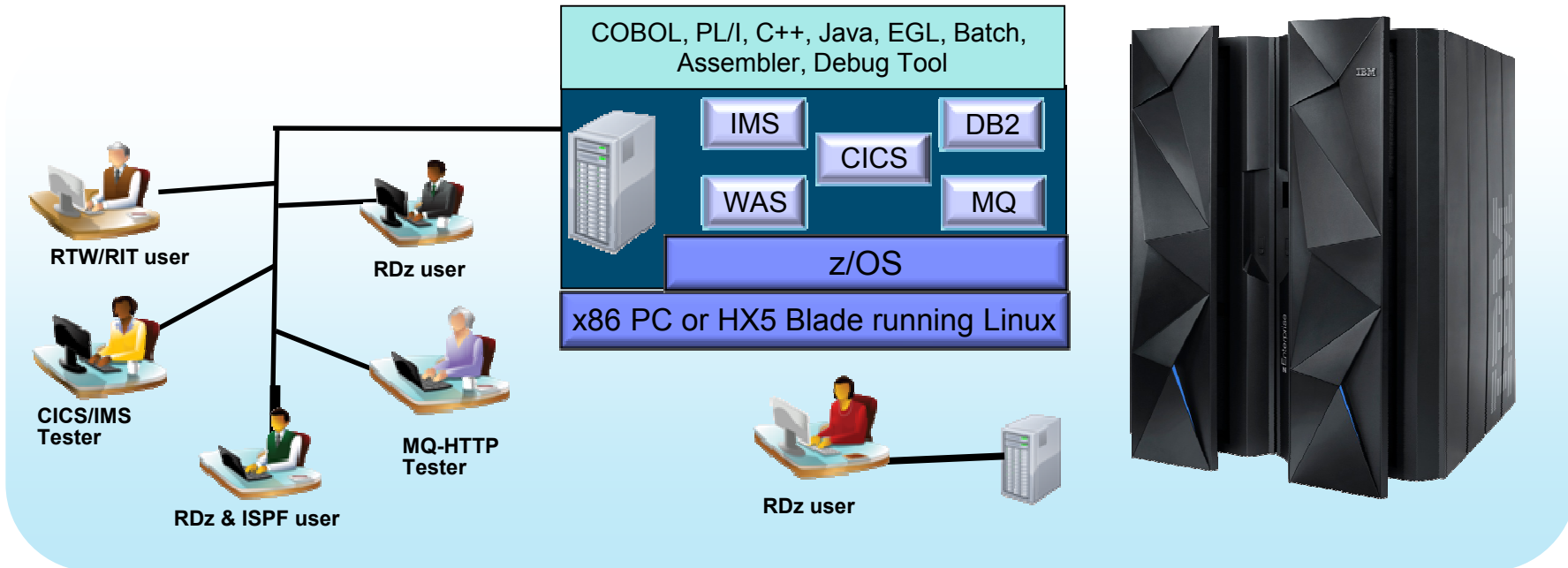
- .Net Objects
- Bytes
- COBOL Copybook
- ebXML
- ASC X12
- UN/EDIFACT
- DFDL
- Fixed Width
- Java Objects
- MIME
- SOAP
- Software AG Broker Docs
- SWIFT
- CHIPS
- FedWire
- TIBCO ActiveEnterprise
- HL7 v3
- XML (DTD, XSD, WSDL)
- ISO8583
- Custom

Technologies

- CentraSite
- Oracle Fusion
- SCA Domain
- Software AG IS, Broker, BPMS
- WebSphere Application Server
- WebSphere Message Broker
- WebSphere MQ
- Websphere SI Bus
- Sonic ESB
- System z (CICS and IMS)
- TIBCO ActiveMatrix
- UDDI
- Web Services
- WebSphere RR
- WSDL
- BPM
- Databases
- Log Files

Rational Development & Test Environment for System z (RD&T)

The ultimate in modern application development for System z

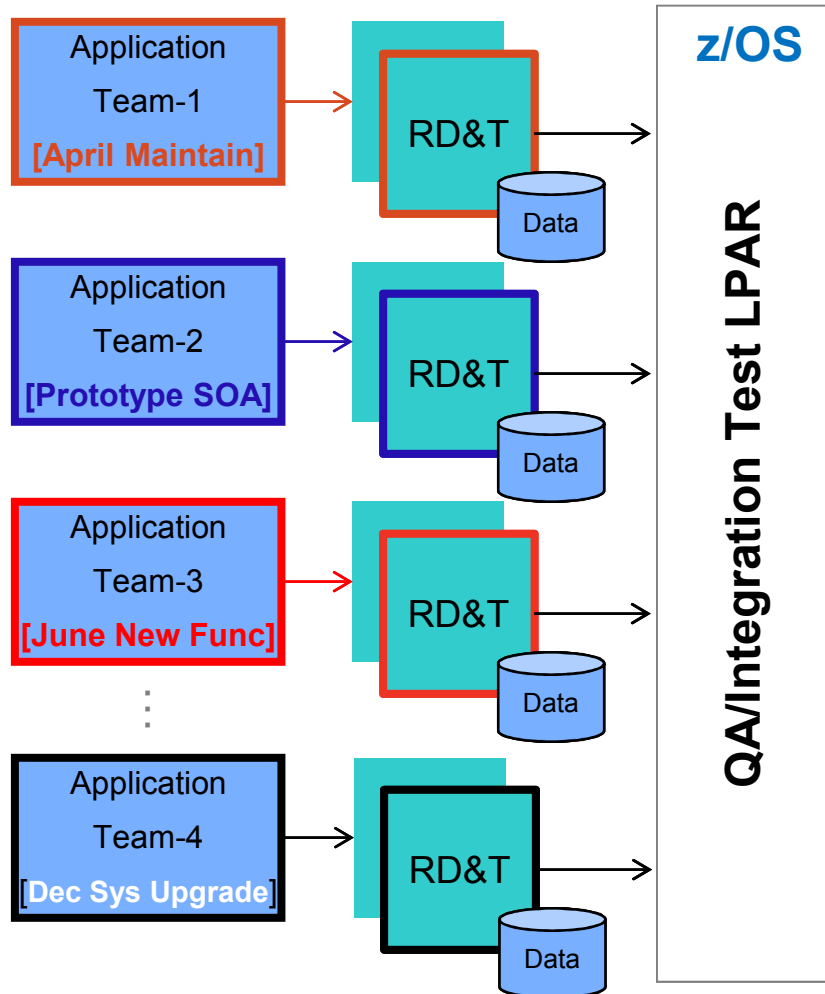


- Enable developers to prototype new applications functions (**Sandbox**)
- Develop and Test System z applications anywhere, anytime! (**Remove constraints**)
- Free-up mainframe Dev/Test MIPS for Production capacity (**Hard cost savings**)
- Eliminate costly delays by reducing dependencies on operations staff (**Turnaround**)

Note: This Program is licensed only for development and test of applications that run on IBM z/OS. The Program may not be used to run production workloads of any kind, nor more robust development workloads including without limitation production module builds, pre-production testing, stress testing, or performance testing.

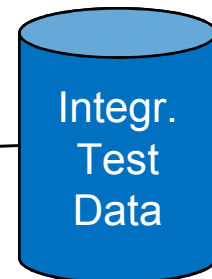
Using RD&T as a Development & Testing Platform

Organized by application team, horizontally sliced, dedicated resources, highly automated



The RD&T consists of:

- **Dev and Test Environment (based on zPDT)**
 - Provide a System z/OS Dev/Test platform on a PC
 - Capable of running CICS, IMS, Batch, DB2, MQ, WAS
 - Sysplex support
 - Provides great flexibility to run a **customized environment**
 - *“Platform Independence”*
- **Software stack** provides a choice of IBM middleware test environments
 - Actual middleware software (including z/OS)
 - Actual enterprise compilers
 - No API simulation



SaaS: RD&T Managed Cloud

How & What value does IBM's Testing Solution with Service Virtualization provide?

Capabilities provided:

- **Capture** and **Model** virtual services
- Virtualize heterogeneous hardware, software and services to provide 24x7 testing capabilities

Value:

- ↘ ▪ Reduce infrastructure costs of traditional testing environments by ***reducing the number of integration platforms***. Reduced technical debt for projects.
- **Deliver earlier**, end-to-end **continuous integration testing** across hardware, software by relieving dependencies and Lowering TCO to consume service
- Reduce delivery risk due to unmanaged dependencies
- ↘ ▪ Faster time to **provision** versus conventional **environment stand-up times (on-demand)**
- ↘ ▪ **Share test environments** across their team enabling **parallel development**
- Employ traceability and collaborate in-context across their development domains
- ↘ ▪ **Test services and applications before their user interfaces** becomes available and do integration testing

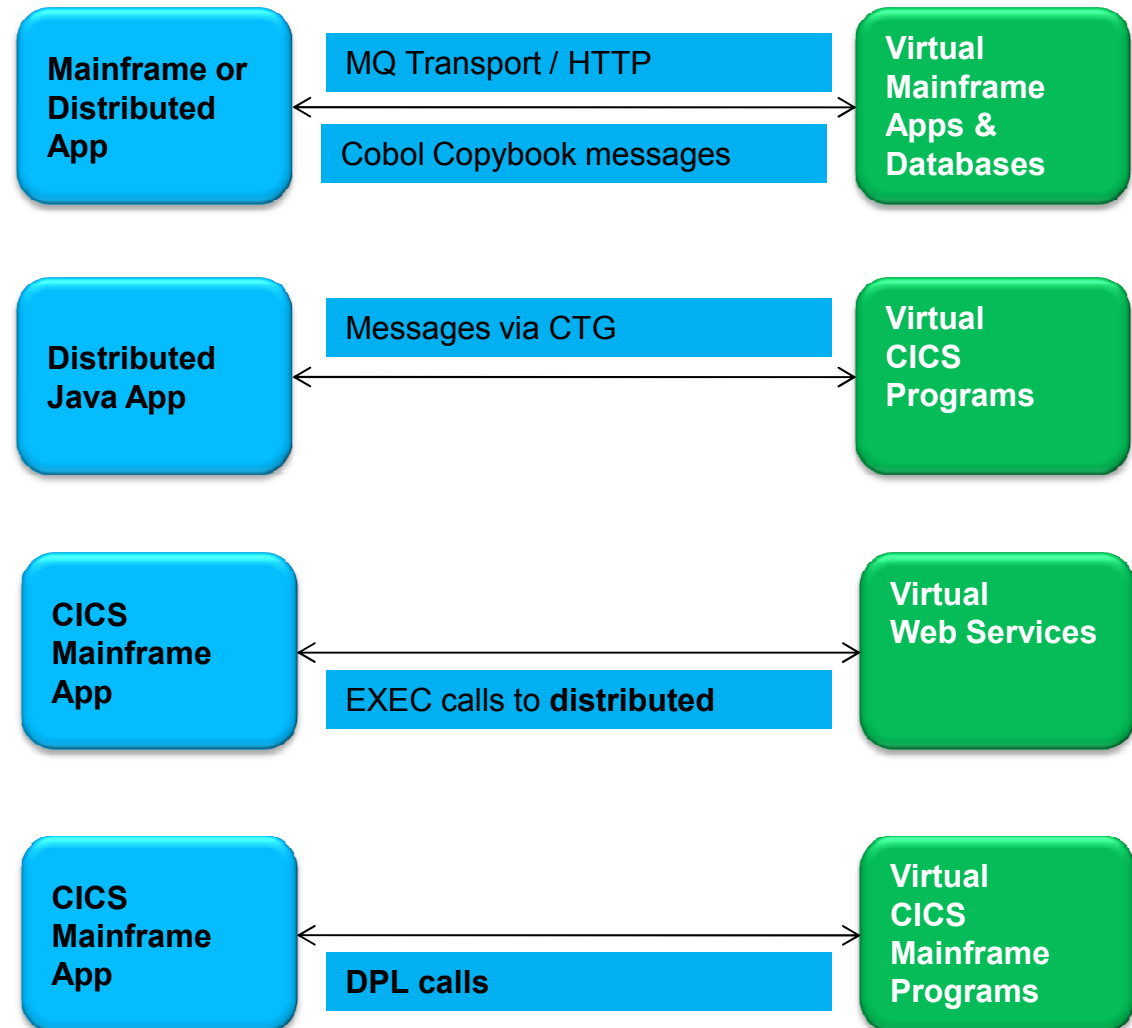
Drives Test Virtualization → Continuous Integration Testing

- **Test Virtualization** is an enabler for Continuous Integration Testing
- Services, applications, systems are **introduced into the continuous integration cycle in a prioritized, controlled fashion (when you need them!)** ←



Benefits of Virtualizing System z Applications

- Set-up multiple Test environments in **minutes** vs. **weeks**
- **Test multi-platform applications** that produce and consume **Cobol Copybooks** / data files and interact with ***MQ, Web Services, DB2 and other systems*** by virtualizing complex dependencies
- Improve coverage for **integration** and **negative test scenarios**
- Improve coverage for **latency tests** by **simulating application behavior** taking too long to respond
- **Early performance testing** to ensure the robustness of system under test
- Execute **Parallel development** on different parts of an application or system by **virtualizing dependencies**



Bank Of Montreal accelerates project delivery 51-75% with IBM Continuous Testing solution

Research by  TechValidate

51-75% Accelerated
Project delivery

10-25% Decreased
Defects in production

10-25% Improved
Team productivity



Business Challenge: The testing organization suffered from inefficient testing processes that were a drain on team productivity.

The Solution: The Bank switched from Parasoft to IBM's test automation because IBM had superior product functionality and was easier to use. IBM service virtualization and test automation was used to:

- Deliver applications built on a service oriented architecture
- Increase the speed at which they could delivery TIBCO applications

Software:

IBM Rational Test Workbench

IBM Rational Test Virtualization Server

“Automated testing is a requirement when building Web Service solutions. IBM’s Green Hat solution was the best tool on the market at the time of our investigation and the support was second to none.”

— Patrick Brophy, Director / VP , Bank of Montreal

The Coca-Cola Company decreased Production defects by 26-50% with IBM

Research by  TechValidate

26-50% Decreased
Defects in production

26-50% Accelerated
Project delivery

26-50% Reduced
Cost of testing

26-50% Improved
Team productivity



Business Challenges:

- Quality issues/defects found in production
- Insufficient or unavailable test environments

The Solution: The Coca-Cola Company chose IBM's service virtualization and automated integration testing solution over other offerings for the following reasons:

- 1) Broadest support for the technologies in their environment
- 2) Cost of the solution
- 3) Realizing increased developer and tester productivity

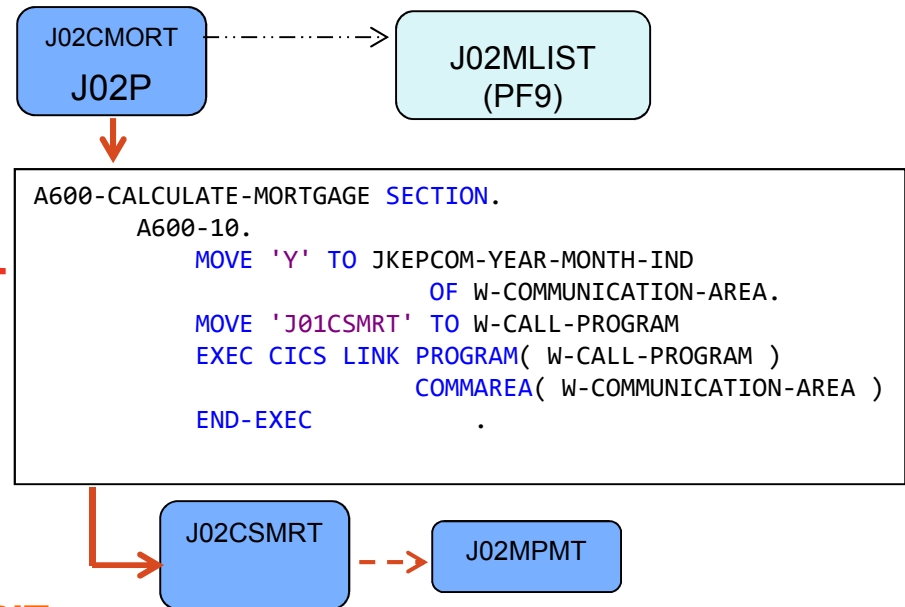
Software:

IBM Rational Test Workbench
IBM Rational Test Virtualization Server

Test & Virtualization Scenario

Mortgage Payment Application

- **Problem:**
CICS test scenario is unavailable for testing
- **Solution:**
 - Virtualize J02P CICS-DPL link as a stub to calculate payment
 - Test/Run Payment Stub
 - Apply change to Payment Stub
 - Demonstrate Sift & Pass-Through
 - Force Error condition
 - Publish/Deploy Stub to Development Team

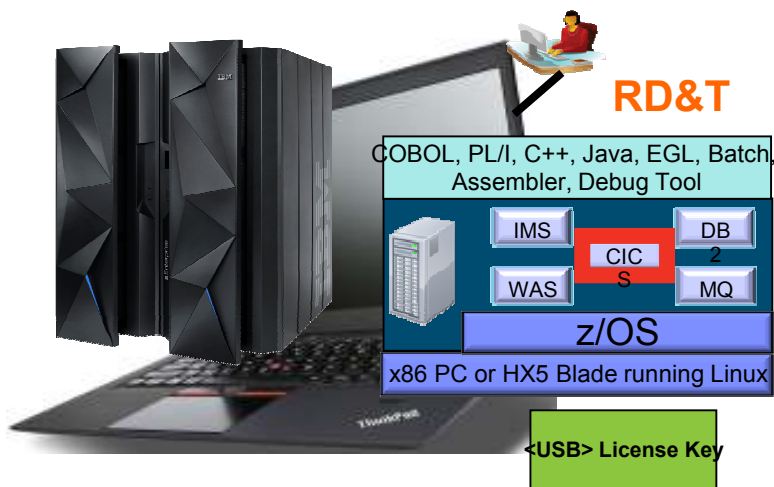


RTW/RIT

- Create a Logical and Physical model of our system under test
- Record events from the system
- Create, design and test stubs before publishing to Dev team via RTVS

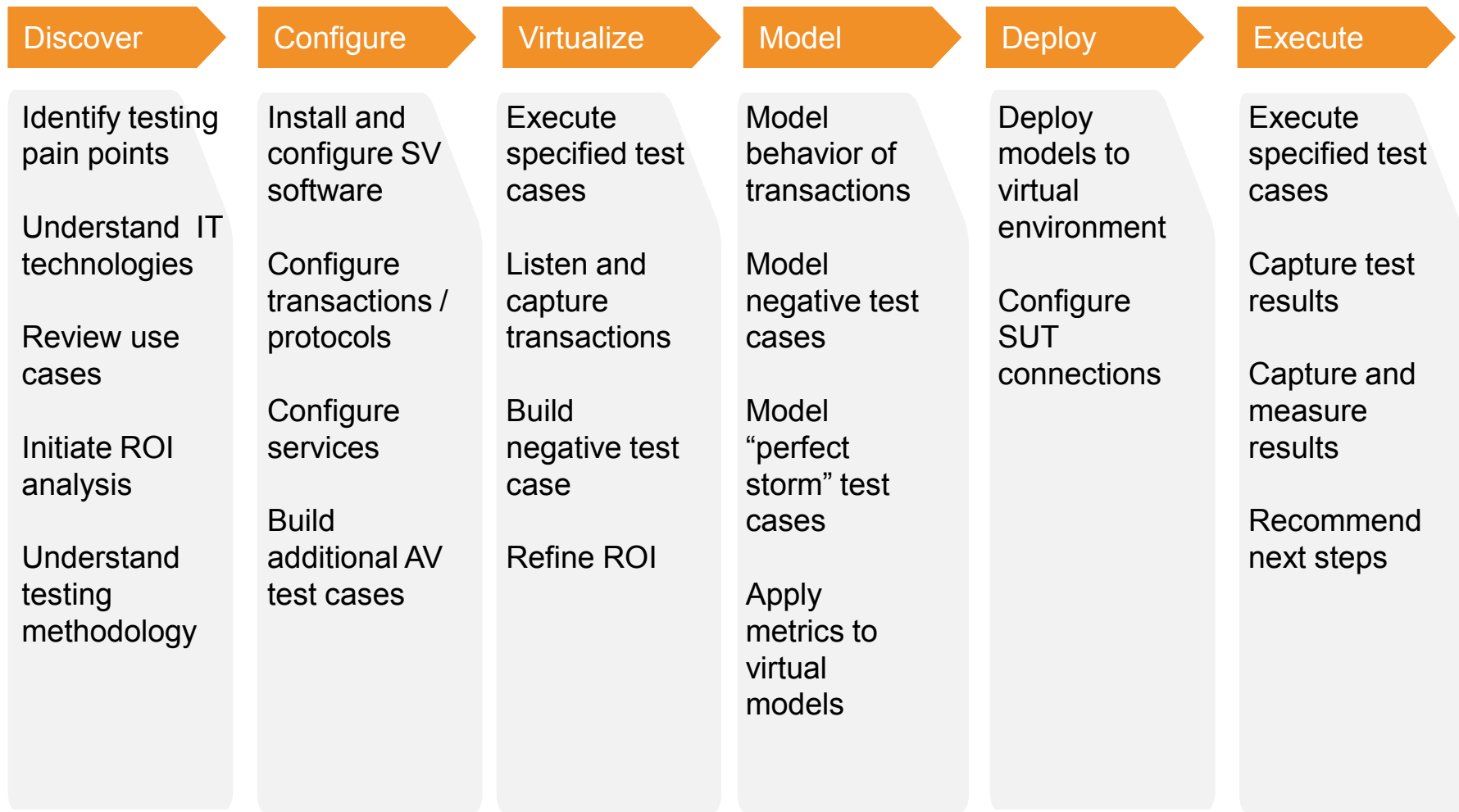
RTCP

- Web-based UI to administer RIT agent, publish stubs, tests and test suites



Demo

Steps to Getting You Started... From Discovery to Execution





THANK YOU

[ibm/devops](https://github.com/ibm/devops)



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END

- Optional Reference & Backup Slides

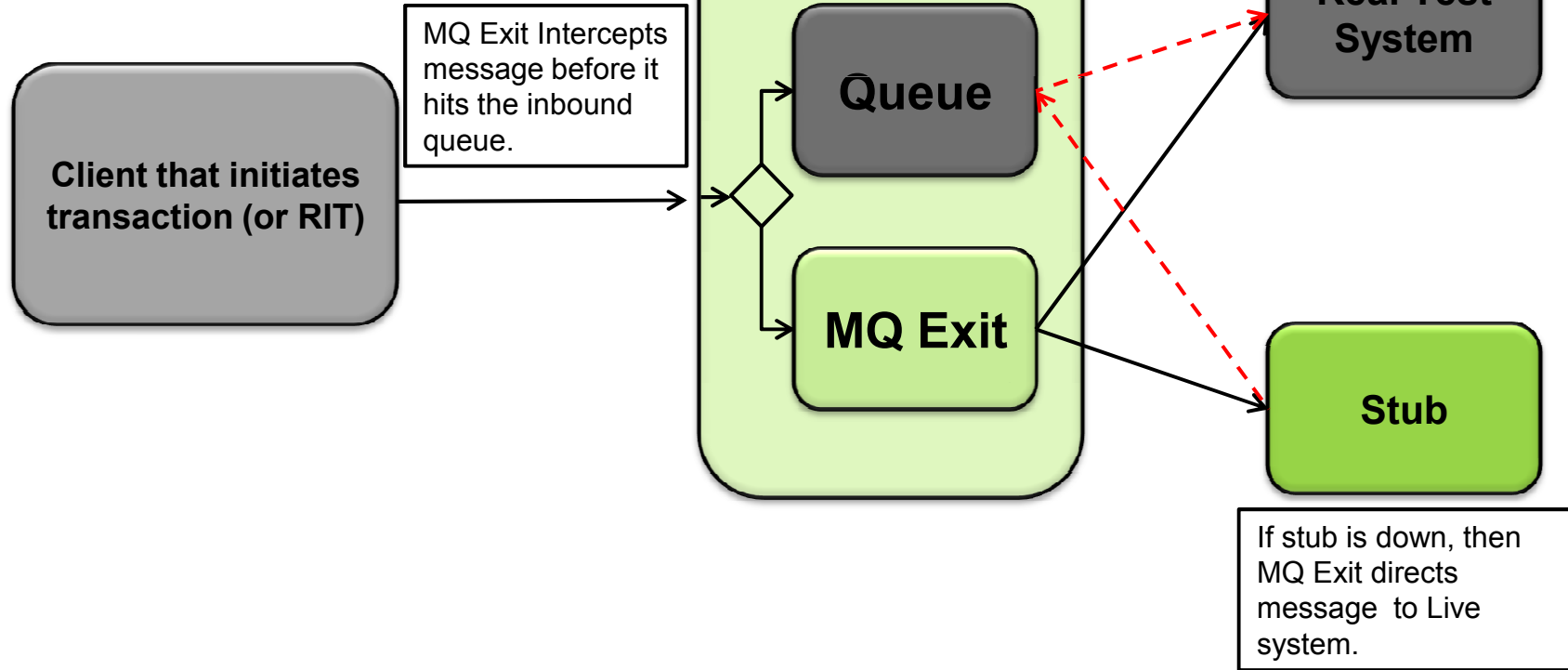
IBM's Rational Test Virtualization Solution

- **IBM's Rational Test Virtualization Solution** focuses on a key set of problems most organizations face: that being time, and resources required to set up and manage test environments. Traditionally, people have been running around installing hardware, setting up application servers, database servers, installing application software, configuring all of that. Not only this is very capital intensive problem, but as environments have become more and more complex, this is also a very error prone process that typically involves a lot of scrap and rework. What the IBM solutions does is to enable organizations to address that problem by Virtualizing complete stacks of software, hardware, and services, enabling developers and testers to stand up test environments in a matter of minutes vs. weeks, which enables them to start testing much earlier than previously possible.

An example using a Virtualized MQ Service/Stub

Sift and Pass-Through with MQ

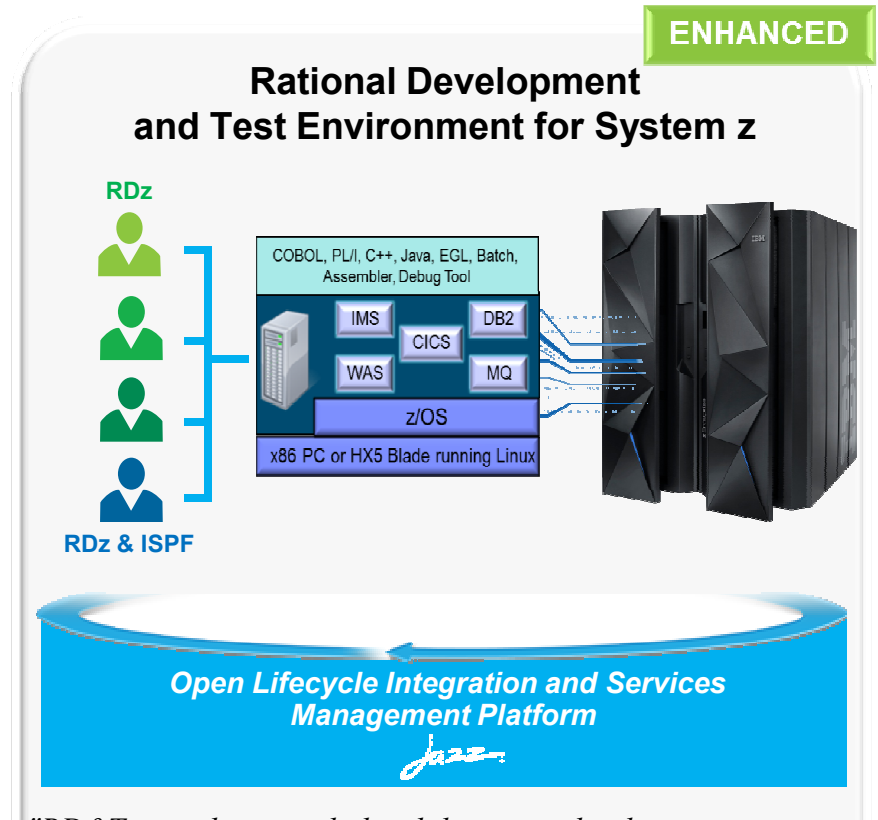
MQ Exit is installed on the MQ Queue Manager. RIT captures inbound and outbound traffic for recording purposes. These recorded messages can then be used as traffic to build tests and stubs which then are directed as inbound and outbound traffic for execution purposes.



Rational Development and Test Environment for IBM System z v9

Reduce System z development costs with high fidelity off host development and test

- Exploit added zEnterprise capability for increased mainframe compatibility
 - **New** Parallel Sysplex support via the latest System z coupling facility
 - **New** zEnterprise EC12 platform support
 - Better development and test coverage early in the cycle for higher quality applications delivered more quickly
- Improve hardware utilization and simplify management
 - **New** support for virtualization technologies, including VMWare vSphere and IBM zEnterprise BladeCenter Extension
- **New**, flexible licensing to support automated testing and variable usage patterns



"RD&T provides us with the ability to try development approaches that may introduce instability to our normal environment with none of the associated risks. It provides an environment where we can quickly start a new project without waiting for setup delays inherent in our day-to-day processes."

Development Team Lead

DEVELOPER VALUE

RD&T Device maps – Defining devices to z/OS

“Devmap” – will map the entities known to Linux, to the devices known to z/OS

z/OS volumes are contained in Linux files

z/OS Communication device is a Linux ethernet card or a logical tunnel device

z/OS printer or card readers can be Linux files

... Other devices are also possible such as SCSI attached tape drives.

