

Luke Clark, Green Hat SME for AP

IBM Rational Test Virtualization Solution v8.0

June 2012 Launch

Original slides from Sreenivasan Rajagopal, Product Manager, Software Group (June 2012)

Agenda

- How to ensure better Software Quality?
 - From “testing” to a smarter quality management
- IBM Rational Test Virtualization Solution
 - Rational Test Workbench
 - Rational Test Virtualization Server
 - Rational Performance Test Server
- Summary
 - Success Stories



Software drives today's innovation for a smarter planet

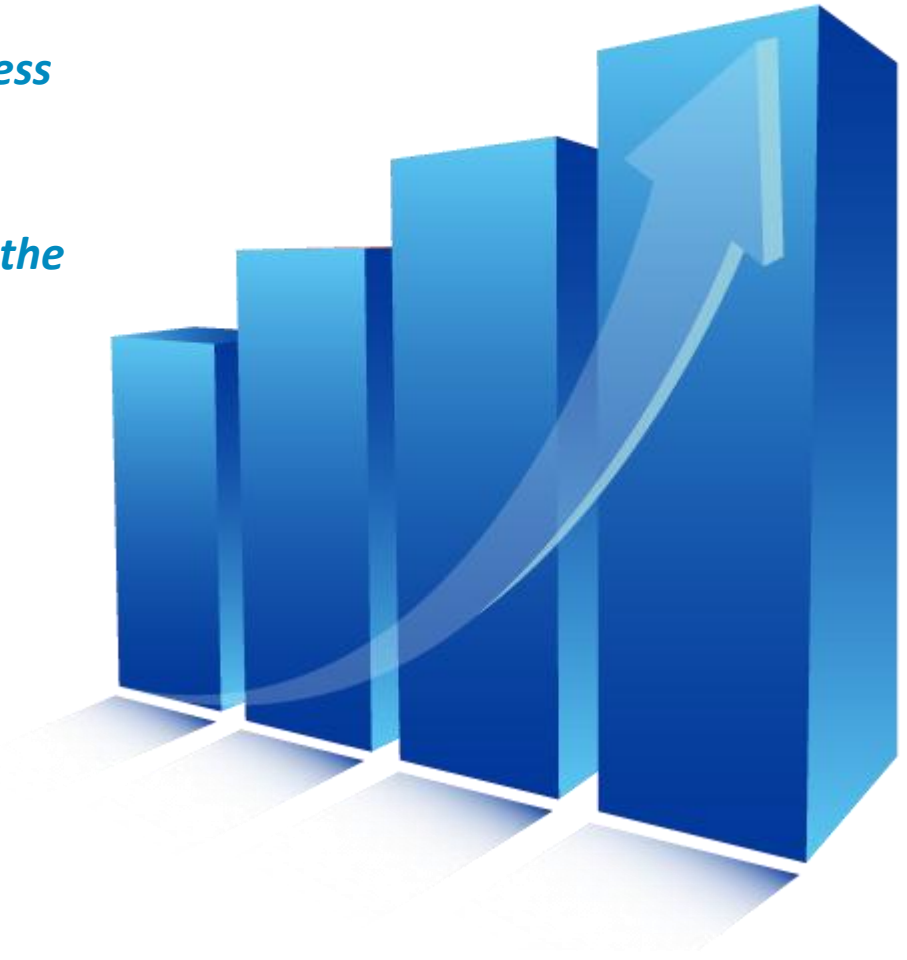


Transforming the way we live, work, and play



Yet software quality is a major problem across all industries

- Software is blamed for *more major business problems than any other man-made product*.
- Poor software quality has become *one of the most expensive topics in human history*
 - *\$150+ billion per year in U.S.*
 - *\$500+ billion per year worldwide.*
- Projects cancelled due to poor quality are *15% more costly than successful projects* of the same size and type.

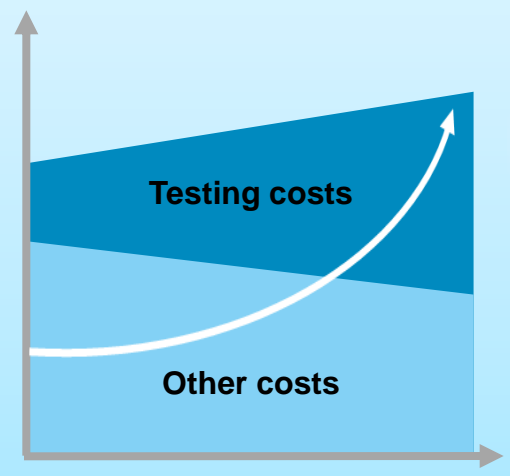


Source: Capers Jones, 2011

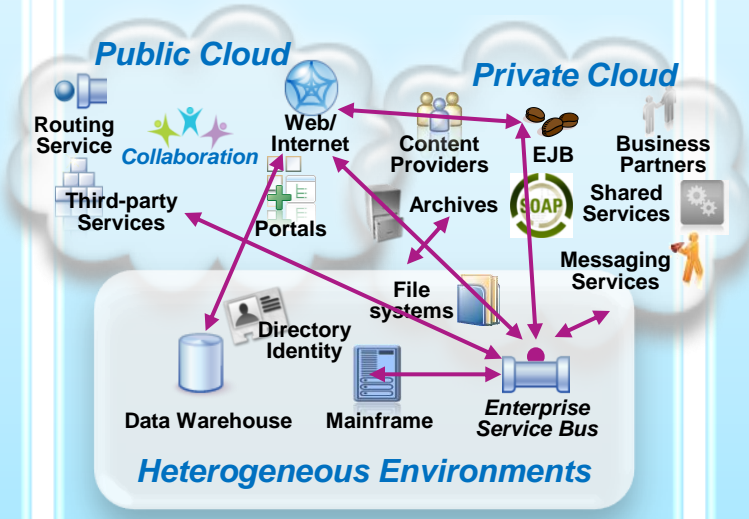
Based on 675 companies, 35 government/military groups, 13,500 projects, 50-75 new projects/month, 24 countries, 15 lawsuits

Cost, complexity and velocity make today's quality paradigm impractical

Increasing Cost of Quality



Increasing Development Complexity



Balancing Quality and Speed



*An estimated 60 - 80 percent of the cost of software development is in rework**

Outsourcing **labor** is no longer a sustainable model as global wages are increasing

Product and application **complexity** and size are increasing

Productivity is inhibited as test teams can no longer keep up with agile development

* Source: <http://www.sei.cmu.edu/about/message/>

Managing software quality has become extremely challenging

Increasing Cost of Quality

\$59.5 billion

The estimated cost of software defects cost to U.S. economy^c

13%

The forecasted increase in wages for India IT workforce in 2011^a

Increasing Development Complexity

\$5-30 million

The typical investment to build a single test lab for a Fortune 500 company. Most have dozens^b...

5X more test labs required

Large global financial services firm increases test lab deployments from 6 to 32 in 13 years^b

Balancing Quality and Speed

74%

The estimated number of projects with significant delays or quality issues^c

30-50%

The average amount of time testing teams spend on setting up test environments, instead of testing^c

^a The Times of India, IT sector to get 12% average salary hike in 2011, TOI Tech & Agencies, March 8, 2011.

^b IBM customer reference.

^c NIST, Planning Report 2002-2003. The Economic Impacts of Inadequate Infrastructure for Software Testing, May 2002.

Better software quality requires a shift in focus

Evolving from Testing to Quality Management

Testing

A technical investigation done to expose quality-related information about the product or service under test



"I have hundreds of testers & lots of automation, but all I do is find more defects. I don't have a testing problem, I have a quality problem." – large global bank

Quality Management

Systematic monitoring and evaluation of the various aspects of a product or service, to maximize the potential to attain target quality standards

Past Solutions and Limitations

Huge Test Lab Costs

Labor, hardware, and software costs to manage test labs and environments

Longer Cycle Time

Days/weeks wasted waiting on the availability of a test environment

Higher Risk

Availability of test environments hinders developers ability to test properly

- Lots of under-utilized and costly test lab resources
- Development and QA waste a lot of time on unproductive activities: installation, configuration, trial/error, etc.
- A significant portion of the testing effort is pushed late in the process resulting in defects costing 10-100x to fix

IBM Rational Test Virtualization Solution

A Smarter Solution for Better Quality

Significantly Lesser Test Lab costs

- Test lab infrastructure costs can be reduced by up to 90%
- Labor involved in setting up test environments can be reduced by 80%+
- Reduced or eliminated the cost of invoking 3rd party systems for non-production use, fee-based web services

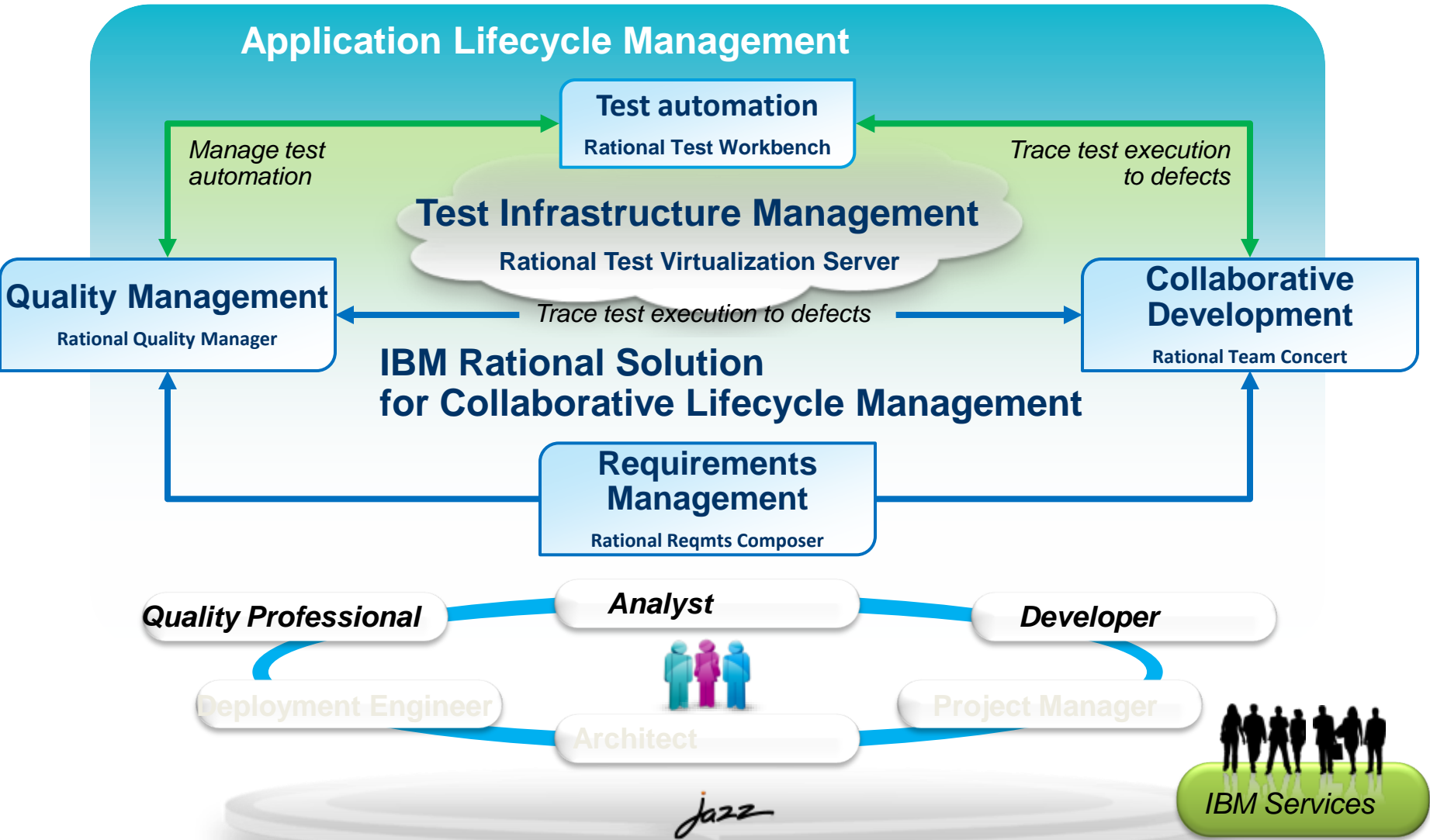
Reduced Cycle Time

- Test environments can be configured in minutes vs weeks
- More testers can be focused on testing, rather than configuring test environments
- More regression testing can be done independently from the User Interface, during development

Lower Risk

- Developers have the means to test software earlier at the Service/API level
- Large teams working on different parts of an application or system can effectively do parallel development by virtualizing different parts of the system

IBM Rational Integrated Quality Management Solution

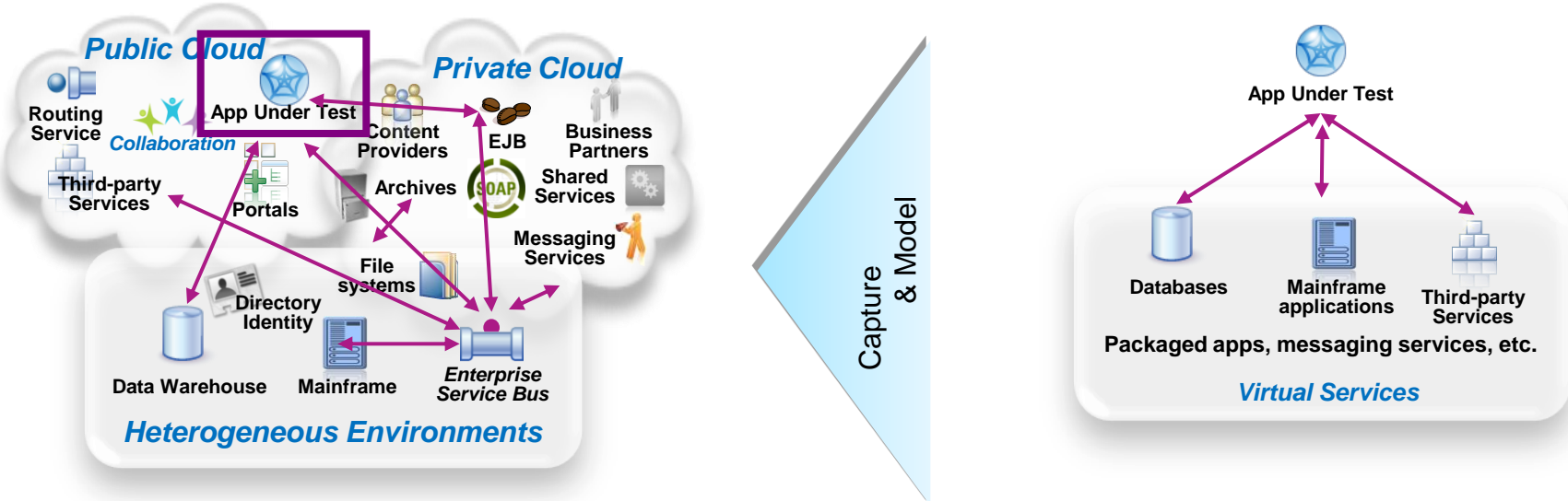


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- How to ensure better Software Quality?
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 - Rational Test Workbench
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What is Test Virtualization?



System **dependencies** are a key challenge in setting up test environments:

- ▶ **Unavailable/inaccessible:** Testing is constrained due to production schedules, security restrictions, contention between teams, or because they are still under development
- ▶ **Costly 3rd party access fees:** Developing or testing against Cloud-based or other shared services can result in costly usage fees
- ▶ **Impractical hardware-based virtualization:** Systems are either too difficult (mainframes) or remote (third-party services) to replicate via traditional hardware-based virtualization approaches

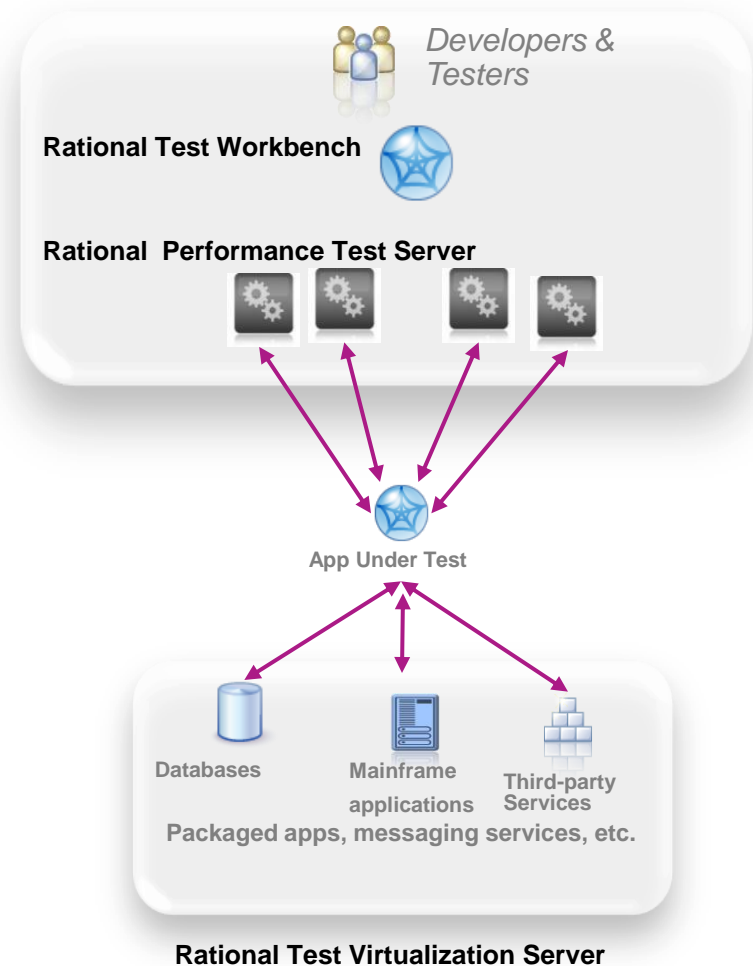
Test Virtualization enables to create “**virtual services**”:

- Virtual Services simulate the behavior of an entire application or system during testing**
- Virtual Services can run on commodity hardware, private cloud, public cloud**
- Each developer, tester can easily have their own test environment**
- Developer and testers continue to use their testing tools (Manual, Web performance, UI test automation)**

IBM Rational Test Virtualization Solution

A smarter solution to better quality

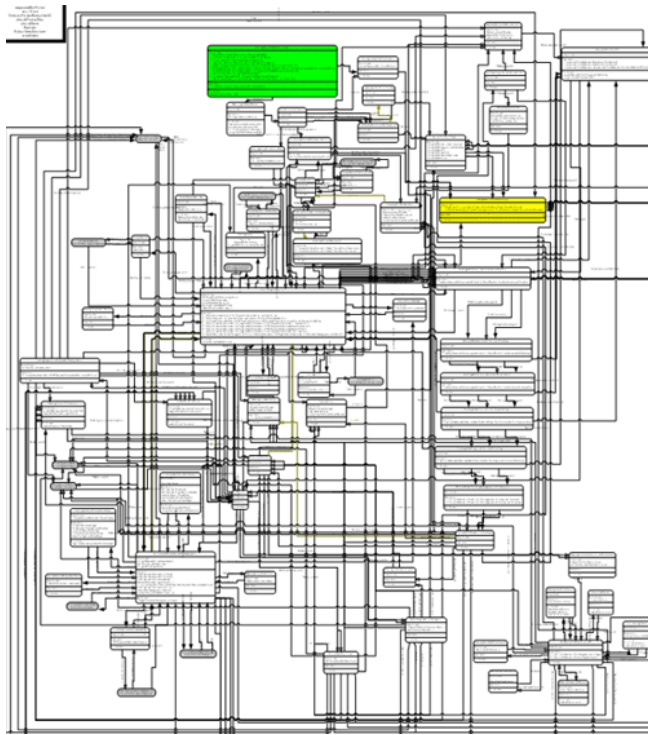
- **Rational Test Workbench** is a desktop solution that enables testers/developers to:
 - Capture and model virtual services
 - Test services and applications long before their user interfaces becomes available and do integration testing (SOA, BPM)
- **Rational Test Virtualization Server** is a server solution that:
 - Provides a central environment to virtualize heterogeneous hardware, software and services to provide 24x7 testing capabilities
 - Reduces infrastructure costs of traditional testing environments
 - Virtual Services can be built from the interface definition of the system for a wide variety of protocols, including HTTP, web services, SOA, JMS, TIBCO, IBM WebSphere MQ, Oracle, etc.
- **Rational Performance Test Server** enables Rational Test Workbench users to reuse test scripts to drive performance testing
 - Can be used in combination with Virtual Services
 - Probe for identification of system bottlenecks



The Modern Application



- Light
- Fresh
- New
- Simple



...but still
unfortunately
connected to 20+
years of IT legacy!

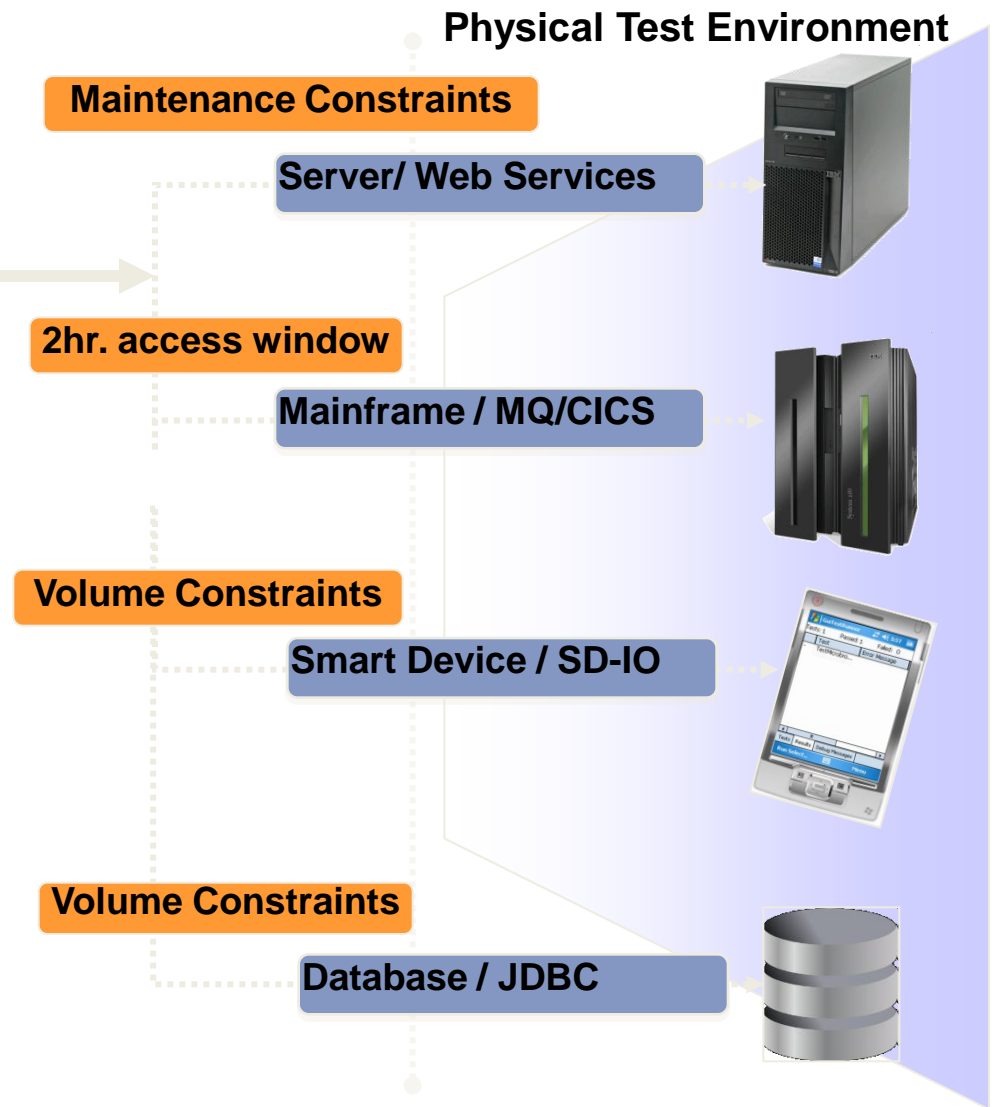
Challenge: Constraints in the development and testing lifecycle



System Under Test

Problem:

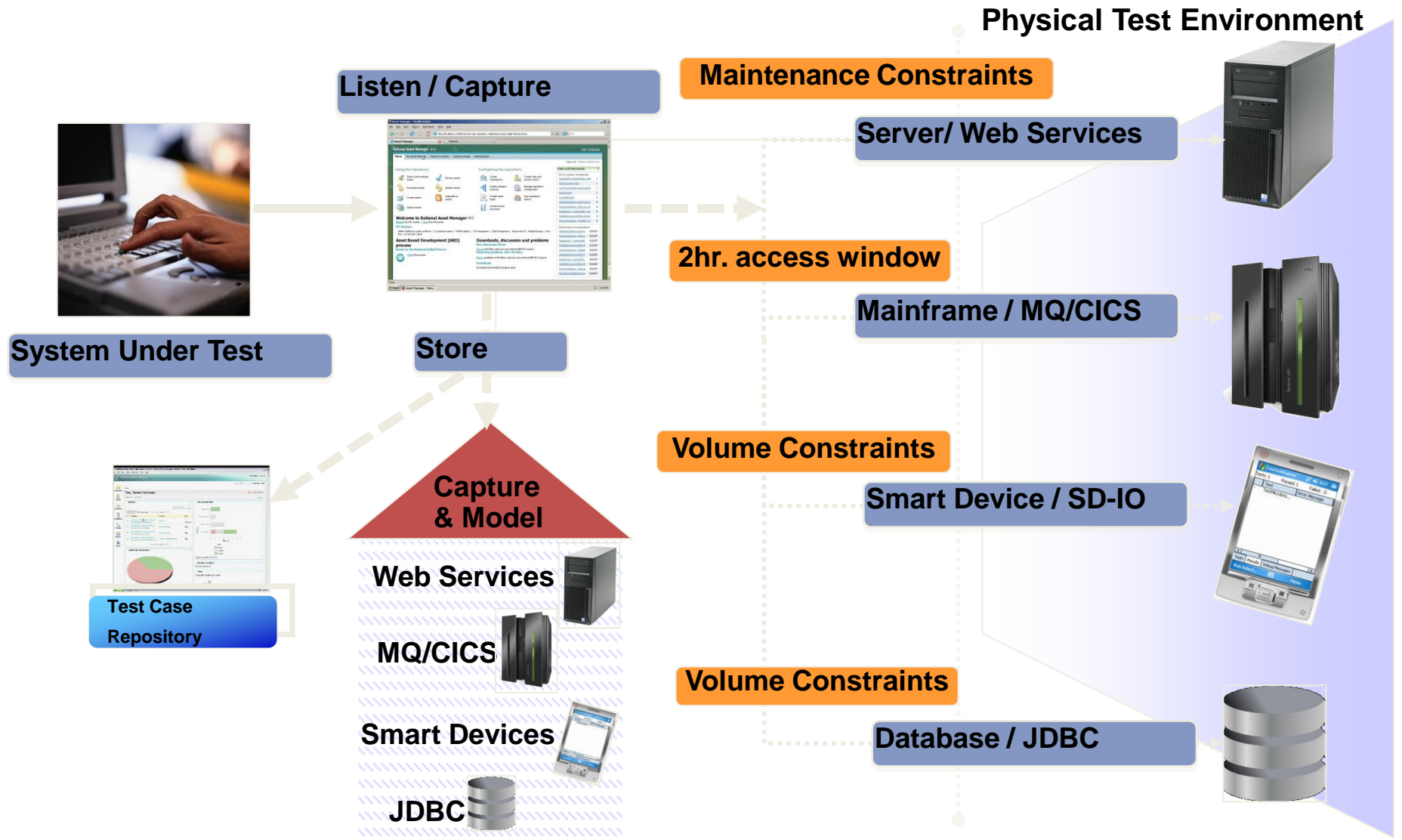
Pervasive constraints on development and testing limit productivity



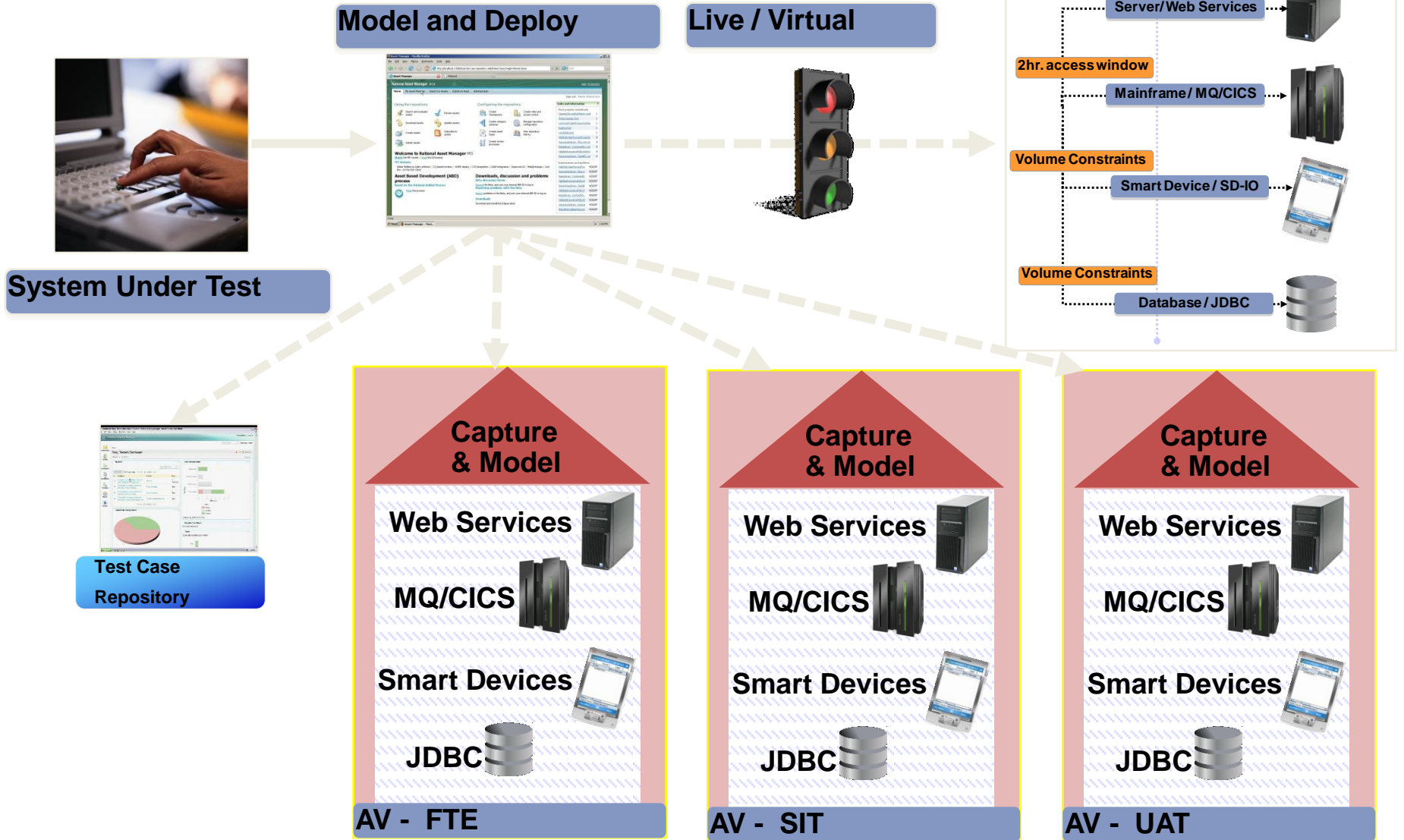
Solution : IBM Rational Test Virtualization Solution



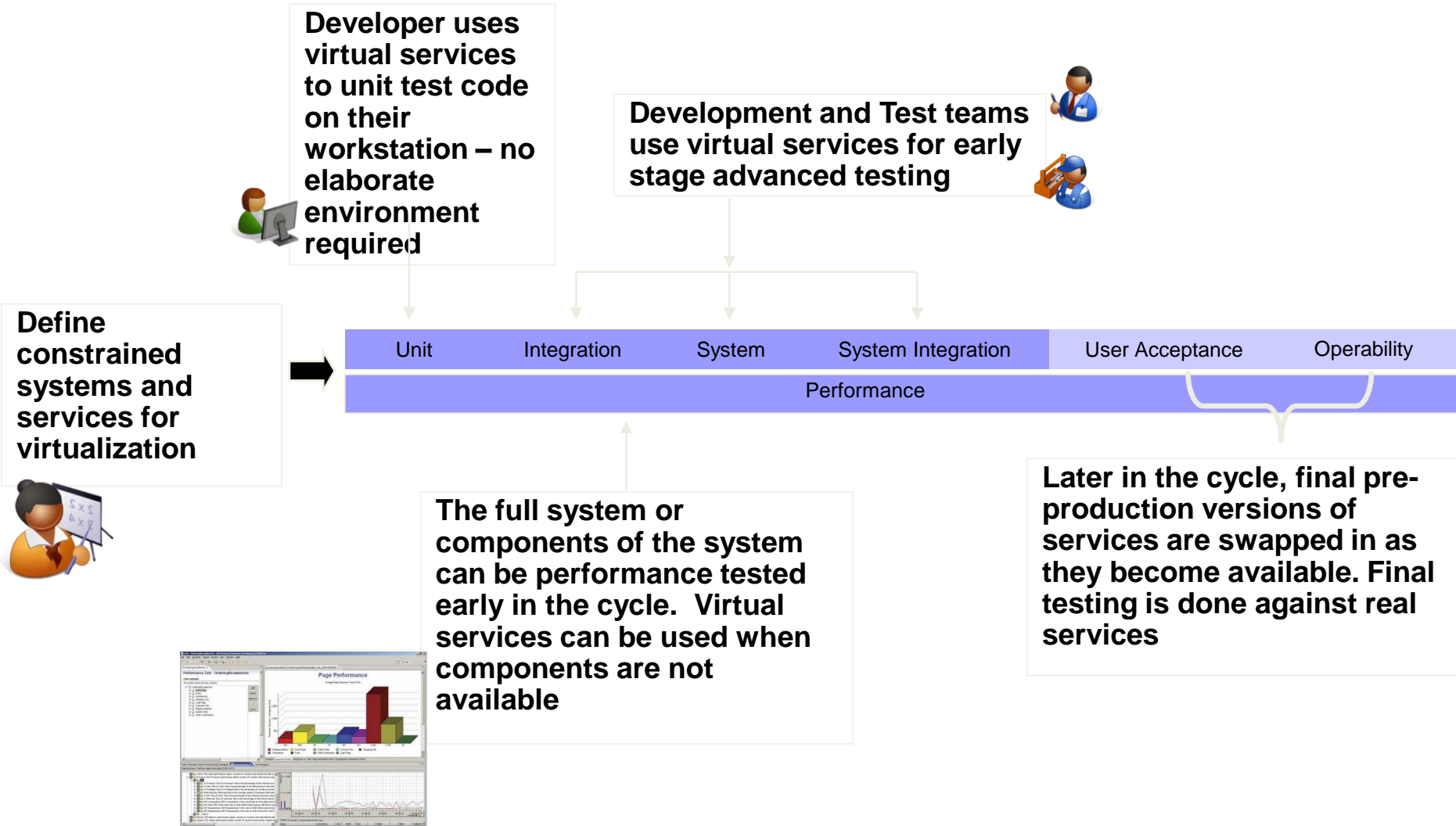
Test Virtualization listens to and captures the behavior and characteristics of back-end systems



IBM Rational Test Virtualization Solution enables deployment of virtual services to multiple environments





IBM Rational Test Virtualization Solution provides benefits across the software delivery life cycle

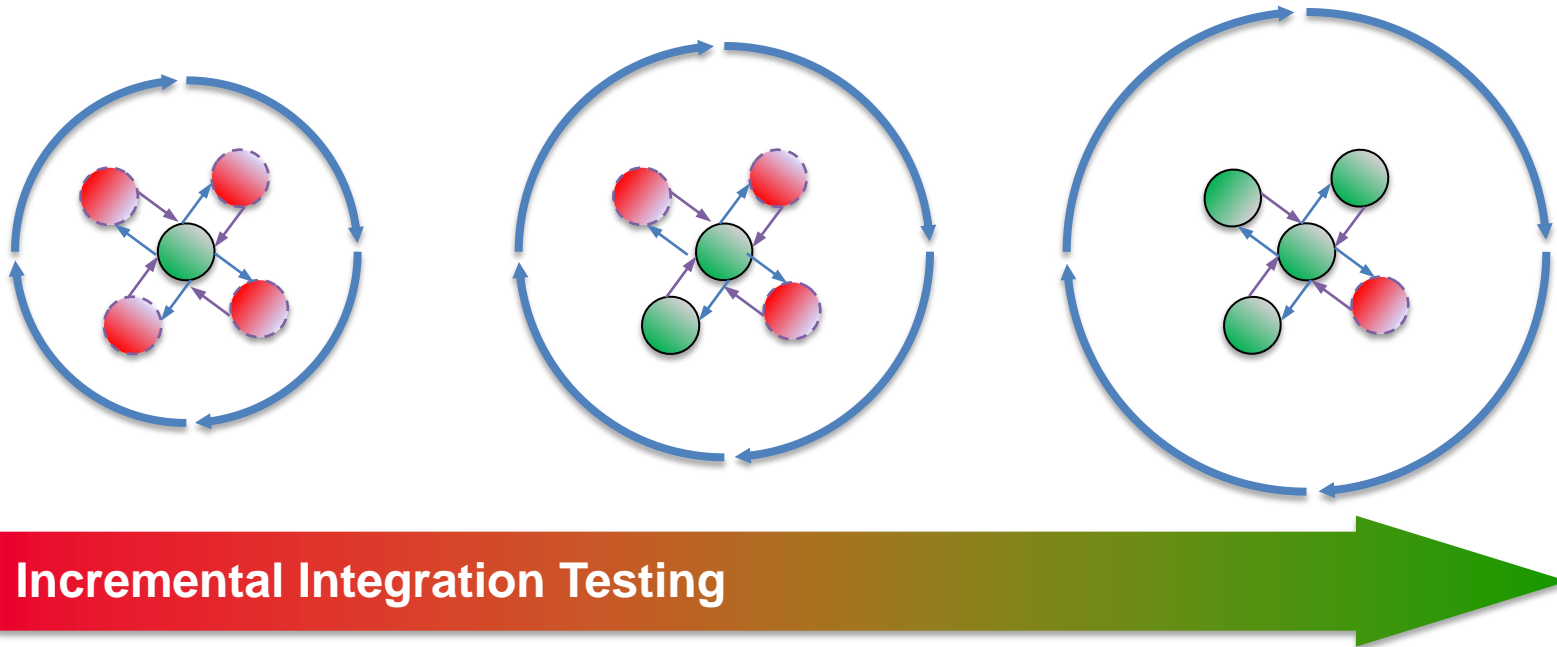


IBM Rational Test Virtualization Solution is a key enabler for Continuous Integration Testing

✓ Test Virtualization is an enabler for continuous Integration Testing

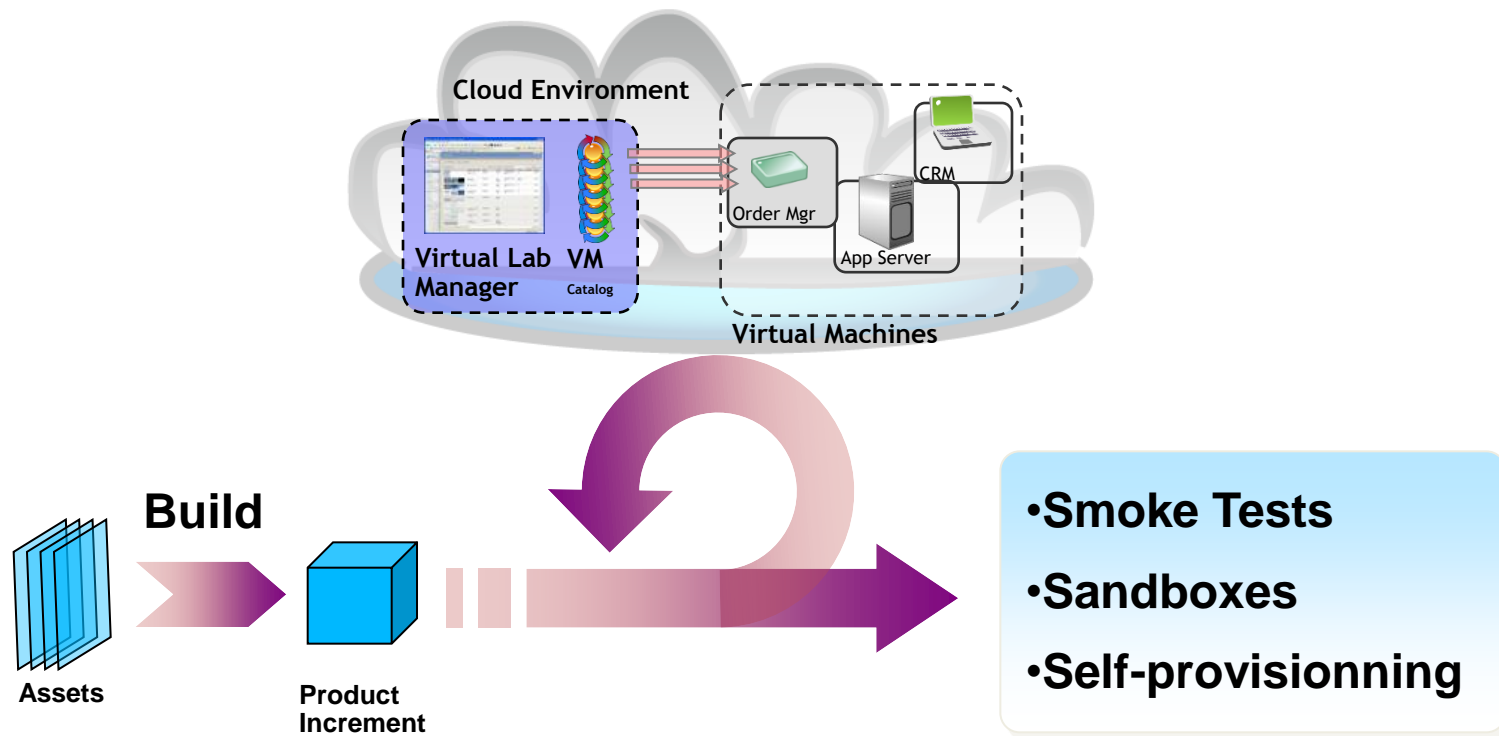
✓ Services, applications, systems are introduced into the continuous integration cycle in a prioritized, controlled fashion.

 Actual Service/App
 Virtual Service/App



IBM Rational Test Virtualization Solution streamlines continuous integration and testing

- Avoid time spent installing and configuring software just to discover basic build issues
- Smoke tests can be integrated as part of the continuous integration process through deployment automation and test virtualization
- Smoke test results are made available to the entire team to shorten resolution



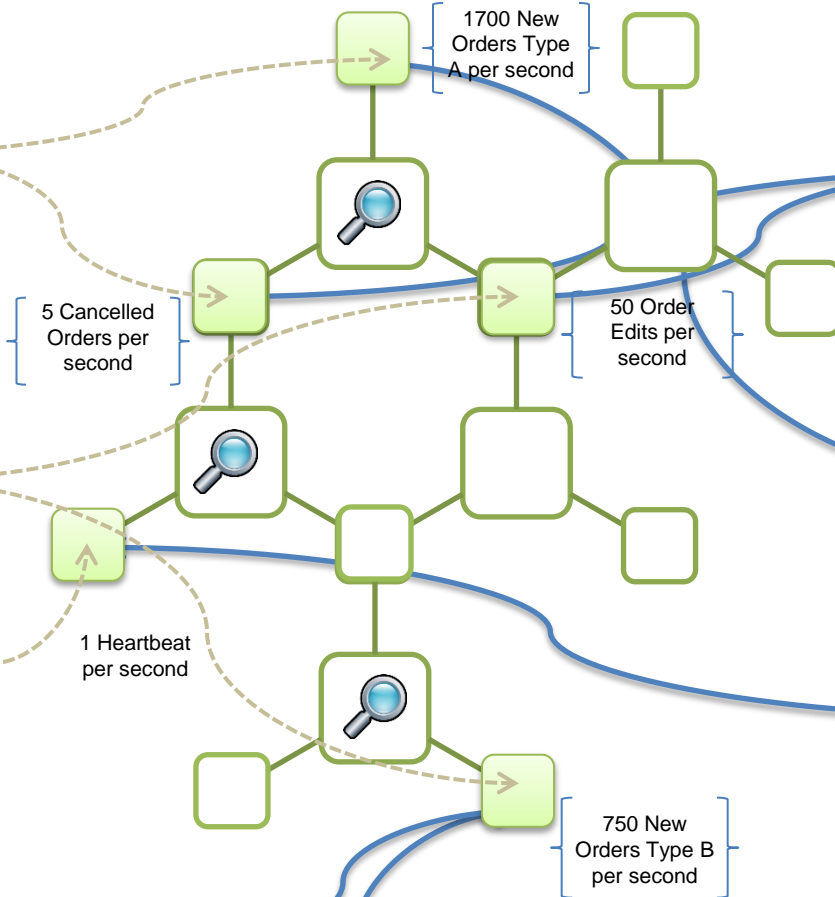
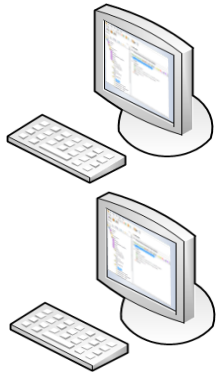
Performance Testing with IBM Rational Test Virtualization Solution



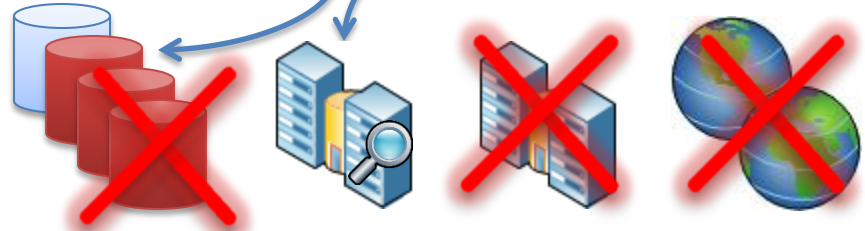
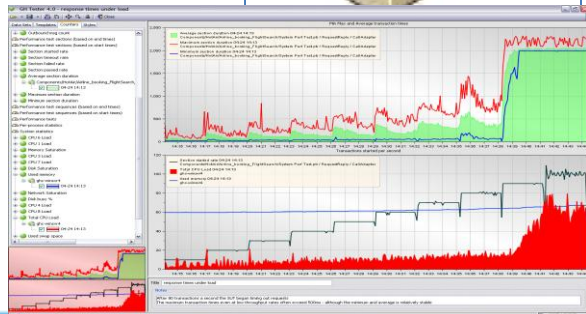
Configure & Control

Execute

Virtualize



Analyse



Supported Environments and Technologies

Messaging Protocols

- ActiveMQ
- Email (SMTP, IMAP)
- Files
- FIX
- FTP/S
- HTTP/S (MIME & Chunked)
- JMS (JBOSS et al)
- IBM WebSphere MQ
- JBoss MQ
- SAP IDoc, BAPI, RFC & XI/PI
- SMTP
- Software AG's IB & IS
- Solace
- Sonic MQ
- TCP
- TIBCO Rendezvous, Smart Sockets & EMS
- Custom

SOA, ESB, Others

- CentraSite
- Oracle Fusion
- SCA Domain
- Software AG IS, BPMS
- Sonic ESB
- TIBCO ActiveMatrix
- UDDI
- Web Services
- WebSphere RR
- WSDL

- BPM
- Databases
- Log Files

Message Formats

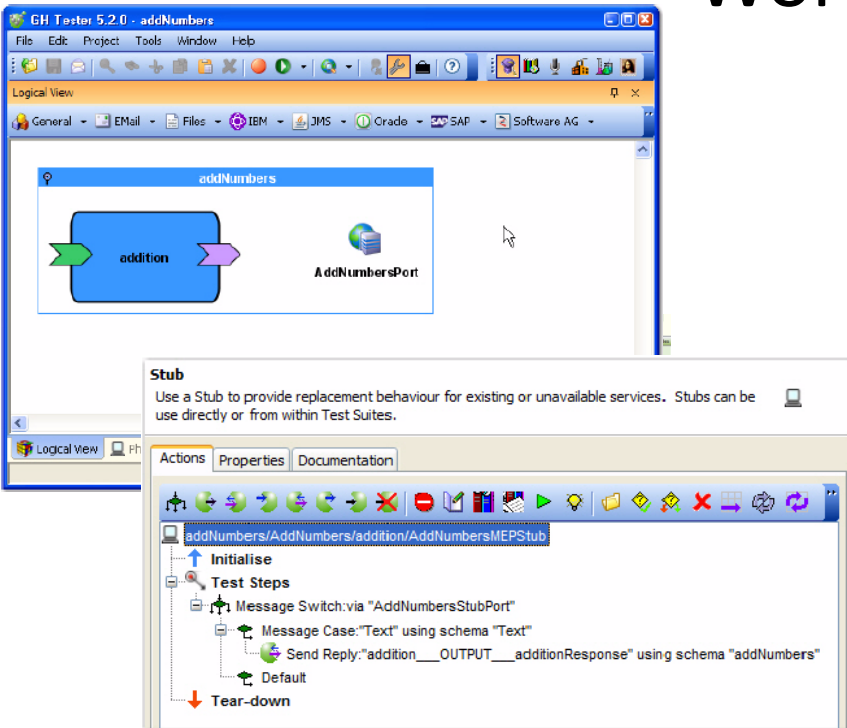
- .Net Objects
- Bytes
- CHIPS
- COBOL Copybook (inc CICS)
- ebXML
- EDI
- Fedwire
- Fixed Width
- FIX
- Google Protocol Buffer
- HL7
- IATA
- Java Objects
- JSON
- MIME
- OAG
- SOAP
- Software AG Broker Docs
- SWIFT
- TIBCO ActiveEnterprise
- XML (DTD, XSD, WSDL)
- Custom

Note : Custom protocol support can be developed

Virtual Application Types

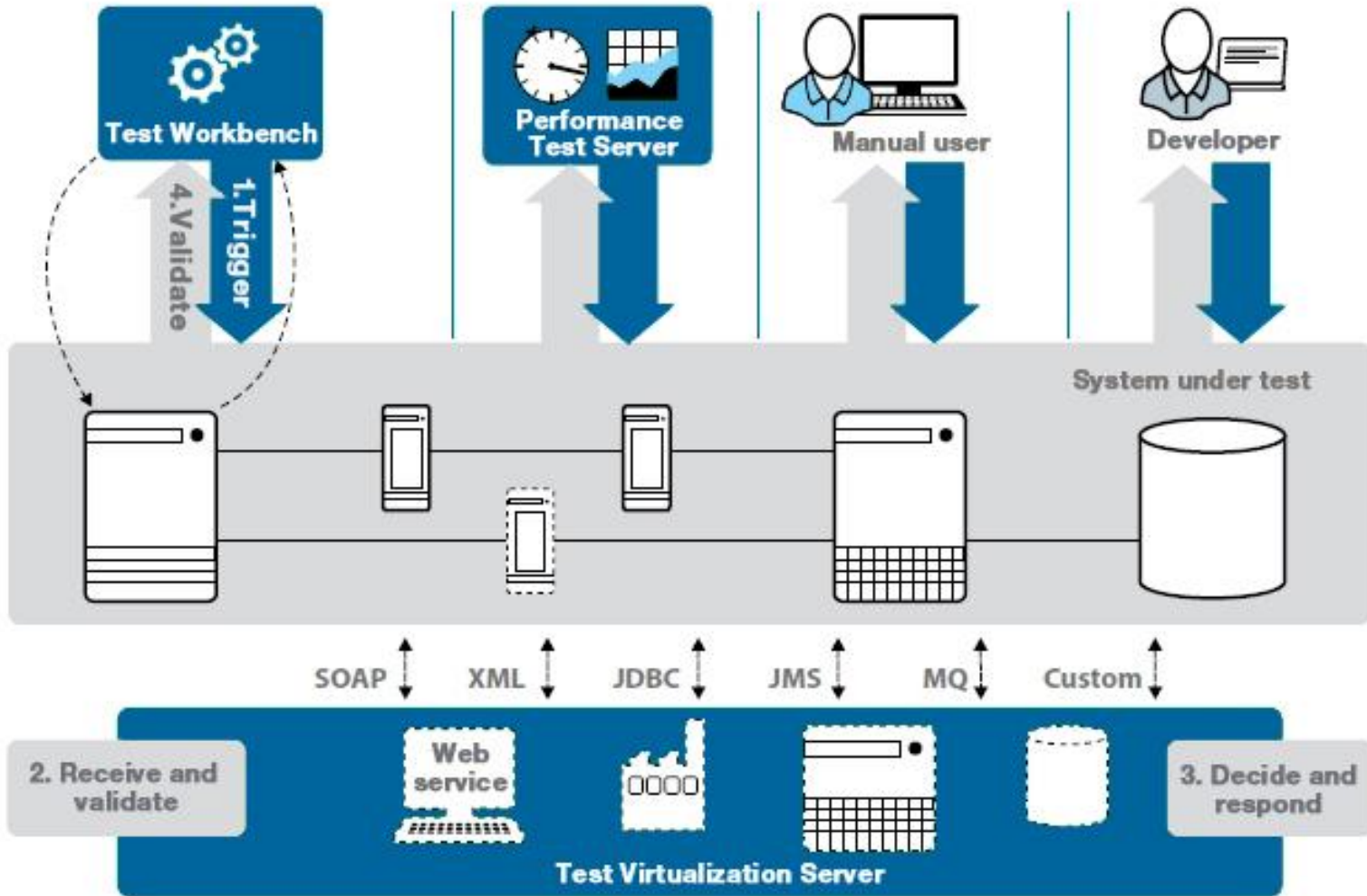
Simple	Hard-coded response returned for given input
Non-deterministic	One-of-n hard-coded responses
Data driven	Input and/or output data specified in external data source (Excel, file, database)
Model driven, stateful	Input and/or output data kept in data model with complex relationships. Supports CRUD and other stateful behavior
Behavioural	Extends model-driven to provide pre-packaged functionality, e.g. shopping basket, real-time data feed, trading exchange, order matching

IBM Rational Test Virtualization Solution Workflow



- Using Rational Integration Tester (part of Rational Test Workbench)
 - Define system architecture in “architecture school”
 - Define protocols
 - Import specification, e.g. WSDL for web services
 - Record conversations
 - Define stubs and data
 - Data captured during recording or supplied in a file, database
 - Publish stubs to Rational Test Virtualization Server (RTVS)
- Dynamically configure message routing from RTVS web console
- Test against virtual system from tool of choice

IBM Rational Test Virtualization Solution: How it all fits together...



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IBM Rational Test Virtualization Solution has proven measurable results and business value



Major telecom carrier

Multiple test releases required additional test resources, increasing testing costs

- Solution: Virtualized services and created reusable test cases across multiple environments
- Results: Reduced testing time by 50%, saving \$800K over 3 years



A leading global financial services firm with assets of over \$2 trillion

Many disparate legacy format to be migrated to next gen payments system

- Solution: Virtualized third-party systems otherwise unavailable for testing
- Results: Reduced manual testing from 10 days to 10 minutes, saving over \$7 million to date



Major U.S. insurer

Recognized manual efforts insufficient for complex SOA and web services

- Solution: Agile middleware solution created to match the legacy systems' functionality
- Results: Reduced testing by 95% to 2 hours; reduced 'rate filing' validation by 94% to 320 hours



Global manufacturer acquires competitor

Migrate off rented infrastructure onto company's standardized middleware platform

- Solution: Virtualized critical, unavailable systems during migration
- Results: Fully integrated in 6 months – 2 months ahead of schedule; saved significant rental costs and dependencies on third-party systems

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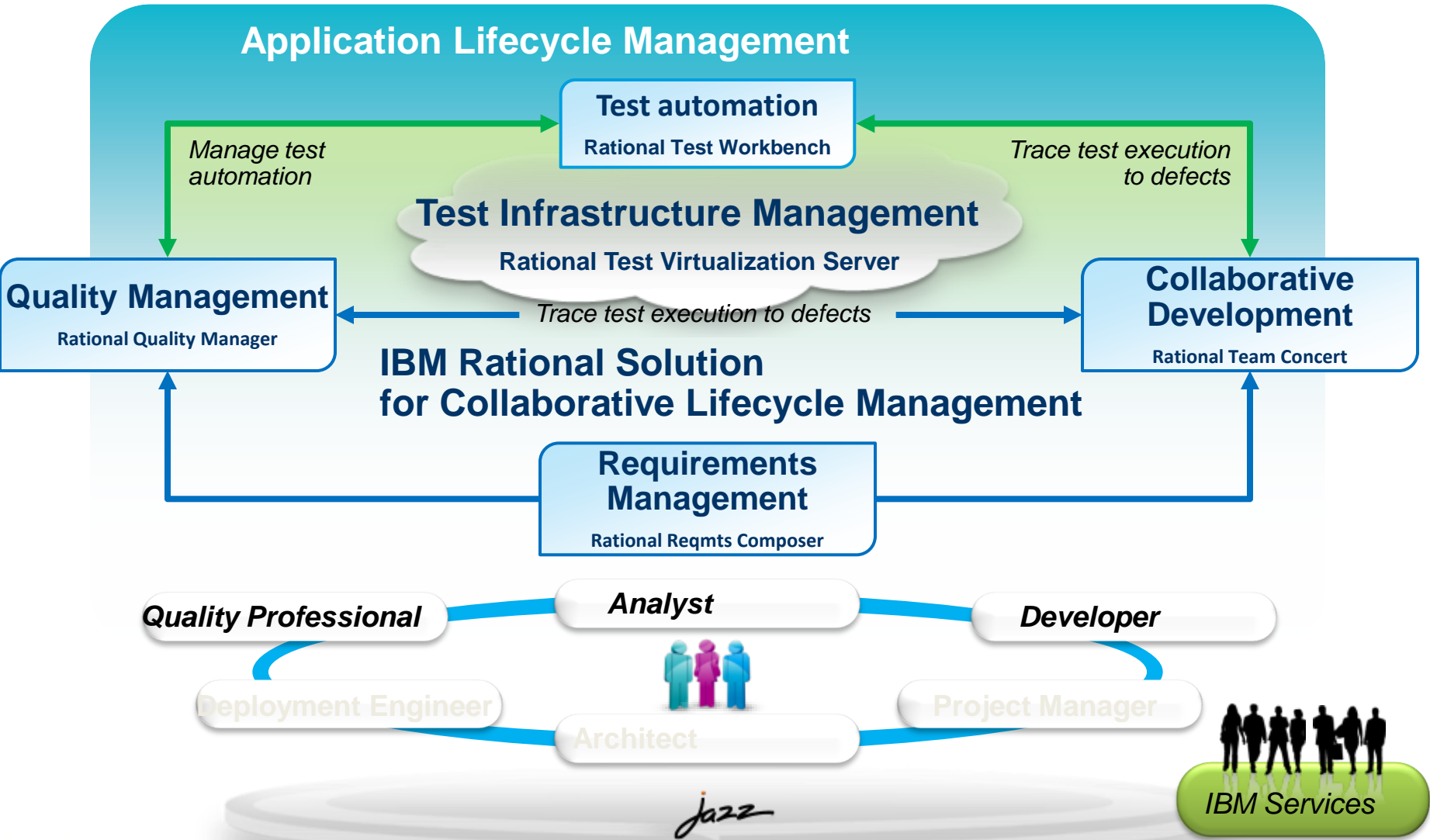
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Lower Risk

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IBM Rational Integrated Quality Management Solution





www.ibm.com/software/rational

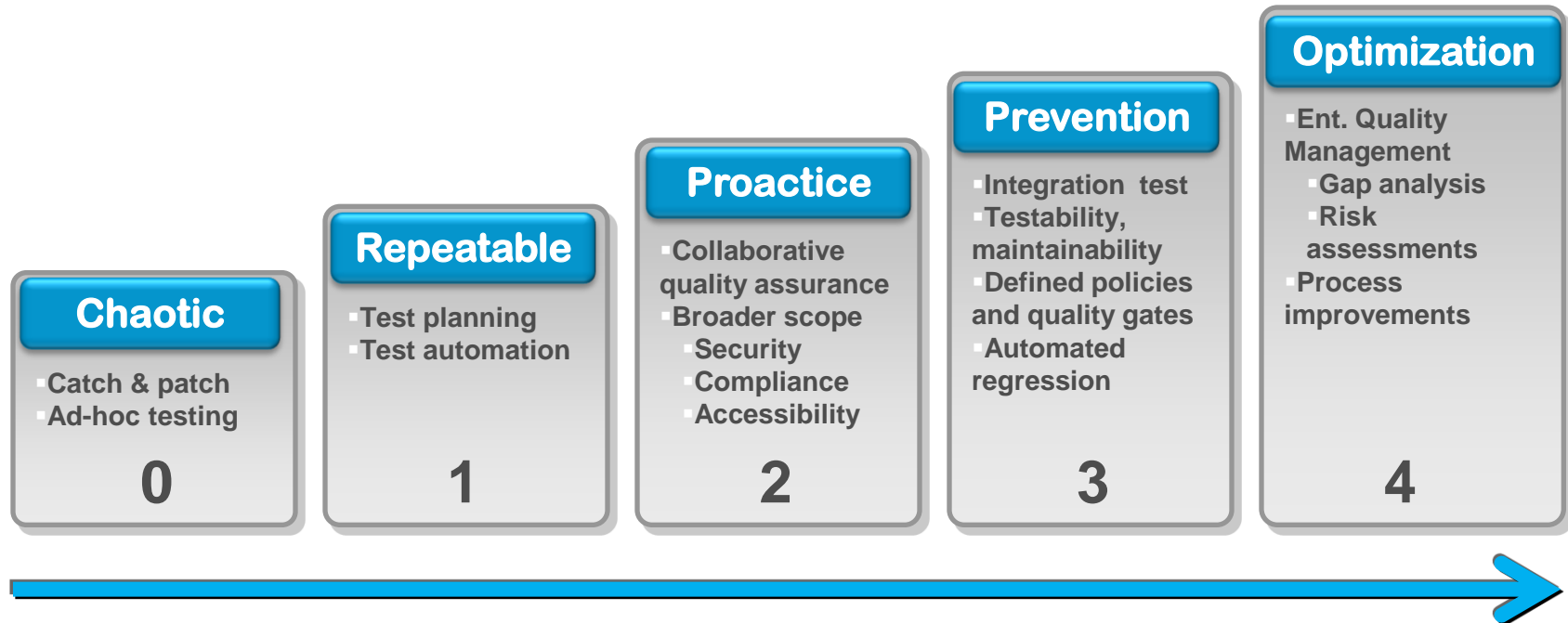
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IBM Rational Test Virtualization Solution

BACKUP

Better software quality requires a shift in focus

Evolving from Testing to Quality Management



Application Virtualization Services are comprised of six iterative phases



- Identify testing pain-points
- Understand IT technologies
- Review Use cases
- Initiate ROI Analysis
- Understand testing methodology

- Install and configure AV software
- Configure transactions / Protocols
- Configure Services
- Build additional AV test cases

- Execute specified test cases
- Listen and capture transactions
- Build negative test case
- Refine ROI

- Model behavior of transactions
- Model negative test cases
- Model “perfect storm” test cases
- Apply production metrics to virtual models

- Deploy models to virtual environment
- Configure SUT connections

- Execute specified test cases
- Capture test results
- Capture and measure results
- Recommend AV next steps

- Use Cases
- Test Cases
- Pain Points
- High Level ROI

- Configured testing environment
- Configured Virtual Environment
- Test cases

- AV Images
- Virtual Transactions
- AV Arch docs
- ROI

- Modeled virtual services (replica of prod)
- Negative test cases

- Deployed virtual services (Ready to test)

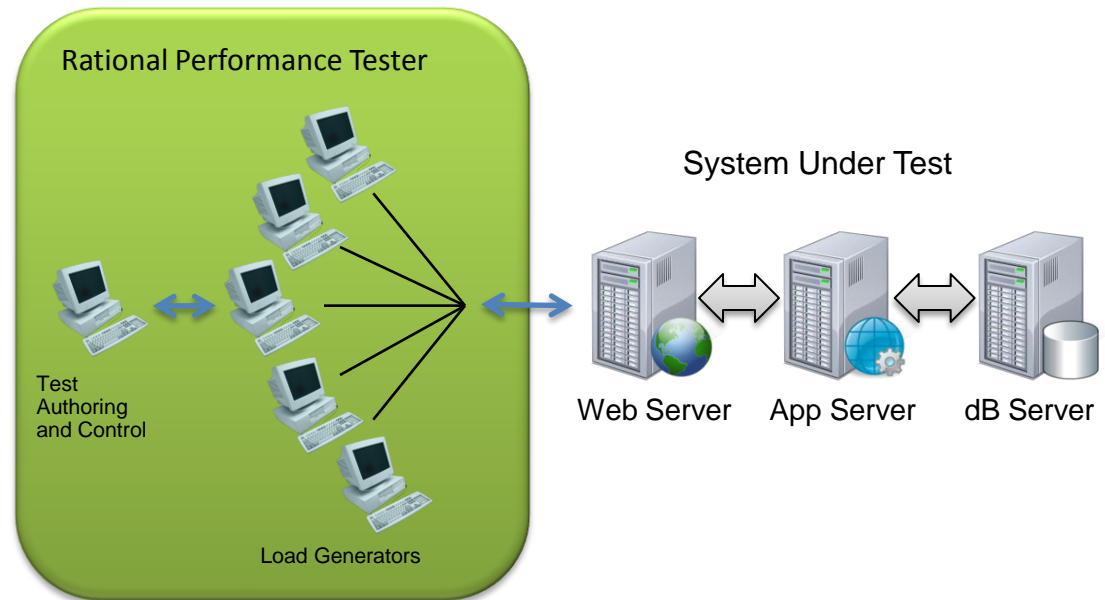
- Test results
- Virtual performance test results
- Confirmed ROI

** Typical timeframe: Actual timeframe will depend on client's specific needs*

Rational Test Workbench – Performance Tester

Comprehensive test planning, authoring, and analysis to identify and manage the risk of application performance failures

1. Capture and track Business SLAs in your test plans
2. Create realistic user workloads that exercise the key business transactions
3. Automatically deploy the environment and schedule execution of your workload
4. Identify the root cause of performance problems
5. Communicate results and areas of non-compliance to the stakeholders



What type of environments are supported?

■ **Web-based applications**

- HTTP/HTTPS with client-side digital certificates
- Ajax
- WebSphere Portal
- Web security
 - NTLM, Kerberos
 - Entrust TruePass
 - WebSeal

■ **SOA**

- SOAP over HTTP/HHTPS
- SOAP over MQ
- SOAP over JMS
- WS-Security

■ **TCP Sockets (Winsock)**

■ **TN 3270**

■ **ERP environments**

- SAP web and Enterprise Portal, SAP GUI and SAP-JCO
- Siebel-web (7.7 and 8.x),
- Lawson System Foundations
- Oracle eBusiness Suite (NCA), PeopleSoft
- Amdocs

■ **Citrix Presentation Server, XenApp (Citrix ICA)**

■ **Application Performance Analysis**

- For J2EE
- For ARM instrumented non-J2EE

■ **Integrated Resource Monitoring**

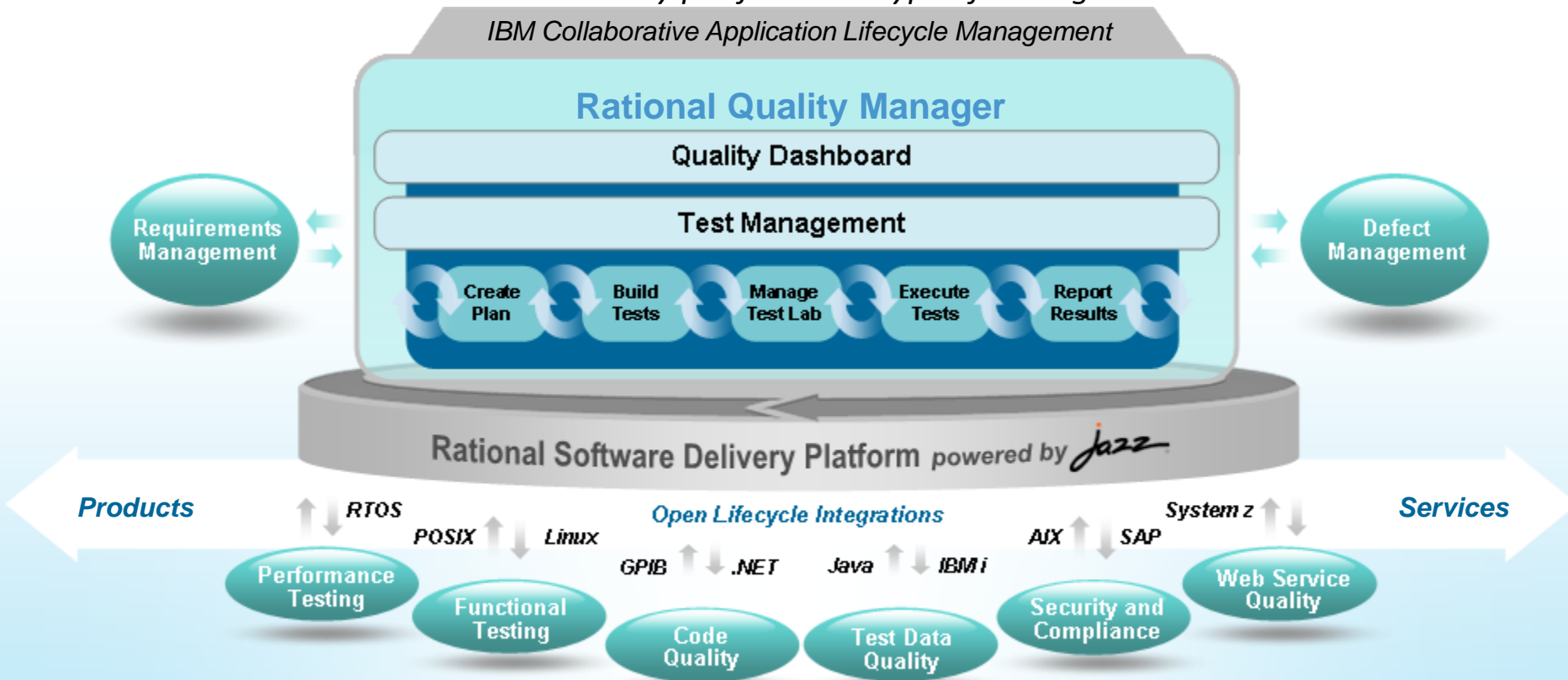
- Windows Perfmon, Unix RSTATD
- WebSphere Application Server, Oracle WebLogic, SAP Netweaver, JBoss
- SQL Server, DB2

Note: This list is representative and not intended to reflect the full set of supported domains and frameworks

Today's High Level QM Segment Architecture

Optimize software quality with a centralized test management hub and integrated full lifecycle support across any platform and type of testing

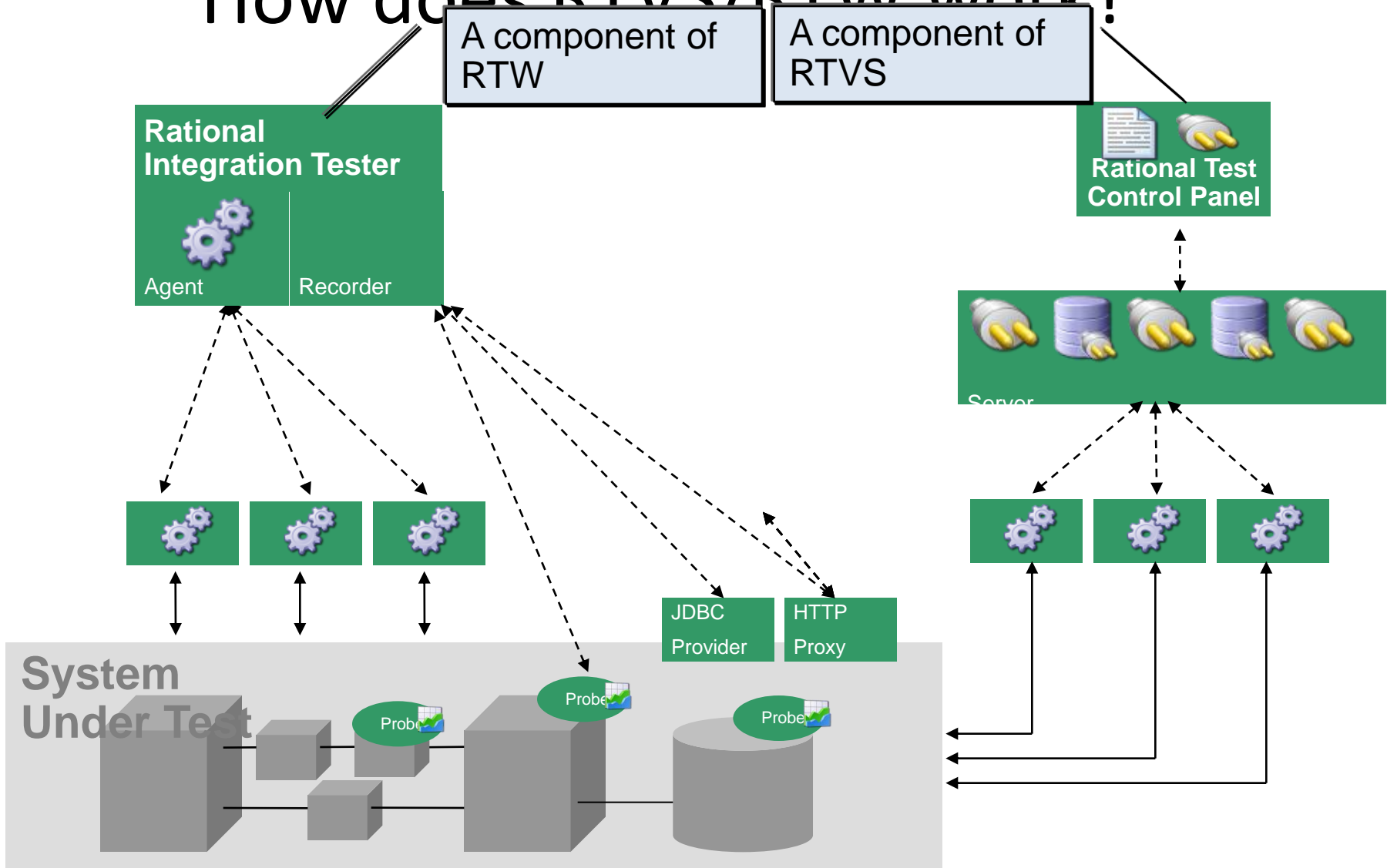
IBM Collaborative Application Lifecycle Management



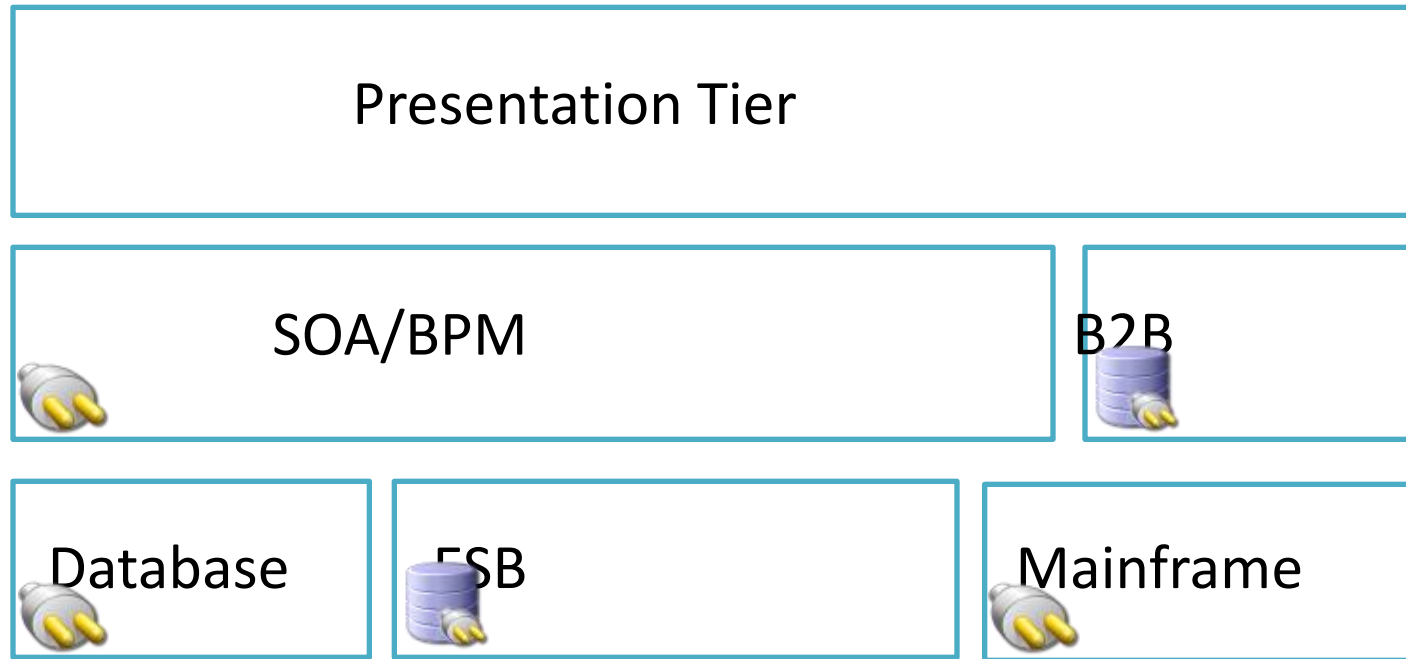
Additional Offerings:

IBM, Third-party, Business Partner, Homegrown, ...

How does RTVS/RTW work?



Candidate system

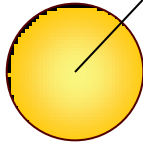


- Typical multi-tiered environment
- Problems with provisioning/access
- Problems with data consistency
- Virtualize selected services or entire application
- Different virtualization models available
- Testers, regardless of test methodology, are unaware of virtualisation

Payload Data

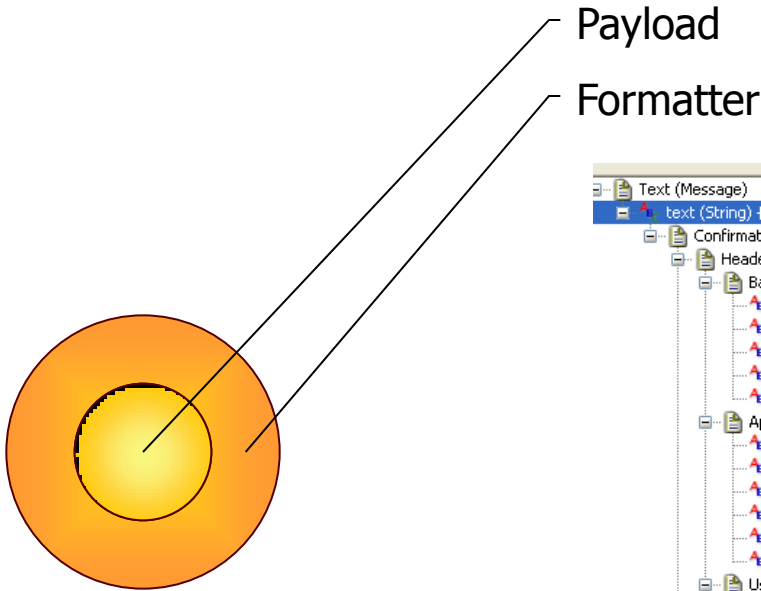
Payload

e.g. SWIFT, FIX, OFAC, Custom



```
{1: XXXXXXXXXXXXXXX0000}{2:I501           }{3:{103:}{113:}{108:}{119:}{115:}}{4:
:16R:GENL
:16R:LINK
:16S:LINK
:16S:GENL
:16R:REGDET
:16R:FIA
:16S:FIA
:16R:FIAC
:16S:FIAC
:16S:REGDET
:16R:CLTDET
:16R:ADDRESS
:16S:ADDRESS
:16R:PERSDET
:16S:PERSDET
:16S:CLTDET
:16R:CADETL
:16S:CADETL
:16R:ADDINFO
:16S:ADDINFO
-}{5:{MAC:}{CHK:}{PDE:}{PDM:}{DLM:}}
```

Payload Visualization



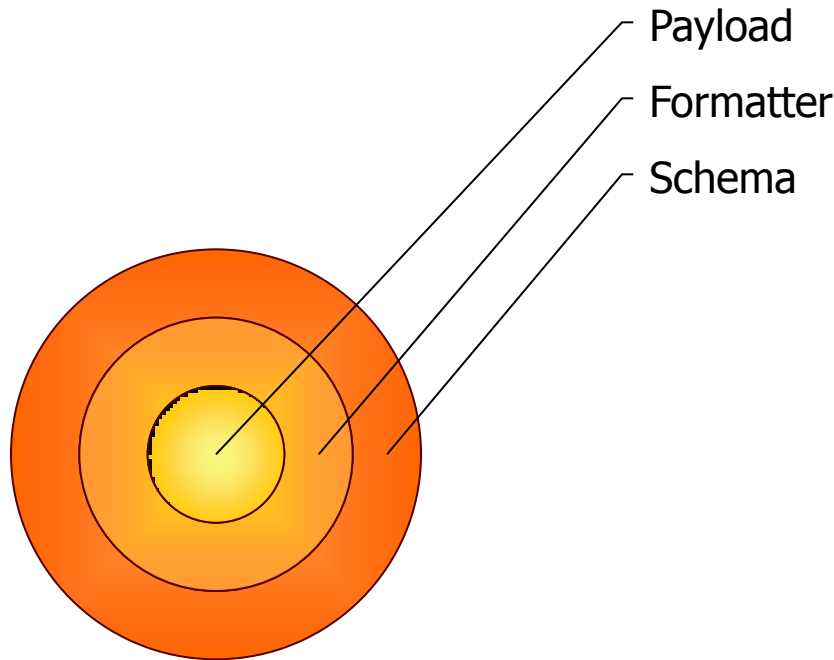
Message

- Text (Message)
 - text (String) {SWIFT}
 - Confirmation of Registration or Modification (MT501)
 - Headers (Message)
 - Basic (Message)
 - Application Identifier (String)
 - Service Identifier (String)
 - Logical Terminal Identifier (String)
 - Session Number (String)
 - Sequence Number (String)
 - Application (Message)
 - IO Identifier (String)
 - Message Type (String)
 - Receiver Address (String)
 - Message Priority (String)
 - Delivery Monitoring (String)
 - Obsolescence Period (String)
 - User (Message)
 - Service Identifier (103)
 - Banking Priority (113)
 - Message User Reference (108)



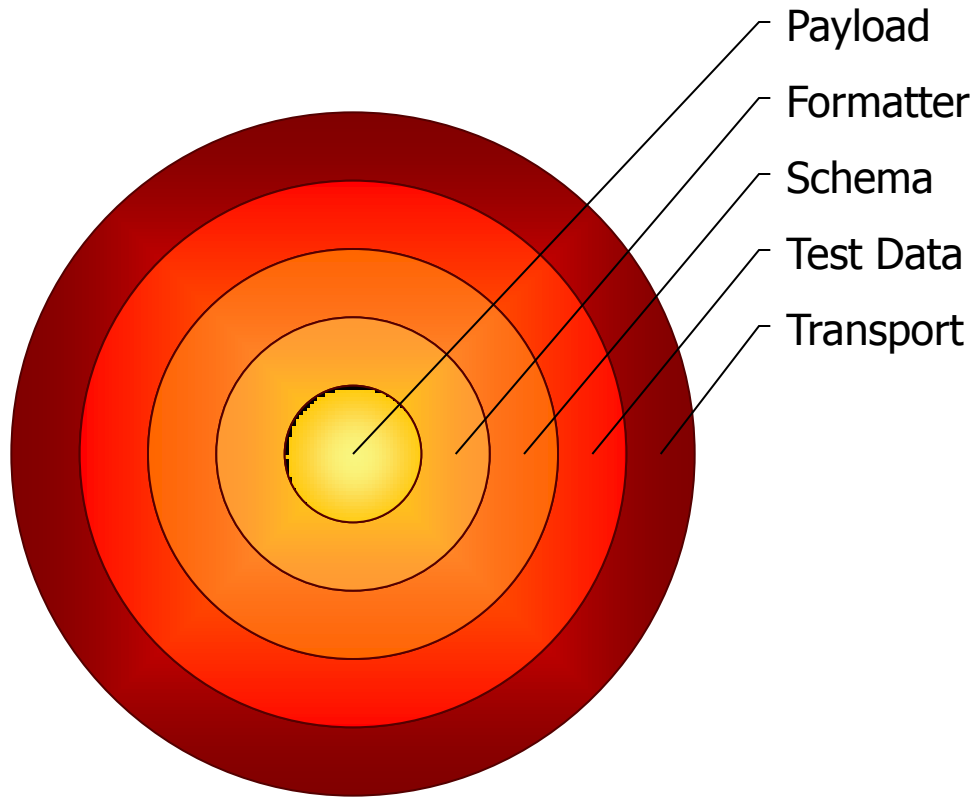
```
{1: XXXXXXXXXXXXXXX0000} {2: I501
:16R: GENTL
:16R: LINK
:16S: LINK
:16S: GENTL
:16R: REGDET
:16R: FIA
:16S: FIA
:16R: FIAC
:16S: FIAC
:16S: REGDET
:16R: CLTDET
:16R: ADDRESS
:16S: ADDRESS
:16R: PERSDET
:16S: PERSDET
:16S: CLTDET
:16R: CADETL
:16S: CADETL
:16R: ADDINFO
:16S: ADDINFO
-} {5: {MAC: } {CHK: } {PDE: } {PDM: } {DLM: } }
```


Payload Schema



SOAP	XML
SWIFT	COBOL Copybook
DTD	XSD
WSDL	HL7
EDI	IATA
Text	MIME
Byte Array	Java Objects
OAG	SAP BAP/RFC
FIX	.Net Objects
TIBCO ActiveEnterprise	
webMethods IB and IS Documents	
Custom...	

Payload Transport



- JMS
- webMethods
- HTTP/S
- FTP
- NDM
- Oracle/BEA
- JDBC
- Sonic MQ
- TCP/UDP
- PL/SQL
- Flat Files
- Shell commands
- TIBCO EMS
- TIBCO iProcess
- TIBCO Rendezvous
- IBM WebSphere MQ
- Custom Transports...