

# Five CICS Multi-Versioning Scenarios that Reduce the Risk of Change

*Steve Zemblowski*

*Zem@us.ibm.com*

Insert  
Custom  
Session  
QR if  
Desired.



SHARE is an independent volunteer-run information technology association  
that provides **education**, **professional networking** and **industry influence**.



© 2015 IBM Corporation



# Abstract



*CI/CS Transaction Server 5.2 introduces many new features that will help you manage the application lifecycle, in particular the transition from the current version of an application to a new version of an application. Think "newcopy," but smarter.*

*The CI/CS Application and Platform capabilities introduced in CI/CS TS 5 will help you manage applications as a single entity, reducing the risk associated with application updates, and providing you with capabilities to roll back to an earlier version of an application if things don't go to plan.*

*Come to this session to see five examples of how the multi-version capabilities in CI/CS TS 5.2 can help you better control application changes in your organization.*

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)





# Why do I need Application Multi-versioning?



Agile methodologies allow developers to increase the rate of change of applications in response to business needs

IT operations needs to respond by deploying applications into production more frequently while reducing cost and maintaining reliability

Multi-versioning allows you to deploy new applications, application features or bug fixes while minimizing any impact to existing users or requiring additional infrastructure



# Five CICS Multi-Versioning Scenarios

1. Web Scenario: New Features
2. Traditional 3270 Scenario: Bug Fix
3. MQ Scenario: Phase In
4. Server Consolidation
5. Application Modernization



# Scenarios

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)



## Web Scenario: New Features



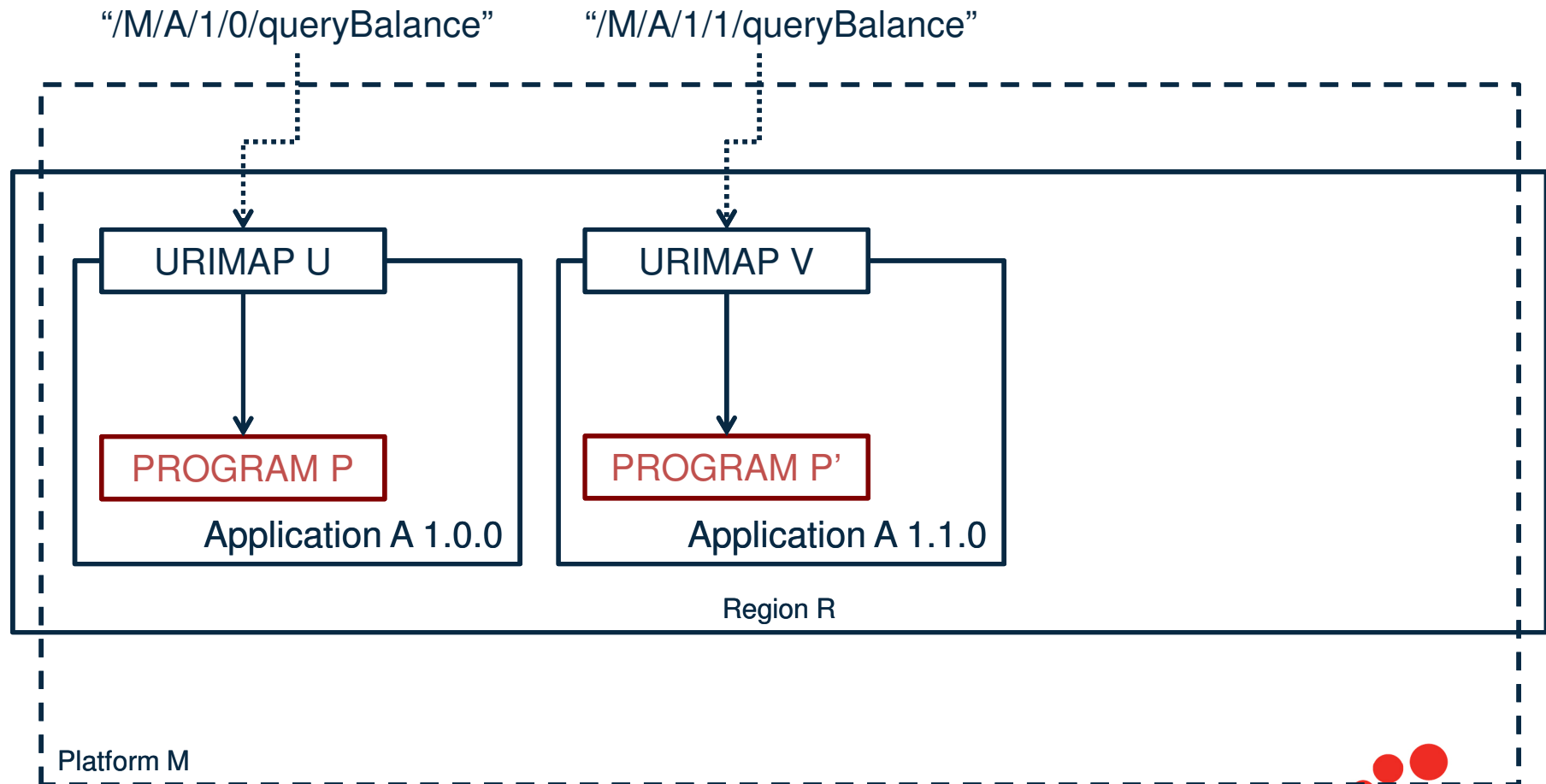
*“The mobile guys need a new feature but I’m concerned about the potential performance impact for the existing high volume web site. This is a pilot so I really don’t want to spin up new regions just to support a few users. I’m also still trying to move the back office users off an old version of the application.”*

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)





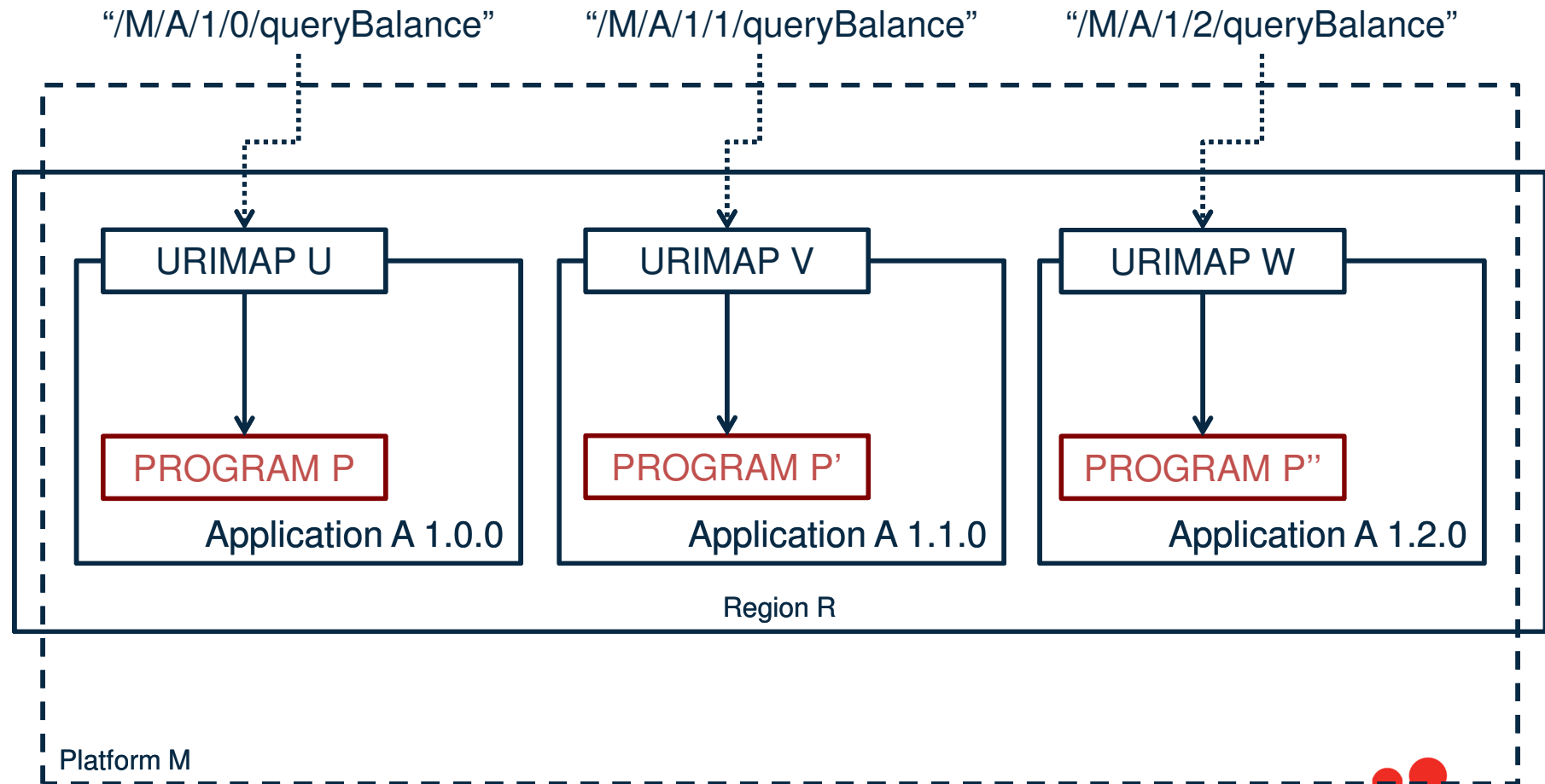
# Application versions 1.0.0 & 1.1.0 are hosted on the same Region(s)



Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)



# Can simply add version 1.2.0 without affecting the users of versions 1.0.0 and 1.1.0

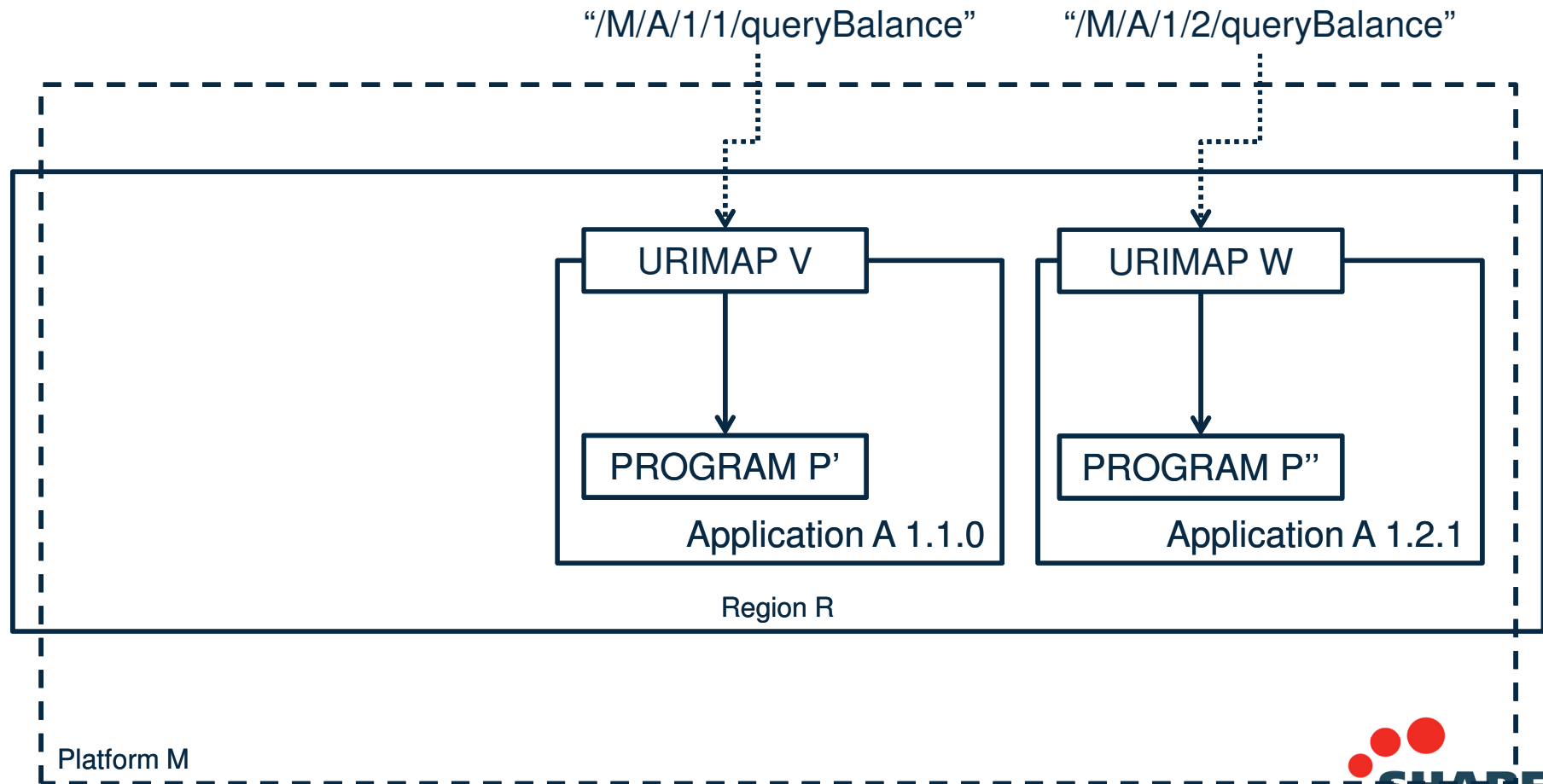


Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)





# Can eventually retire version 1.0.0 when users have moved to a higher version (by looking at Monitoring data)



Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)



# Demo



Hosting two versions of a CICS application  
concurrently on the same platform  
using the  
CICS Transaction Server for z/OS V5.2  
and CICS Explorer V5.2

[http://ibmtvdemo.edgesuite.net/software/http/cics/2014\\_06\\_05\\_2311\\_Cloud\\_web\\_application\\_concurre.mp4](http://ibmtvdemo.edgesuite.net/software/http/cics/2014_06_05_2311_Cloud_web_application_concurre.mp4)

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)





## Traditional 3270 Scenario: Bug Fix



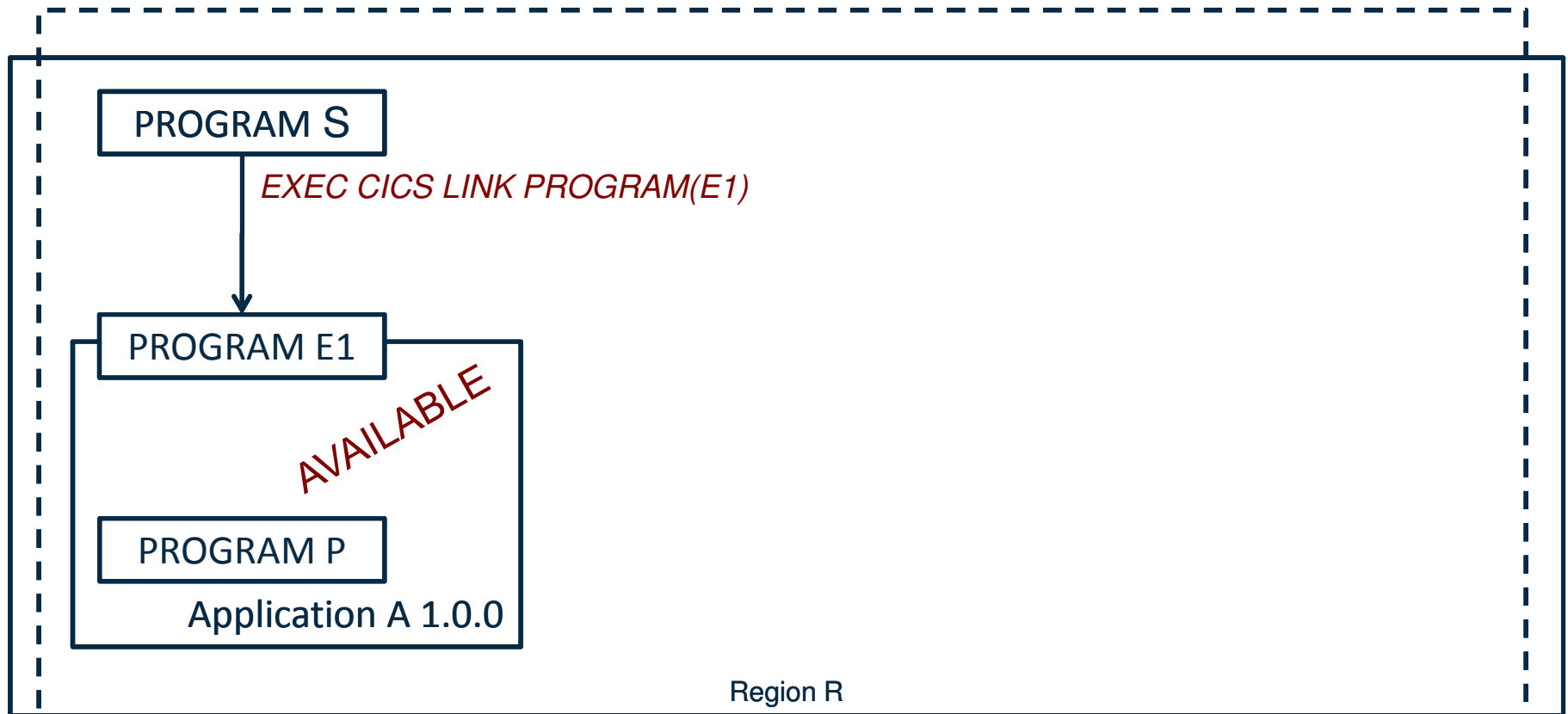
*“I need to apply a hot fix to an application in production but I want to use the same process that I use for my weekly updates so I get an audit trail and correct monitoring data. I really want to make sure it’s installed correctly before making it live while the existing version is still being used. Also if the update makes things worse I want to rollback the change as quickly as possible”*

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)



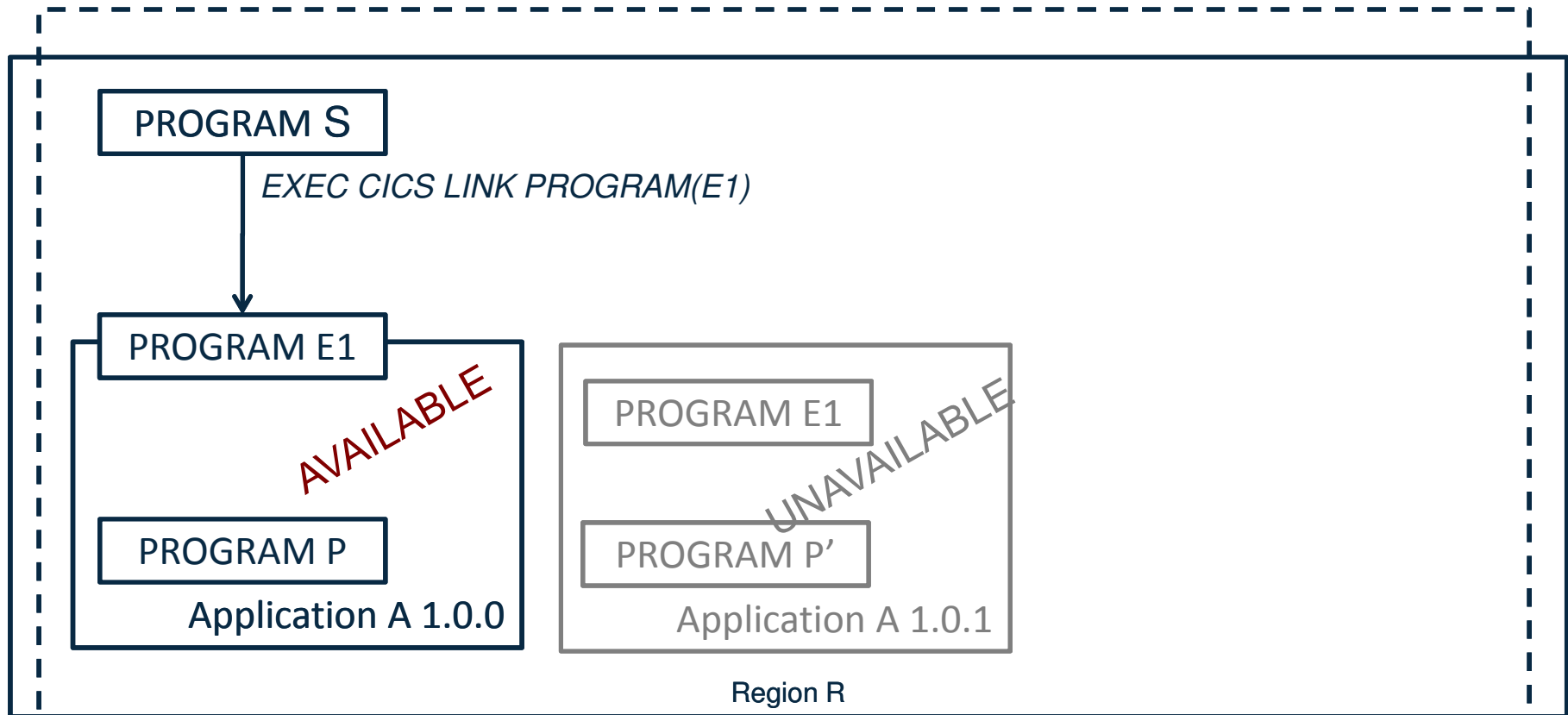


# Application version 1.0.0 has a bug



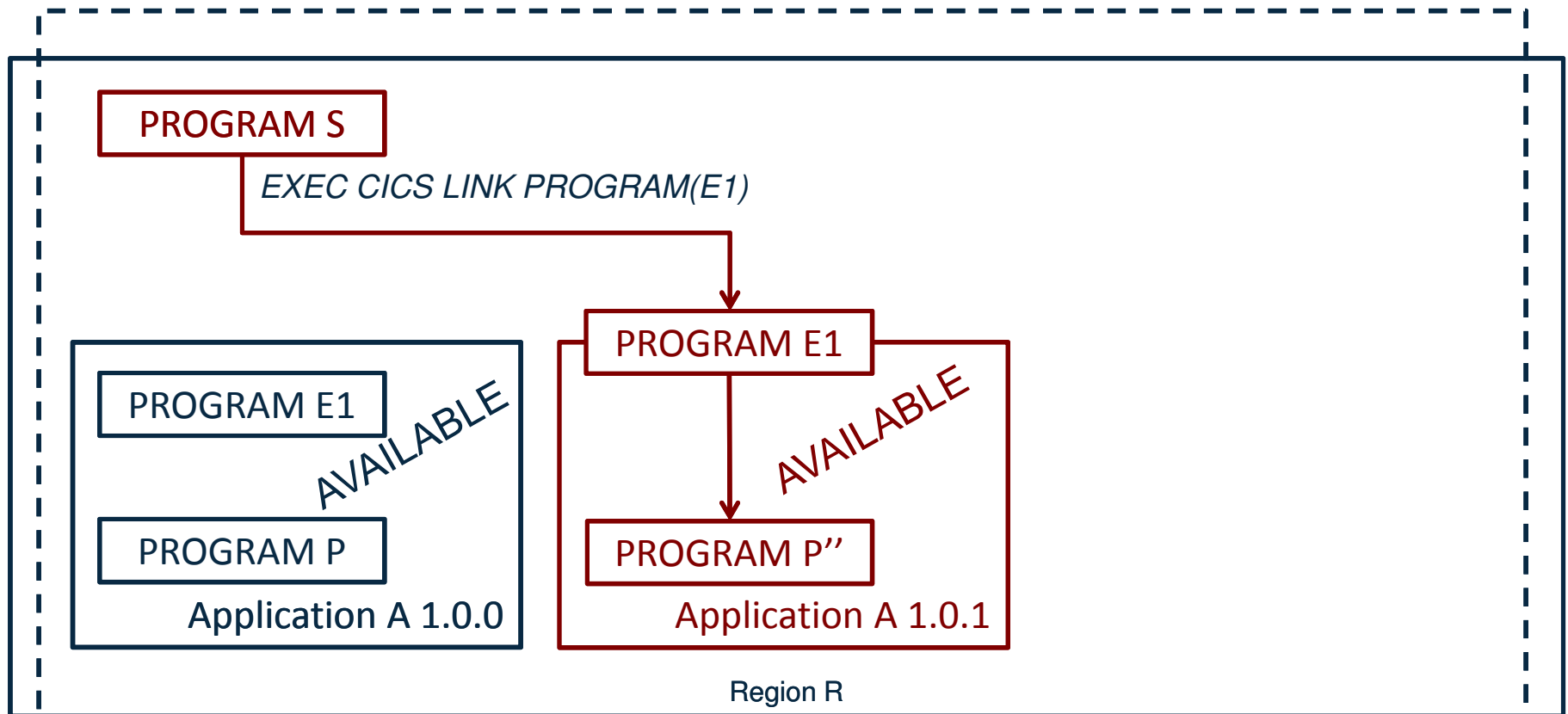


# INSTALL and ENABLE version 1.0.1 but requests still go to version 1.0.0



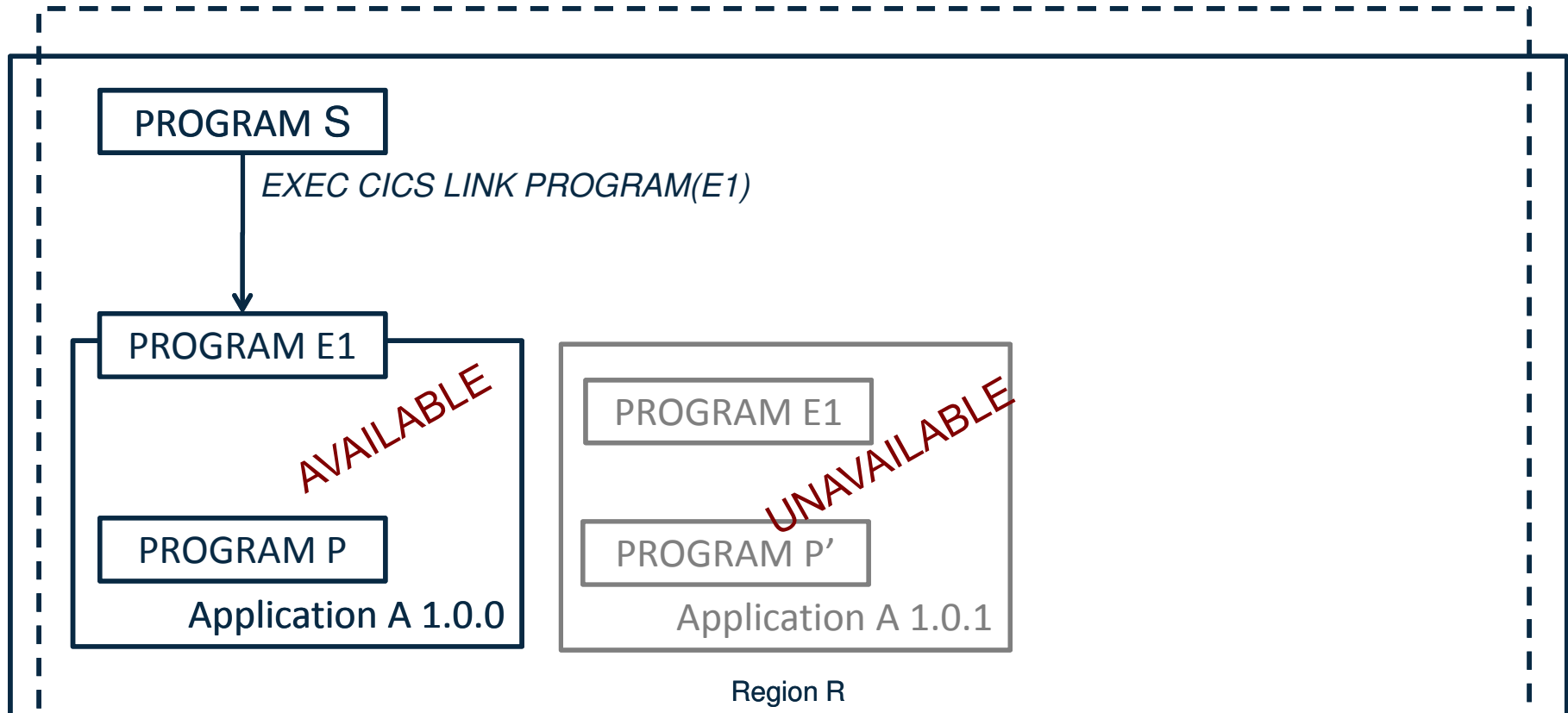


# Make application version 1.0.1 **AVAILABLE** so it receives new requests





If there is a problem make version 1.0.1  
**UNAVAILABLE** to rollback to version 1.0.0





# Demo



Provisioning application updates with  
no loss of service using  
CICS Transaction Server for z/OS V5.2  
and CICS Explorer V5.2

[http://ibmtvdemo.edgesuite.net/software/http/cics/2014\\_06\\_05\\_2546\\_Cloud\\_application\\_update\\_video.mp4](http://ibmtvdemo.edgesuite.net/software/http/cics/2014_06_05_2546_Cloud_application_update_video.mp4)

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)





## MQ Scenario: Phase In



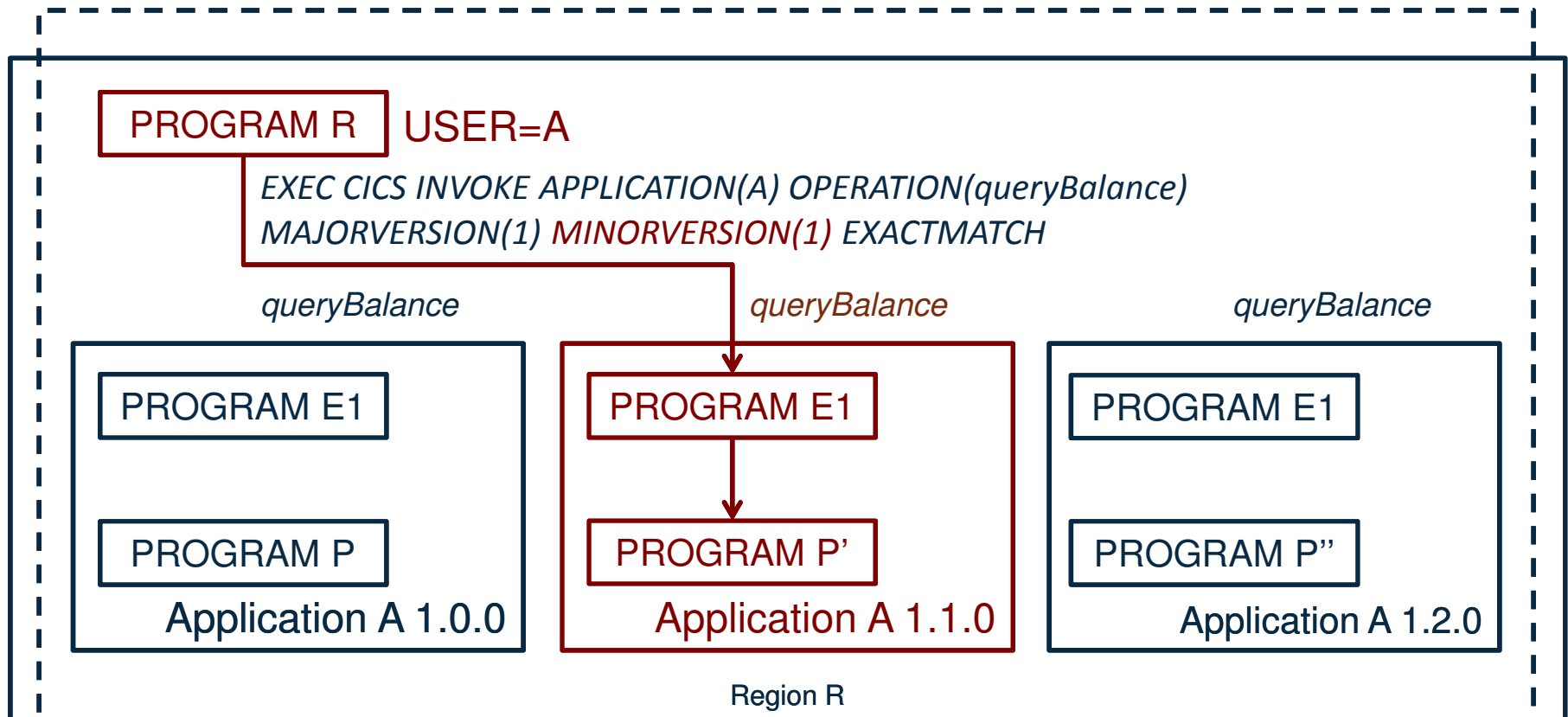
*“When rolling out a new version of an application I want to initially give access to just 10% of my users. That way I can reduce the impact of any potential problems related to either the new features or to the platform because of performance. The requests arrive over MQ so I want to use origin data to route each one to the appropriate application version”*

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)



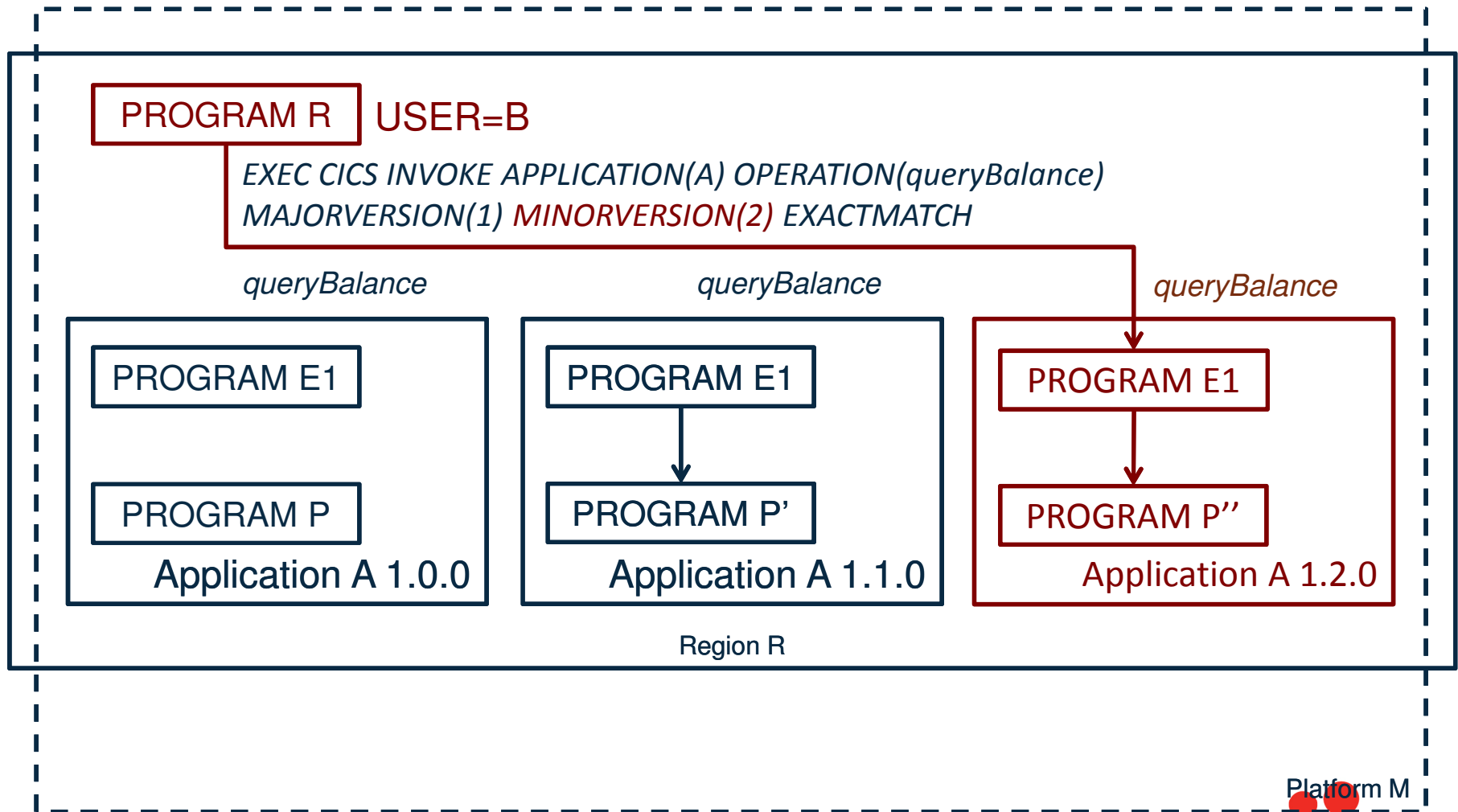


# Most users get application version 1.1.0





# “Early access” users get the latest application version 1.2.0





# Server Consolidation Scenario



*“I have two applications (one of which was developed by a company we acquired) that currently run on different sets of CICS regions. I’d like to take advantage of the recent scalability improvements especially being able to increase MAXTASK. However, I know that their PROGRAM name clashes which prevent these applications from being hosted together.”*

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)

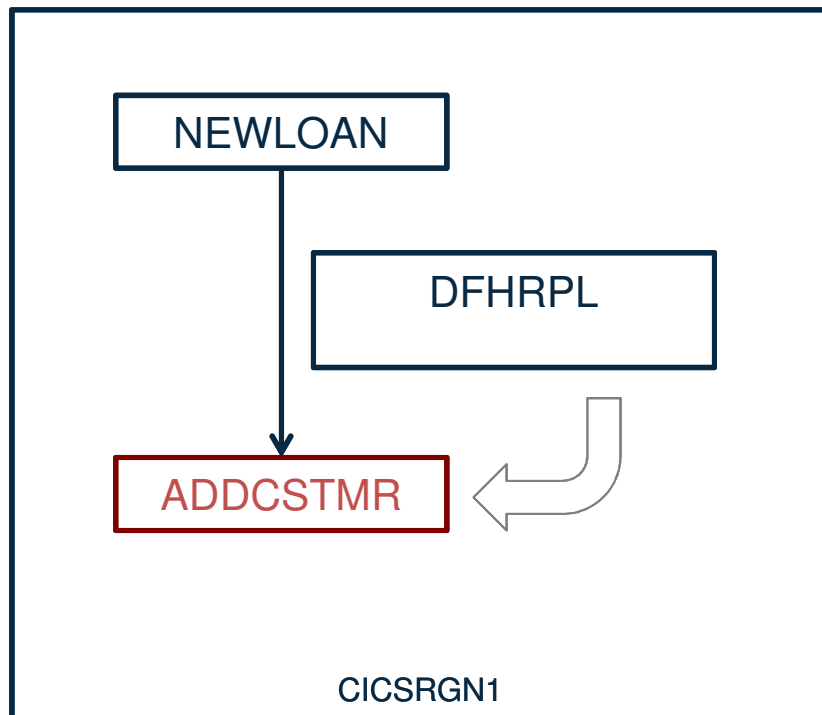




# The Home Loan application has an ADDCSTMR program



Home Loan



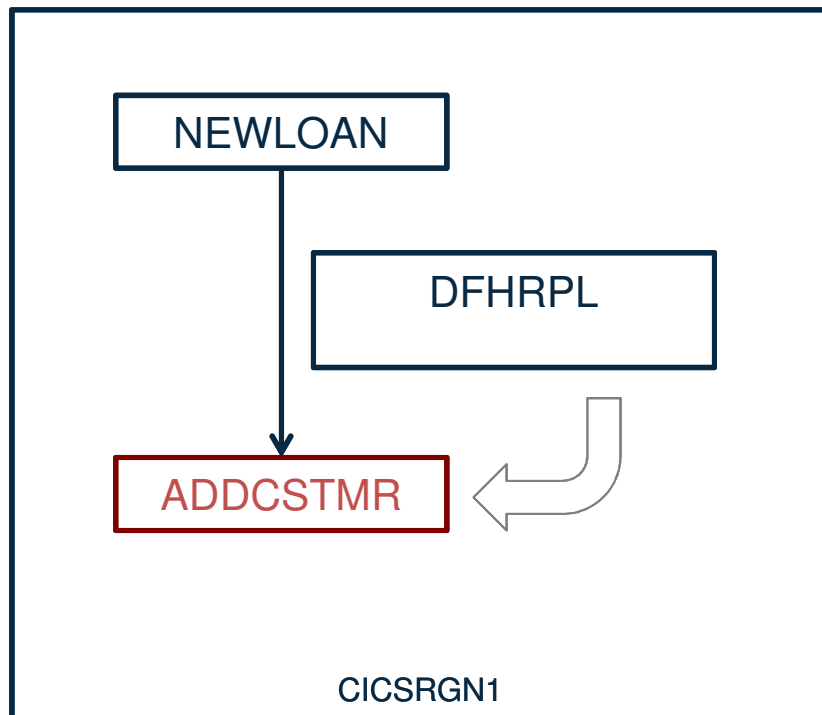
Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)



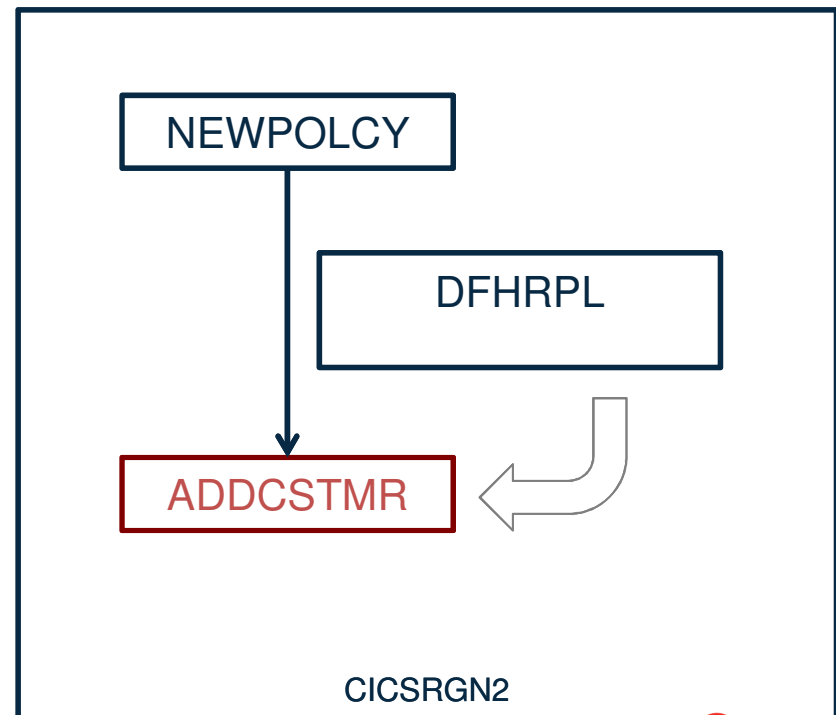


# Unfortunately the Fire Insurance application also has an ADDCSTMR program so must be kept separate

## Home Loan

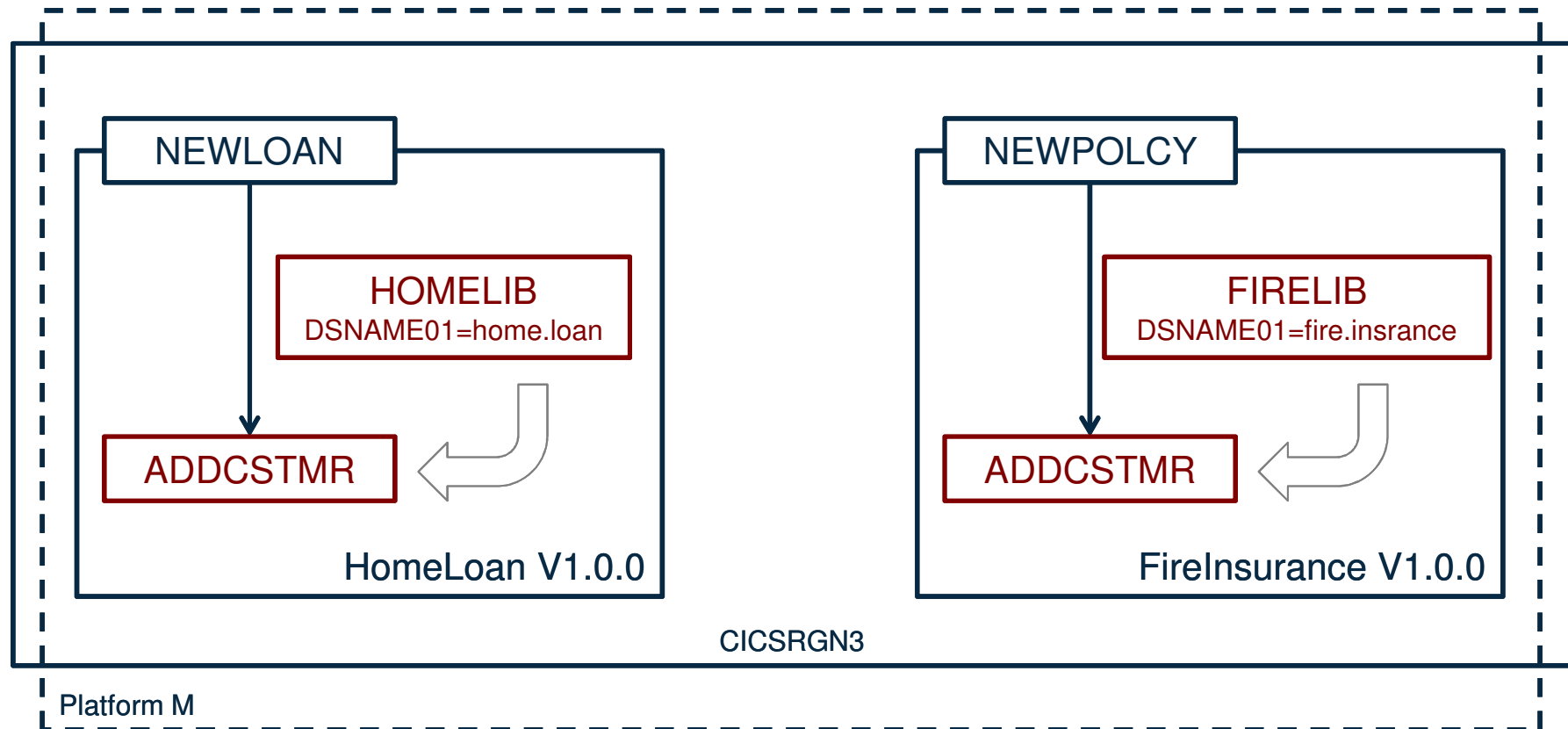


## Fire Insurance





# HomeLoan and FireInsurance both with ADDCSTMR installed into the same Region(s)



Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)





# Application Modernization Scenario



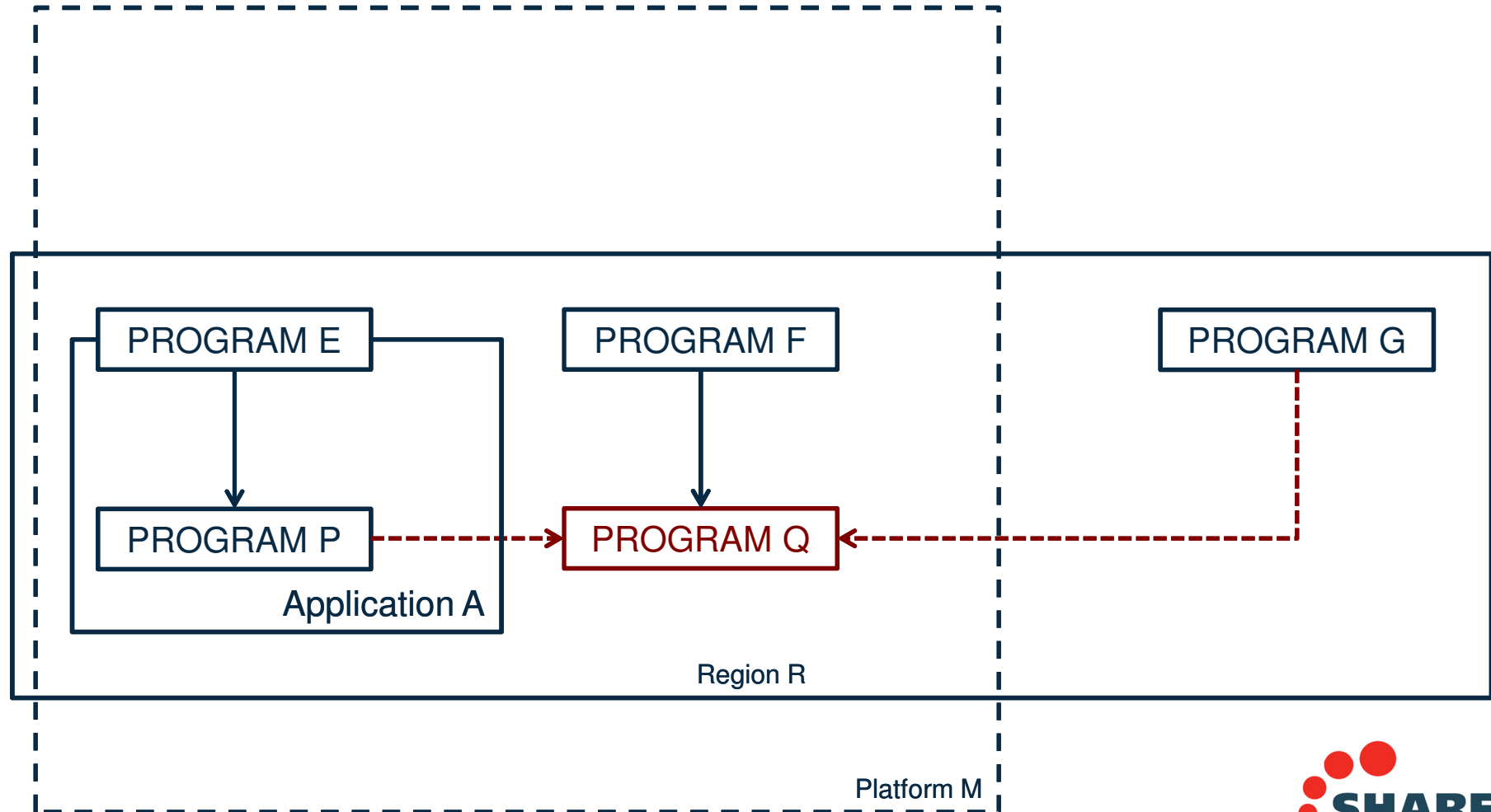
*“We have spent a lot of time using CICS Interdependency Analyzer (IA) to understand the call structure of one of our applications. This has enabled us to add more validation logic to avoid ABENDs when a copybook changes and someone hasn’t recompiled all the right modules. But now we need to ensure no one bypasses these new checks.”*

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)





# Any PROGRAM in the Region can LINK to PROGRAM Q avoiding the checks in PROGRAM F

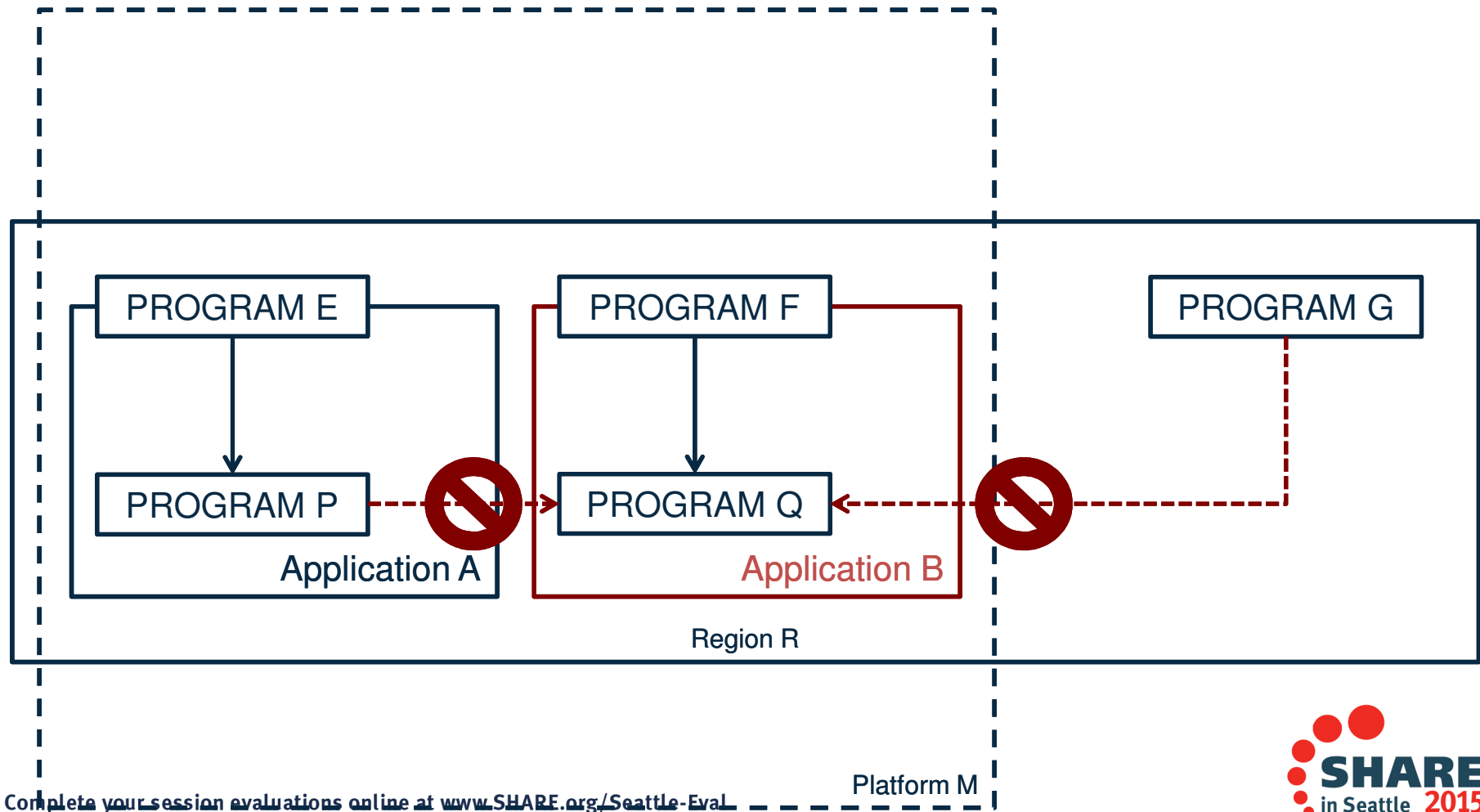


Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)



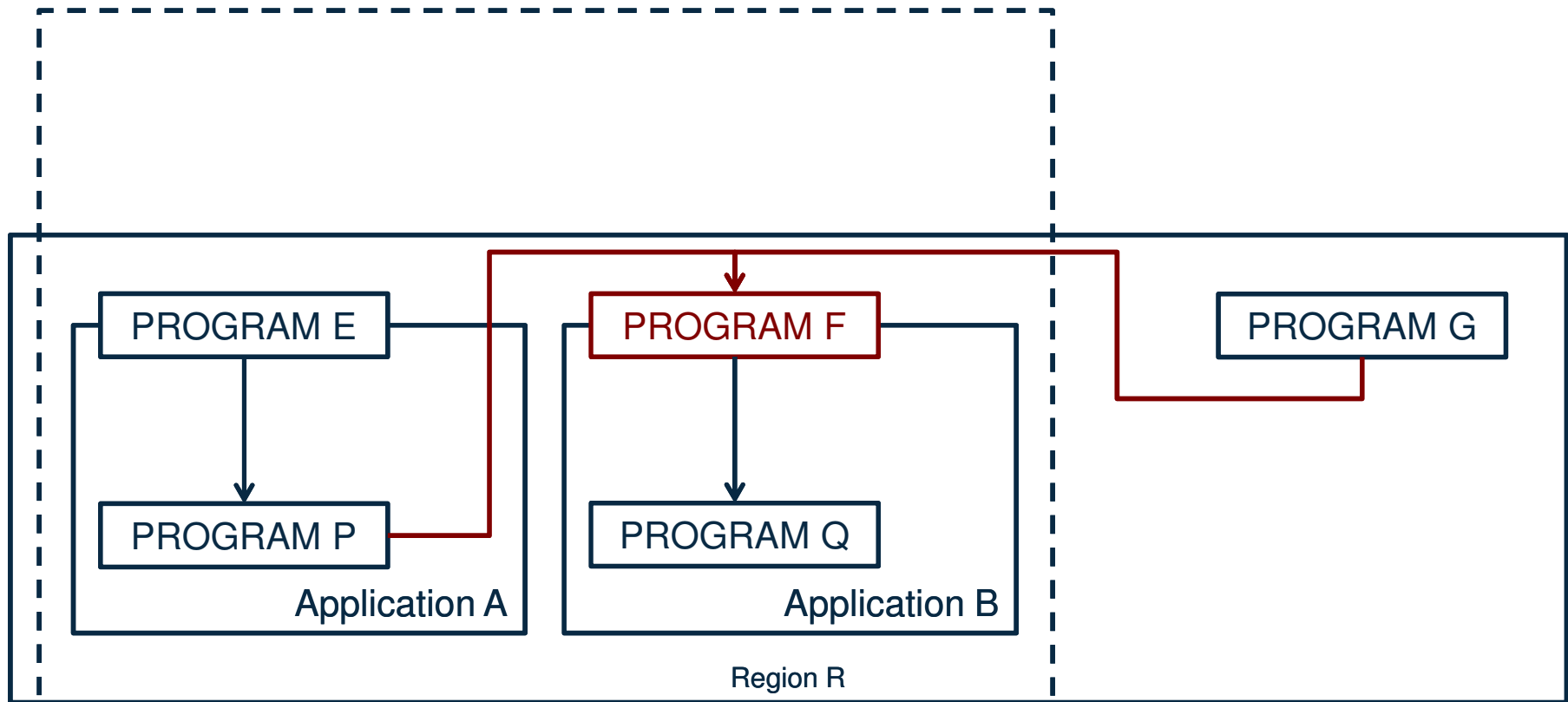


# PROGRAM Q is now private to Application B





# Must LINK through entry point PROGRAM F entry point



Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)

Platform M



# HOW DOES IT WORK?

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)



# Application Multi-versioning

## Entry Points

PROGRAM, URIMAP, TRANSACTION (CICS TS V5.3 open beta)

## Resources

LIBRARY, PROGRAM, POLICY

## Capability

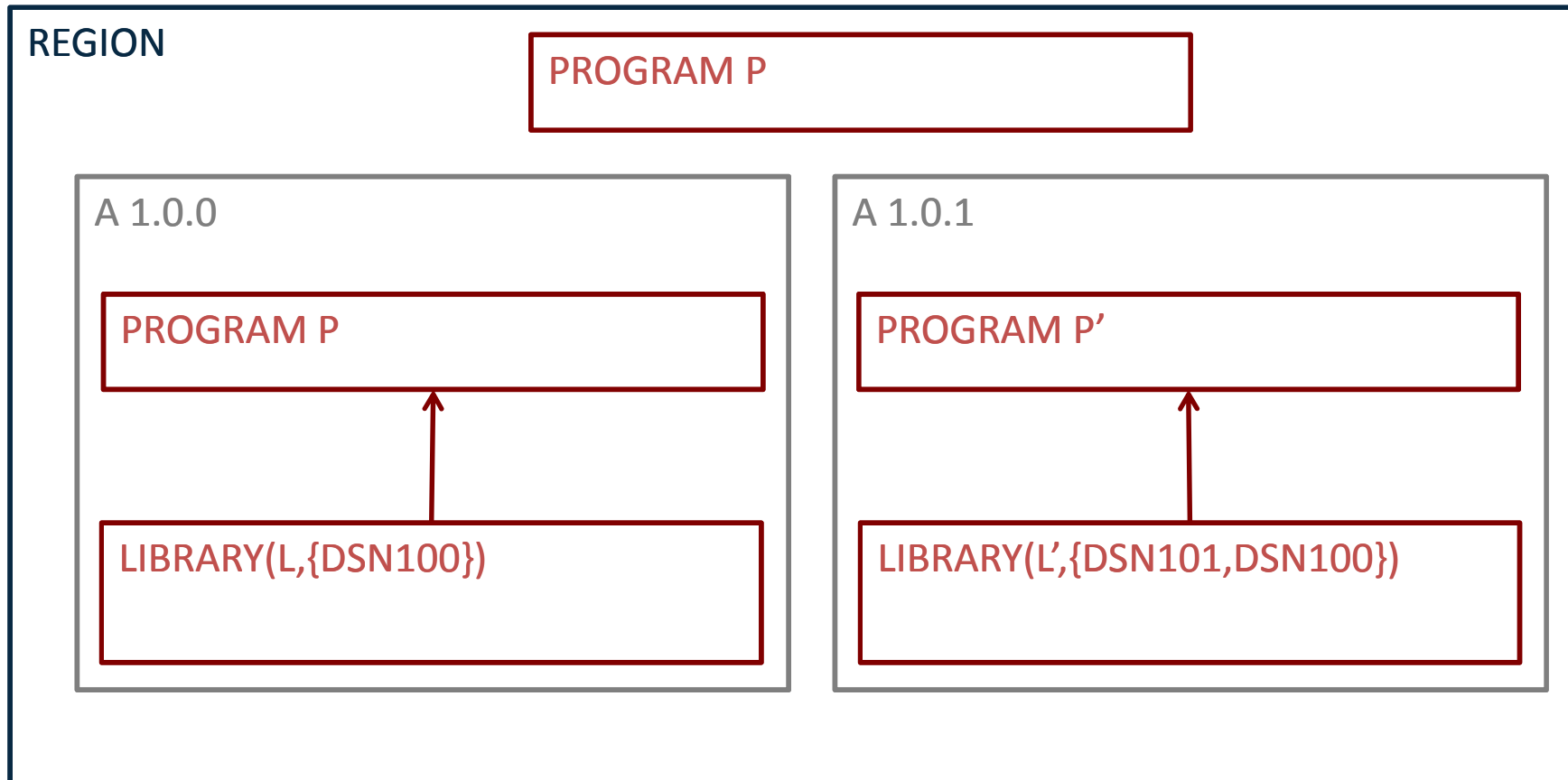
Provide end user access to two or more versions of an application hosted on the same platform by using the new private **PROGRAM** and **LIBRARY** resources

Quickly switch back and forth between two different versions of an application using the **AVAILABLE | UNAVAILABLE** state

Route requests from users to different versions of an application using the new **INVOKE APPLICATION API**



# LIBRARY Resources not added to global search order





# AVAILABLE | UNAVAILABLE application status



- New AVAILABLE | UNAVAILABLE state
  - CICS application
  - CICS bundle
  - URIMAP entry point
- UNAVAILABLE
  - “Close the door”
  - Existing tasks complete normally
  - No new requests
- AVAILABLE
  - “Open the door”
  - Measure resource usage
  - Enforce policy
  - Control access (for packaged resources)

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)





# EXEC CICS INVOKE APPLICATION

- EXEC CICS LINK PROGRAM()
- EXEC CICS INVOKE APPLICATION()
  - OPERATION()
  - OPERATION() MAJORVERSION() MINORVERSION() MINIMUM
  - OPERATION() MAJORVERSION() MINORVERSION() EXACTMATCH PLATFORM()
- JCICS Application.invoke()

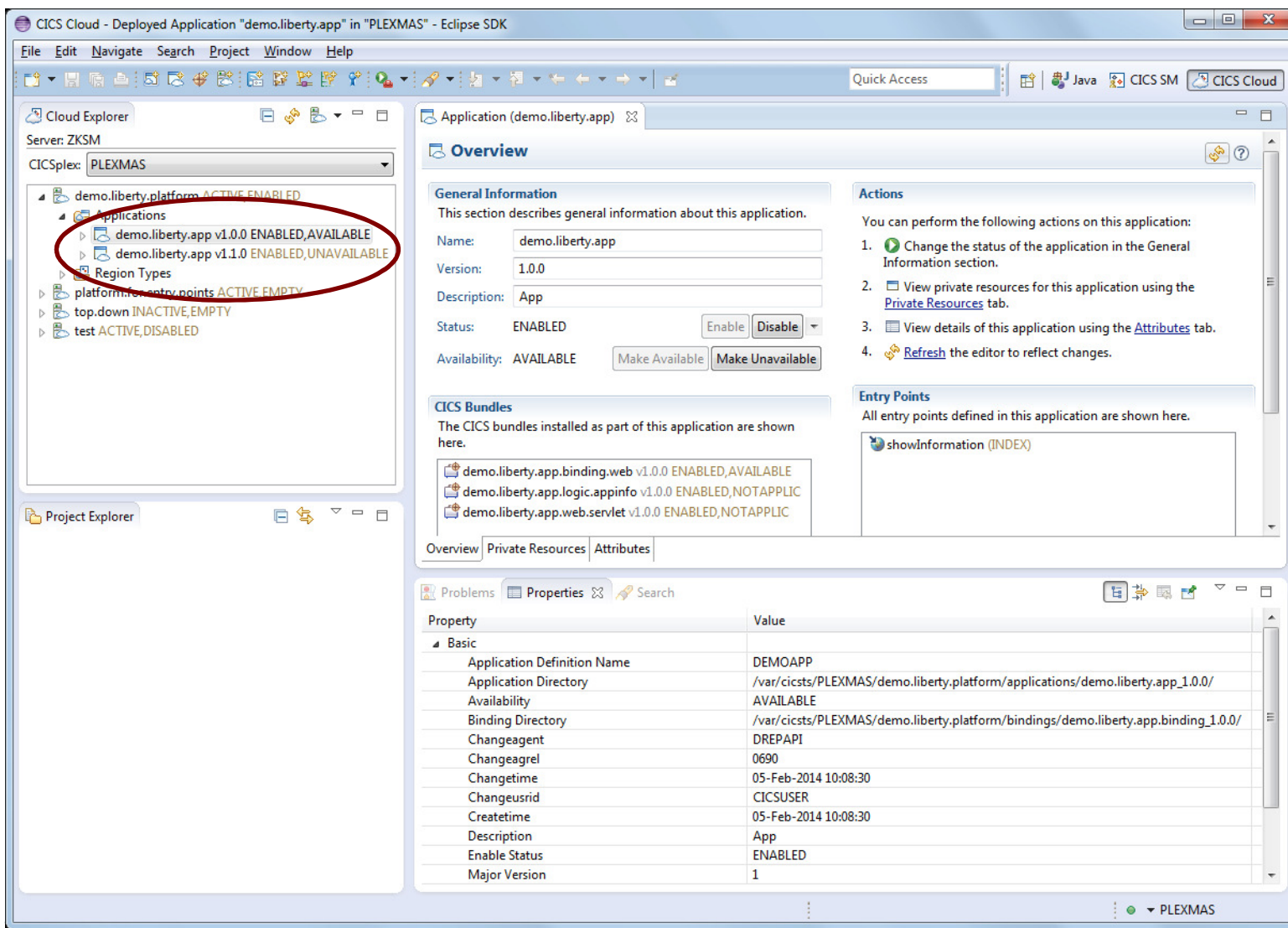


# CICS Cloud Explorer

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)



# Managing Multi-Versioned Applications



**Cloud Explorer**  
Server: ZKSM  
CICSplex: PLEXMAS

- demo.liberty.platform ACTIVE, ENABLED
  - Applications
    - demo.liberty.app v1.0.0 ENABLED, AVAILABLE
    - demo.liberty.app v1.1.0 ENABLED, UNAVAILABLE
  - Region Types
  - platform.entry.points ACTIVE, EMPTY
  - top.down INACTIVE, EMPTY
  - test ACTIVE, DISABLED

**Application (demo.liberty.app) Overview**

**General Information**  
This section describes general information about this application.

Name: demo.liberty.app  
Version: 1.0.0  
Description: App  
Status: ENABLED [Enable] [Disable]  
Availability: AVAILABLE [Make Available] [Make Unavailable]

**Actions**  
You can perform the following actions on this application:

- Change the status of the application in the General Information section.
- View private resources for this application using the [Private Resources](#) tab.
- View details of this application using the [Attributes](#) tab.
- Refresh the editor to reflect changes.

**CICS Bundles**  
The CICS bundles installed as part of this application are shown here.

- demo.liberty.app.binding.web v1.0.0 ENABLED, AVAILABLE
- demo.liberty.app.logic.appinfo v1.0.0 ENABLED, NOT APPLIC
- demo.liberty.app.web.servlet v1.0.0 ENABLED, NOT APPLIC

**Entry Points**  
All entry points defined in this application are shown here.

- showInformation (INDEX)

**Properties**

Property	Value
Application Definition Name	DEMOAPP
Application Directory	/var/cicsts/PLEXMAS/demo.liberty.platform/applications/demo.liberty.app_1.0.0/
Availability	AVAILABLE
Binding Directory	/var/cicsts/PLEXMAS/demo.liberty.platform/bindings/demo.liberty.app.binding_1.0.0/
Changeagent	DREPAPI
Changeagrel	0690
Changetime	05-Feb-2014 10:08:30
Changeusrid	CICSUSER
Createtime	05-Feb-2014 10:08:30
Description	App
Enable Status	ENABLED
Major Version	1

Complete your session evaluations online at [www.informatica.com/seattle-2015](#)



# Application Lifecycle

The image displays two screenshots of the Cloud Explorer application interface, illustrating the application lifecycle management process.

**Left Screenshot:** The Cloud Explorer window shows the 'Server: ZKSM' and 'CICSplex: PLEXMAS'. The tree view displays the following structure:

- demo.liberty.platform ACTIVE,ENABLED
  - Applications
    - demo.liberty.app v1.0.0 ENABLED,AVAILABLE
    - demo.liberty.app v1.1.0 ENABLED,UNAVAILABLE
  - Region Types
- platform.for.entry.points ACTIVE,EMPTY
- top.down INACTIVE,EMPTY
- test ACTIVE,DISABLED

**Right Screenshot:** The Cloud Explorer window shows the same structure. The 'demo.liberty.app v1.1.0' item is selected, and a context menu is open over it. The 'Make Available' option is highlighted with a red circle.


The context menu options are:



- New
- Open
- Discard
- Enable
- Disable
- Make Available**
- Make Unavailable
- Refresh F5
- Search

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)



# New *Online* Application Editor

Application (demo.liberty.app) 

**Overview**  

**General Information**  
This section describes general information about this application.

Name:


Version:


Description:


Status: **ENABLED**

Availability: **AVAILABLE**





**CICS Bundles**  
The CICS bundles installed as part of this application are shown here.

 demo.liberty.app.binding.web v1.0.0 **ENABLED,AVAILABLE**


 demo.liberty.app.logic.appinfo v1.0.0 **ENABLED,NOTAPPLIC**

 demo.liberty.app.web.servlet v1.0.0 **ENABLED,NOTAPPLIC**

**Actions**  
You can perform the following actions on this application:

1.  Change the status of the application in the General Information section.
2.  View private resources for this application using the [Private Resources](#) tab.
3.  View details of this application using the [Attributes](#) tab.
4.  [Refresh](#) the editor to reflect changes.


**Entry Points**  
All entry points defined in this application are shown here.


 showInformation (INDEX)


Overview | Private Resources | Attributes



# Private Resources



Application (demo.liberty.app) 





**Private Resources** 

**Structure** 

- demo.liberty.app v1.0.0
  - logic
    - IYK3ZKSW
  - web
    - IYK3ZKSW

**Private Resources**

Programs  





 Name:   





CNX0211I Context: IYK3ZKSW. Resource: PROGRAM. 1 records collected at 24-Feb-2014 15:32:36

Region	Name	Status	Concurrent ...	Language	Operation N...
IYK3ZKSW	BDCGETAI	ENABLED	0	C	

Overview Private Resources A

**Private Resources**



Programs  







 Name:   

CNX0211I Context: IYK3ZKSW. Resource: LIBRARY. 1 records collected at 24-Feb-2014 15:30:01

Region	Name	Search Position	Ranking	Critical Status	Enable Sta...	Numdsnames
IYK3ZKSW	APPMV	1	50	NONCRITICAL	ENABLED	1

**Private Resources**

Programs  



 Name:   

CNX0211I Context: IYK3ZKSW. Resource: LIBDSN. 1 records collected at 24-Feb-2014 15:30:27

Region	Name	D..	DS Name	DS Name Search Position
IYK3ZKSW	APPMV	1	BENCOX.APP-MV.DEMO.LOAD	1001

Complete your session evaluations



# Application demo.liberty.app 1.0.0 vs. 1.1.0

Application (demo.liberty.app) ✕

Overview

**General Information**  
This section describes general information about this application.

Name: demo.liberty.app


Version: 1.0.0


Description: App


Status: ENABLED

Availability: AVAILABLE

**CICS Bundles**  
The CICS bundles installed as part of this application are shown here.

 demo.liberty.app.binding.web v1.0.0 ENABLED,AVAILABLE

 demo.liberty.app.logic.appinfo v1.0.0 ENABLED,NOTAPPLIC

 demo.liberty.app.web.servlet v1.0.0 ENABLED,NOTAPPLIC

Overview Private Resources Attributes

Application (demo.liberty.app) ✕

Overview

**General Information**  
This section describes general information about this application.

Name: demo.liberty.app


Version: 1.1.0


Description: App


Status: ENABLED

Availability: UNAVAILABLE

**CICS Bundles**  
The CICS bundles installed as part of this application are shown here.

 demo.liberty.app.binding.web v1.1.0 ENABLED,UNAVAILABLE

 demo.liberty.app.logic.appinfo v1.1.0 ENABLED,NOTAPPLIC

 demo.liberty.app.web.servlet v1.1.0 ENABLED,NOTAPPLIC

Overview Private Resources Attributes

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)



# Application demo.liberty.app 1.0.0 vs. 1.1.0: PROGRAM

Application (demo.liberty.app) [X]

**Private Resources** [?]

**Structure** [Icons]

- demo.liberty.app v1.0.0
  - logic
    - IYK3ZKSW
  - web
    - IYK3ZKSW

**Private Resources**

Programs [Icons] LIBRARYs [Icons] LIBRARY DS Names [Icons]

Name:

CNX0211I Context: IYK3ZKSW. Resource: PROGRAM. 1 records collected at 24-Feb-2014 15:32:36

Region	Name	Status	Concurrent ...	Language	Operation N...
IYK3ZKSW	BDCGETAI	ENABLED	0	C	

Application (demo.liberty.app) [X] Application (demo.liberty.app) [X]

**Private Resources** [?]

**Structure** [Icons]

- demo.liberty.app v1.1.0

**Private Resources**

Programs [Icons] LIBRARYs [Icons] LIBRARY DS Names [Icons]

Name:

CNX0211I Context: PLEXMAS. Resource: PROGRAM. 1 records collected at 24-Feb-2014 15:51:20

Region	Name	Status	Concurrent ...	Language	Operation N...
IYK3ZKSW	BDCGETAI	ENABLED	0	C	



# Application demo.liberty.app 1.0.0 vs. 1.1.0: LIBRARY



## Private Resources

Programs LIBRARYs LIBRARY DS Names

Name:

CNX0211I Context: IYK3ZKSW. Resource: LIBRARY. 1 records collected at 24-Feb-2014 15:30:01

Region	Name	Search Position	Ranking	Critical Status	Enable Sta...	Numdsnames
IYK3ZKSW	APPMV	1	50	NONCRITICAL	ENABLED	1

Programs LIBRARYs LIBRARY DS Names

Name:

CNX0211I Context: IYK3ZKSW. Resource: LIBDSN. 1 records collected at 24-Feb-2014 15:30:27

Region	Name	D..	DS Name	DS Name Search Position
IYK3ZKSW	APPMV	1	BENCOX.APP-MV.DEMO.LOAD	1001

## Private Resources

Programs LIBRARYs LIBRARY DS Names

Name:

CNX0211I Context: PLEXMAS. Resource: LIBRARY. 1 records collected at 24-Feb-2014 16:04:01

Region	Name	Search Position	Ranking	Critical Status	Enable Sta...	Numdsnames
IYK3ZKSW	APPMV	1	50	NONCRITICAL	ENABLED	1

Programs LIBRARYs LIBRARY DS Names

Name:

CNX0211I Context: PLEXMAS. Resource: LIBDSN. 1 records collected at 24-Feb-2014 15:51:25

Region	Name	DS Number	DS Name	DS Name Search Position
IYK3ZKSW	APPMV	1	BENCOX.APP-MV.DEMO.LOAD2	1001

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)



# Summary



Use multi-versioning to deploy new applications, application features or bug fixes while minimizing any impact to existing users or requiring additional infrastructure

Implement the different scenarios using private PROGRAM and LIBRARY resources, the AVAILABLE | UNAVAILABLE application status, and INVOKE APPLICATION API

Manage multi-versioned applications in Explorer with the new online editor

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)





# More Information



- **IBM Redbooks publication (“Cloud Enabling IBM CICS”):**  
<http://www.redbooks.ibm.com/abstracts/sg248114.html?Open>
- **Blog (CICSdev):**  
<https://www.ibm.com/developerworks/mydeveloperworks/blogs/cicsdev/tags/blog?language=en>
  - *What is CICS Application Multi-versioning?*
  - *How can I phase in the new version of a CICS Application?*
  - *Quick start CICS Explorer projects for “Cloud Enabling CICS”*
- **Demos:**  
<http://www.ibm.com/software/http/cics/tserver/v52/library/demos.html>
  - *Provisioning application updates with no loss of service*
  - *Hosting two versions of a CICS application concurrently on the same platform*
- **Podcasts:**  
<http://www.ibm.com/software/os/systemz/podcasts/websphereonz/>
  - *CICS V5.2 - Multi-Versioning*
- **Scenarios:** [https://www-01.ibm.com/support/knowledgecenter/#!/SSGMCP\\_5.1.0/com.ibm.cics.ts.scenarios.doc/topics/Scenarios.html](https://www-01.ibm.com/support/knowledgecenter/#!/SSGMCP_5.1.0/com.ibm.cics.ts.scenarios.doc/topics/Scenarios.html)
  - *Updating an application on a platform*
  - *Hosting two versions of a CICS application concurrently on the same platform*

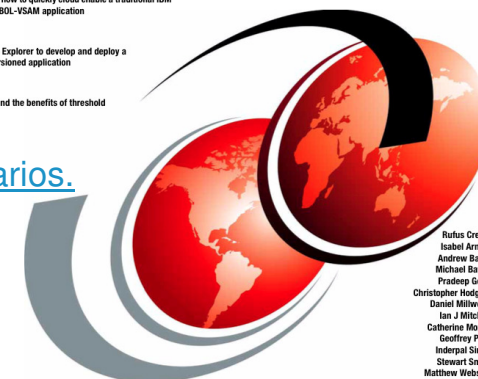
IBM

## Cloud Enabling IBM CICS

Discover how to quickly cloud enable a traditional IBM 3270-COBOL-VSAM application

Use CICS Explorer to develop and deploy a multi-versioned application

Understand the benefits of threshold policy



Rufus Credle  
Isabel Arnold  
Andrew Bates  
Michael Boylin  
Pradeep Gohil  
Christopher Hodgins  
Daniel Milwood  
Ian J Mitchell  
Catherine Moxey  
Geoffrey Prie  
Indrapal Singh  
Stewart Smith  
Matthew Webster

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)

[ibm.com/redbooks](http://ibm.com/redbooks)

**Redbooks**



# CI/CS Transaction Server V5.3 open beta



- New Policy Rules
  - Name Counter Server
    - GET COUNTER|DCOUNTER
  - Temporary Storage
    - Support for Shared TS
  - WebSphere MQ
    - Number of MQ requests
  - IMS
    - Number of DBCTL calls
- New Entry Point
  - Transaction
    - Allows association of a policy with a TRANID

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)





# CICS Transaction Server V5.3 open beta...



- DevOps Enhancements
  - CICS Build Toolkit
    - Multi-platform tool with a command line interface to build CICS cloud applications and bundles
  - DFHDPLOY
    - Batch utility to deploy and undeploy CICS cloud applications and bundles
  - CICS plug-in for UrbanCode Deploy
    - Extends UrbanCode Deploy to deploy and undeploy CICS applications in coordination with other applications and database components in a single action

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)



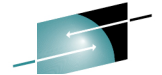


# Questions?

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)



# Notices and Disclaimers



Copyright © 2015 by International Business Machines Corporation (IBM). No part of this document may be reproduced or transmitted in any form without written permission from IBM.

## **U.S. Government Users Restricted Rights - Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM.**

Information in these presentations (including information relating to products that have not yet been announced by IBM) has been reviewed for accuracy as of the date of initial publication and could include unintentional technical or typographical errors. IBM shall have no responsibility to update this information. THIS DOCUMENT IS DISTRIBUTED "AS IS" WITHOUT ANY WARRANTY, EITHER EXPRESS OR IMPLIED. IN NO EVENT SHALL IBM BE LIABLE FOR ANY DAMAGE ARISING FROM THE USE OF THIS INFORMATION, INCLUDING BUT NOT LIMITED TO, LOSS OF DATA, BUSINESS INTERRUPTION, LOSS OF PROFIT OR LOSS OF OPPORTUNITY. IBM products and services are warranted according to the terms and conditions of the agreements under which they are provided.

## **Any statements regarding IBM's future direction, intent or product plans are subject to change or withdrawal without notice.**

Performance data contained herein was generally obtained in a controlled, isolated environments. Customer examples are presented as illustrations of how those customers have used IBM products and the results they may have achieved. Actual performance, cost, savings or other results in other operating environments may vary.

References in this document to IBM products, programs, or services does not imply that IBM intends to make such products, programs or services available in all countries in which IBM operates or does business.

Workshops, sessions and associated materials may have been prepared by independent session speakers, and do not necessarily reflect the views of IBM. All materials and discussions are provided for informational purposes only, and are neither intended to, nor shall constitute legal or other guidance or advice to any individual participant or their specific situation.

It is the customer's responsibility to insure its own compliance with legal requirements and to obtain advice of competent legal counsel as to the identification and interpretation of any relevant laws and regulatory requirements that may affect the customer's business and any actions the customer may need to take to comply with such laws. IBM does not provide legal advice or represent or warrant that its services or products will ensure that the customer is in compliance with any law.





# Notices and Disclaimers (con't)



Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products in connection with this publication and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products. IBM does not warrant the quality of any third-party products, or the ability of any such third-party products to interoperate with IBM's products. IBM EXPRESSLY DISCLAIMS ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

The provision of the information contained herein is not intended to, and does not, grant any right or license under any IBM patents, copyrights, trademarks or other intellectual property right.

- IBM, the IBM logo, ibm.com, Bluemix, Blueworks Live, CICS, Clearcase, DOORS®, Enterprise Document Management System™, Global Business Services®, Global Technology Services®, Information on Demand, ILOG, Maximo®, MQIntegrator®, MQSeries®, Netcool®, OMEGAMON, OpenPower, PureAnalytics™, PureApplication®, pureCluster™, PureCoverage®, PureData®, PureExperience®, PureFlex®, pureQuery®, pureScale®, PureSystems®, QRadar®, Rational®, Rhapsody®, SoDA, SPSS, StoredIQ, Tivoli®, Trusteer®, urban{code}®, Watson, WebSphere®, Worklight®, X-Force® and System z® Z/OS, are trademarks of International Business Machines Corporation, registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the Web at "Copyright and trademark information" at: [www.ibm.com/legal/copytrade.shtml](http://www.ibm.com/legal/copytrade.shtml).

Complete your session evaluations online at [www.SHARE.org/Seattle-Eval](http://www.SHARE.org/Seattle-Eval)

