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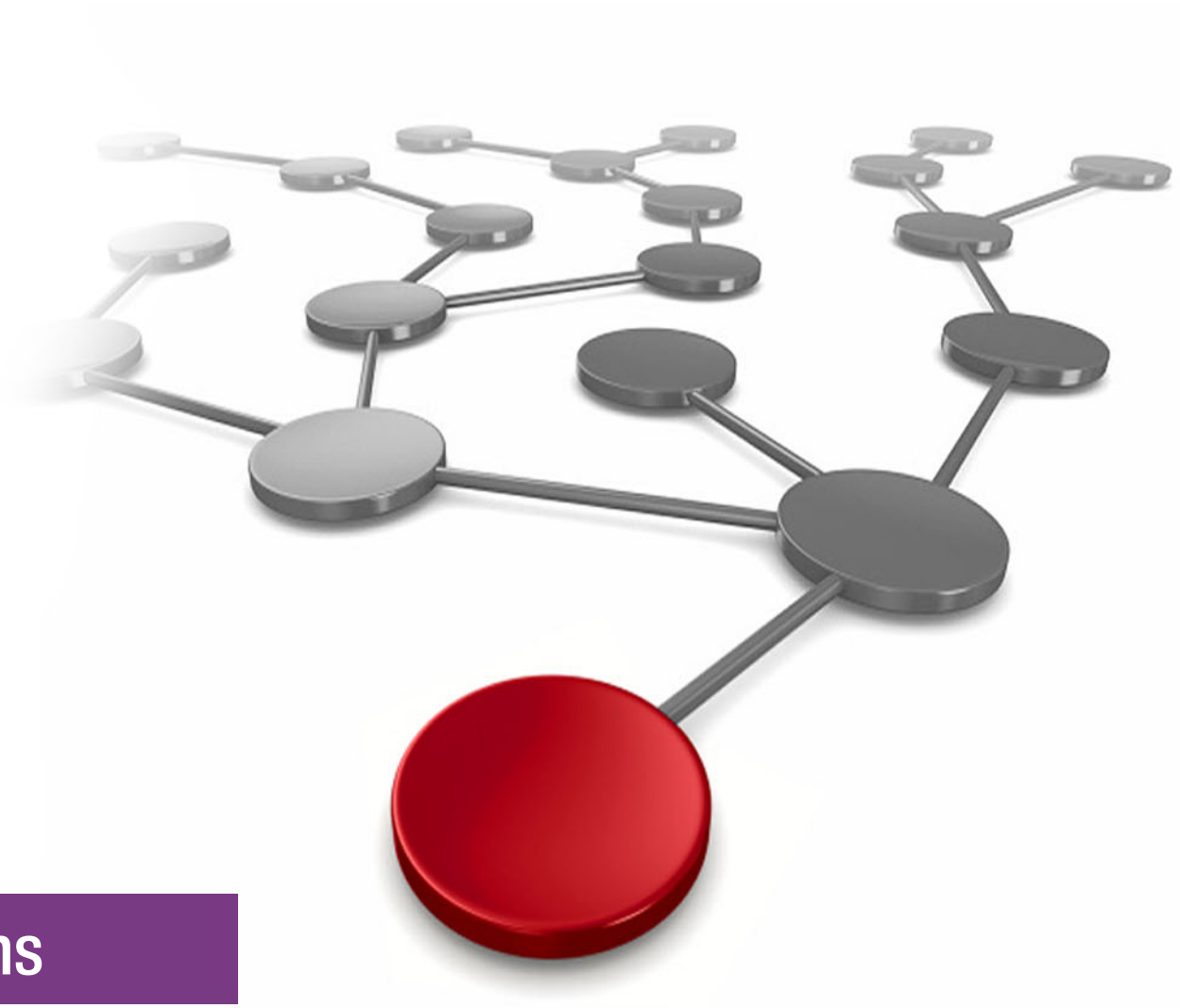
Removing Barriers Between Devs and Ops teams with IBM CICS Transaction Server

Hernan Cunico



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Removing Barriers Between Devs and Ops teams with IBM CICS Transaction Server

To speed the release of new applications and updates, the IT industry is seeking to apply agile and lean principles to development and deployment. At the core of these principles is eliminating wasted work, breaking down artificial barriers between related functional teams, and adopting continuous release cycles that push improvements out to users faster than ever.

In response to this effort, a new, more aggressive, and *business-driven* approach called *DevOps* has emerged. DevOps combines many traditional development and operations activities such that applications can be built, deployed, rebuilt, and redeployed in rapid cycles (Figure 1). The result is continuous, incremental improvements that drive new features into the marketplace with minimal impact on users and more efficient use of IT staff.

IBM® CICS® Transaction Server has long been the workhorse of the global financial community. Now, with the latest release, CICS Transaction Server V5.3 supports DevOps-based organizations, too. Two capabilities in particular, the CICS build toolkit and a CICS plug-in for IBM UrbanCode™ Deploy, can help teams break down the long-standing walls between development and operations teams.

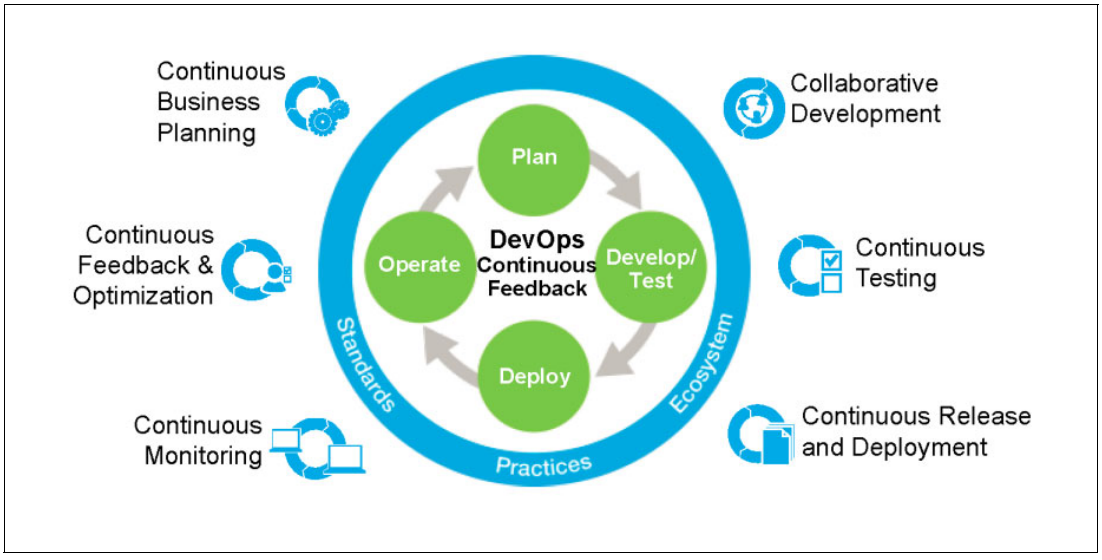

Figure 1 DevOps overview

This IBM Redbooks® Solution Guide provides an overview of the features and capabilities of CICS Transaction Server V5.3 and shows how you can use this solution to help your DevOps team build and deploy solutions more quickly and efficiently.

Did you know?

You don’t have to introduce DevOps features in CICS Transaction Server 5.3 all at once. Teams can adopt a bi-modal approach and use DevOps capabilities to release new Java business or interface logic in rapid cycles while retaining existing development methods for updates to mission-critical, back-end applications.

Business value

In a DevOps shop, the business owner, the developers, and the operations team work collaboratively. The plan-develop-build-deploy-feedback process is continuous. When possible, human actions are minimized in favor of autonomous tools, such as when software builds are set to start automatically when eligible code updates become available. In the end, applications reach their full potential faster, often using fewer resources than in the past.

There is a strong focus on continuous integration, continuous collaboration, and continuous improvement. These are the core principles of DevOps, and together, they provide numerous advantages:

- Enhanced experience for customers and consumers

  New features and functions are pushed out to users faster than before. Plus, as each new feature is released, you get feedback that can be used to improve the next release.

- Increased ability to innovate

  Teams can work on small, incremental updates that get released almost immediately rather than being held for a major release months later. This allows more time for innovation, which itself becomes an ongoing, repeatable process.

- Faster time to value

  By releasing more frequent but smaller updates and generating new user feedback each time, applications are improved faster and the end state of the promised functionality is achieved more rapidly.

The DevOps approach is multi-platform. The principles are the same whether the application runs on a mainframe, in a distributed environment, or in the cloud. DevOps also can be applied to any development effort, ranging from enterprise applications such as back-end banking systems to more customer-facing products such as smartphone tools. And DevOps is customer-neutral. Whether you are working with an external customer or an internal line of business, DevOps can help you meet your commitments faster and with better results.

Solution overview

CICS Transaction Server V5.3 includes a number of component solutions to help DevOps teams manage artifacts and build and deploy applications.

CICS build toolkit for automated builds

The CICS build toolkit provides a command-line interface (CLI) to build the CICS projects that you create in IBM CICS Explorer®. This method is superior to the previous manual method of using a wizard to export CICS projects because you can use a script to build projects in a reliable, repeatable manner. Using the build toolkit is one step toward a fully automated, continuous integration process (see Figure 2).

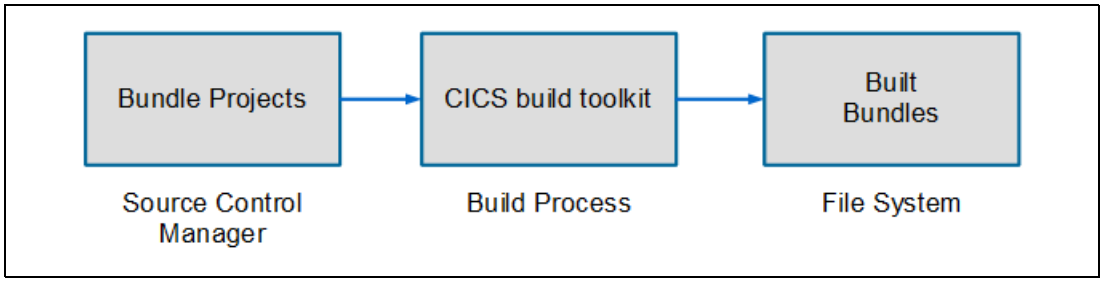

Figure 2 Path toward continuous integration with CICS build toolkit

The CICS build toolkit can build these projects:

- CICS bundles
- CICS applications
- CICS application bindings
- CICS reference projects, such as Open Services Gateway initiative (OSGi) bundles, OSGi application projects (enterprise bundle archives or EBAs), enterprise applications (typically wrapped in an enterprise archive or EAR), and dynamic web projects (typically wrapped in a web archive or WAR)

A significant feature of the CICS build toolkit is its ability to resolve variables within attributes by using values from a properties file. This allows CICS bundles to be redeployed to different target environments by using different variable settings, without any changes to the underlying source code. For example, a debug variable can be set in the development environment but not in the test or production environment.

The automation features of the CICS build toolkit apply within two specific processes. First, the build automation process uses the toolkit to build the project. After that, the deployment automation process uses the toolkit to resolve the variables into specific values for the target environment.

The CICS build toolkit is supported on the IBM z/OS®, Linux, and Microsoft Windows operating systems, which makes it easy to integrate it with various source code management (SCM) and other tools. Plus, it can be used with CICS Transaction Server V4.1 and later versions, enabling organizations that are not yet using CICS Transaction Server V5.3 to still make the move toward DevOps.

DFHDPLOY for batch deployments

Also introduced in CICS Transaction Server V5.3 is a utility called DFHDPLOY. DFHDPLOY provides a set of commands that can be used in a script to deploy, undeploy, and set the state of CICS bundles and cloud-enabled CICS applications in batches. The utility also can connect to a CICSplex.

When you use the utility's **Deploy** command, the CICS bundle or CICS application can be defined and its state changed to Disabled, Enabled, or Available within a CICS system or group of CICS Systems.

For a cold start, the **Deploy** command can be used to add a bundle definition to a CICS System Definitions (CSD) group that is part of a startup list, or add it to a Resource group definition (RESGROUP) that is added to a Resource description definition (RESDESC).

When you use the **Undeploy** command, the CICS bundle or CICS application state can be changed to Unavailable, Disabled, or Discarded. The Unavailable state waits for the application workload to complete before performing any action.

When you use the **SET** command, a higher version of an OSGi bundle can be phased in without disrupting active tasks.

The DFHDPLOY utility is called by using JCL and can be easily integrated into existing deployment tools and automation procedures. DFHDPLOY can be used with the CICS build toolkit to automate the building and deployment of CICS bundles and cloud-enabled CICS applications.

Deploying through IBM UrbanCode Deploy

IBM UrbanCode Deploy automates the deployment of a variety of artifacts ranging from applications to middleware configurations to database changes. CICS Transaction Server V5.3 includes a plug-in that enables IBM UrbanCode Deploy to work with CICS resources.

For more information about IBM UrbanCode Deploy, including typical use cases and features or to download an evaluation version, go to:

https://developer.ibm.com/urbancode/products/urbancode-deploy

Organizations that rely on CICS can use the UrbanCode Deploy plug-in to improve workflow efficiency and wrap CICS deployments into their overall continuous delivery processes. The plug-in can perform these actions:

- Define and install bundle resources in CICS System Definitions (CSDs).
- Define and install bundle resources in business applications services.
- Define groups and add them to startup lists.
- Enable, disable, and discard resources.
- Open and close resources.
- Perform NEWCOPY and PHASEIN actions on resources.
- Scan pipelines.
- Check the status of resources (Enable or Open).
- Deploy and undeploy bundles and applications (using DFHDPLOY).
- Set resources as Available and Unavailable.

Integration with Rational tools

IBM Rational® tools provide a framework that supports for the entire lifecycle of software development. For the purpose of this document we only focus on IBM Rational Team Concert™. Rational Team Concert is an all-in-one software development and collaboration tool that offers features that include source control management, integrated development environment, build, automation, Agile project planning and reporting, defect tracking, and many more.

The following sections provide more detail about the integration with Rational.

Solution architecture

When the new tools and utilities described in this guide are considered together, it creates a new DevOps-style delivery pipeline.

Figure 3 illustrates how IBM Rational Team Concert can provide a framework for development and build activities. Developers can use the Rational Team Concert client and use IDE extensions with plug-ins such as CICS Explorer. Concurrently, they can use source control management practices for accurate versioning of the source code repository.

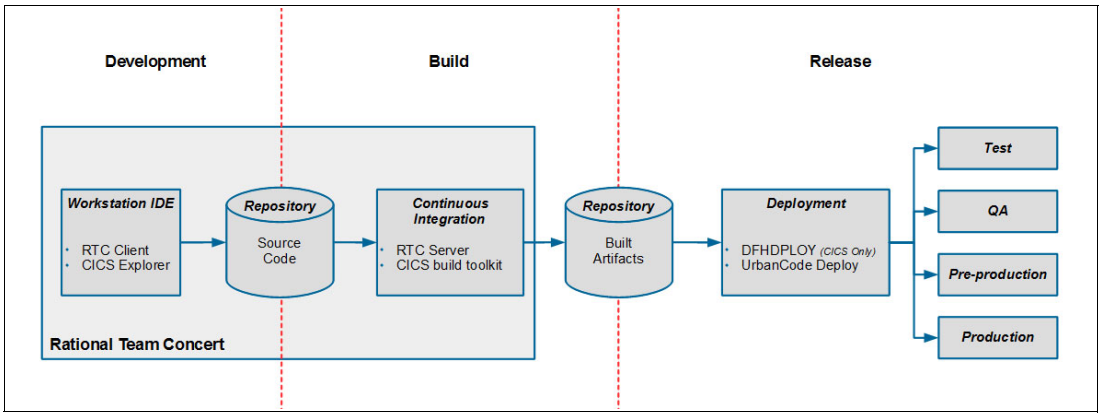

Figure 3 Tools of the DevOps trade

As you move into the functions that control the build, continuous integration, and testing, Rational Team Concert can be extended with the CICS build toolkit for process integration and build automation. Built artifacts can then be stored in a separate repository where deployment tools such as DFHDPLOY and IBM UrbanCode Deploy inject environment-specific variables and definitions before finally deploying the artifacts to the target environments.

Usage scenarios

The tools described in this document are specially designed for the different environments that are associated with software development and deployment. In generic terms, these environments are defined as follows:

- Development
- Build
- Release

Development environment

The goal of DevOps is to create an integrated pipeline in which developers can develop in parallel, get rapid feedback on their work, deliver updates continuously, and maintain stable deployments. This pipeline can help development teams to realize the benefits of the DevOps methodology.

Integrated development environments

An integrated development environment (IDE) is software program that is used for developing applications. IDEs support different types of coding languages and build engines and usually allow the addition of plug-ins to support additional features:

- Source code management
- Build and deploy
- Database connectivity

CICS application development is supported on various IDEs, for example:

- *Rational Developer for z Systems* is an Eclipse-based IDE that provides multiple toolsets for developing IBM z/OS applications. Rational Developer for z Systems is unique in that it offers development tools for PL/I, COBOL, Java, C++, and assembly language, along with real-time syntax validations.
- *CICS Explorer* is an Eclipse-based tool for managing CICS systems. In CICS Explorer, you gets a central space to manage all CICS resources, from regions to resource definitions, including help from various wizards and resource editors. You can also manage CICS bundles, cloud applications, and platforms, and integrate your CICS environment with an SCM system by using an Eclipse plug-in.
- *CICS Configuration Manager* provides mechanisms to easily deploy and manipulate CICS resource definitions in a controlled and auditable manner. Using the CICS Configuration Manager plug-in for CICS Explorer, developers build and start what are known as *change packages* in which the developer defines CICS resource definition changes that are required by the current application release (including new, altered, and deleted resource definitions). With the package defined, it can progress through a continuous delivery pipeline with any dependent code changes.

Learning about CICS Explorer can be beneficial, even if you still develop your z/OS applications under Time Sharing Option Extensions (TSO/E). For additional details, see *CICS and DevOps: What You Need to Know*, SG24-8339, which is available at:

http://www.redbooks.ibm.com/abstracts/sg248339.html

Source code management

At a minimum, source code management (SCM) systems provide backup and version management of source code and related assets. Different SCMs work differently. Some require files to be locked for editing (and unlocked after the change is made), while others permit editing by many users and then resolve any conflicts after the changes are integrated. This latter method typically allows for faster, more concurrent development.

Rational Team Concert uses a centralized repository model. It offers command-line, Eclipse, and Microsoft Visual Studio IDE clients for developing code. It permits concurrent editing and encourages backups of undelivered changes in personal, on-server repositories known as *repository workspaces*. Rational Team Concert also has tight integration between its own SCM system, continuous integration (CI) server, and build engines.

To provide direct SCM support in CICS Explorer, the Rational Team Concert client for Eclipse can be installed into the same instance as CICS Explorer either by using IBM Installation Manager or the Eclipse p2 installation process.

Test systems

A primary principle of DevOps is to amplify feedback loops. This activity can occur at the start of development by using testing techniques that allow the developer to quickly understand the impact of changes and to verify the behavior of code within test frameworks and systems.

Eclipse and products that are based on Eclipse (such as Rational Developer for z Systems and CICS Explorer) contain the toolset known as *Java Development Tools*. These tools provide integration for running JUnit tests to unit test Java code and promote test-driven development (TDD).

When working with COBOL code, unit testing can be achieved through the Unit Test feature of Rational Developer for z Systems or the Rational Development and Test Environment for z Systems feature. Both of these features emulate z/OS to replicate a system and to allow code to be tested before it gets to a real z/OS system.

Build environment

One of the keys to the DevOps approach is the ability to do continuous builds without any human intervention. In a continuous build, developers need only to check in their code to an SCM system for a build to be triggered. Builds are triggered only when the system determines that the checked-in code contains changes from what was previously in place.

Rational Team Concert Build, the build component of Rational Team Concert, supports the automation, monitoring, and build awareness of team builds. The team build component integrates the team's build system into Rational Team Concert, providing build awareness, control, and traceability. Team members can track build progress, view build alerts and results, request builds, and trace builds to other artifacts, such as change sets and work items. Team members can see what builds exist, inspect build results, monitor builds in progress, and request builds at any time, all within the IDE. Rational Team Concert Build provides a model for representing a team's build definitions, build engines, and build results.

Using Rational Team Concert Enterprise Extension you can build CICS COBOL applications. This function is unlocked through the Developer for IBM Enterprise Platforms Client Access License and includes the z/OS Dependency Build template. The z/OS Dependency Build is used to compile and link-edit COBOL and PL/I applications.

Release environment

Software deployment refers to the process of moving applications through various stages, such as development, test, and production. At each stage, changes must be made to enable the application to work in the new environment. Managing these changes puts significant pressure on the release engineers who are responsible for application deployments.

To cope with the increasing complexity of release management within ever-shrinking deployment cycles, organizations need a more automated, streamlined release management process that is flexible, reliable, and reusable. Ultimately, to achieve true continuous delivery, you must be able to deploy an application to any environment at any time.

As we mentioned earlier, here are some of the tools is available to help with release management.

- UrbanCode Deploy
- DFHDPLOY utility
- CICS build toolkit

Supported platforms

For full details about supported hardware and software, see:

http://www.ibm.com/support/docview.wss?uid=swg27006382

Ordering information

For ordering and other technical information, see the IBM CICS Transaction Server V5.3 announcement letter:

http://www.ibm.com/common/ssi/cgi-bin/ssialias?infotype=an&subtype=ca&supplier=897&letternum=ENUS215-363

Before updating to CICS Transaction Server V5.3 from an earlier version of CICS, read *Upgrading information for CICS when changing releases of CICS, z/OS, DB2 or IMS* at:

http://www.ibm.com/support/docview.wss?uid=swg21207399

Before planning for a CICS upgrade or applying maintenance, review the Preventive Service Planning (PSP) bucket information for your product that is available here:

http://www.ibm.com/support/docview.wss?uid=swg21231874

Related information

For more information about the DevOps features in IBM® CICS Transaction Server V5.3, refer to the documents and websites listed here.

- *CICS and DevOps: What You Need to Know*, SG24-8339

  http://www.redbooks.ibm.com/abstracts/sg248339.html
- *CICS Transaction Server family*

  http://www.ibm.com/software/products/en/cics-tservers
- *CICS Transaction Gateway for z/OS*

  http://www.ibm.com/software/products/en/cics-ctg-zos
- *IBM CICS Transaction Server for z/OS, V5.3 delivers advances in service agility, operational efficiency, and cloud enablement with DevOps,* IBM United States Software Announcement 215-363, 05 October 2015

  http://www.ibm.com/common/ssi/cgi-bin/ssialias?infotype=an&subtype=ca&supplier=897&letternum=ENUS215-363
- IBM Offering Information page (announcement letters and sales manuals)

  http://www.ibm.com/common/ssi/index.wss?request_locale=en

  On this web page, enter `IBM CICS Transaction Server V5.3`, select the information type, and then click **Search**. On the next page, narrow your search results by geography and language.

Authors

This solution guide is based on a larger book produced by a team of specialists from around the world working at the International Technical Support Organization, Raleigh Center.

Hernan Cunico is a Senior Information and IT Architect at the ITSO, Raleigh Center. He has over 18 years of experience in the consulting and development fields. His areas of expertise include user experience design, information and application development, middleware, portals, open source, cloud, mobile, and agile development. He has written extensively on commerce, portals, migrations, HR, and learning solutions.

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