Meeting the challenges of agile development with DevOps, CICS and UrbanCode Deploy

12 July, 2016

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IBM

Agenda

DevOps

An approach for software delivery based on lean and agile principles

Tooling

Automate the reliable and repeatable deployment of CICS applications and bundles

Build

- CICS build toolkit

Deploy

- CICS Build Toolkit, DFHDPLOY, CICS plug-in for UrbanCode Deploy

Demo

Deploy a web application into a Liberty JVM server in CICS

What is DevOps?

Movement to help development and operations work better together

DevOps is an approach for software delivery based on “lean” and “agile” principles, in which **all stakeholders —** from line of business to development, quality assurance and operations — **collaborate to deliver software more efficiently** based on a **continuous feedback loop**.

Adopting DevOps capabilities and principles **can result in applications that are more efficient and effective, with continuous process improvement**, while helping ensure that the changes and enhancements to the software are based on real customer feedback.

ibm.com/software/products/en/category/enterprisemodernization

IBM Software

Technical White Paper

IBM

Best practices for a DevOps approach with IBM System z

Highlights

Why DevOps?

- Align portfolio decisions with business goals
- Achieve innovative ideas through collaborative development
- Deliver innovation by automating processes and eliminating waste
- Enable continuous integration with rapid testing
- Improve processes and products using feedback from internal and external customers

Today’s enterprise applications are complex. While they provide users with a modern interface that can fit literally into the palm of their hands, applications still need to access back-end systems and operational databases, as well as integrate with third-party application programming interfaces (APIs), to provide the business functionality customers demand.

DevOps is an approach for software delivery based on “lean” and “agile” principles, in which all stakeholders—from line of business to development, quality assurance and operations—collaborate to deliver software more efficiently based on a continuous feedback loop. Adopting DevOps capabilities and principles can result in applications that are more efficient and effective, with continuous process improvement, while helping ensure that the changes and enhancements to the software are based on real customer

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Adjust)—to c
core approach
ously improve
manufacturing
lean and agile

IBM

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2nd IBM Limited Edition

DevOps FOR DUMMIES

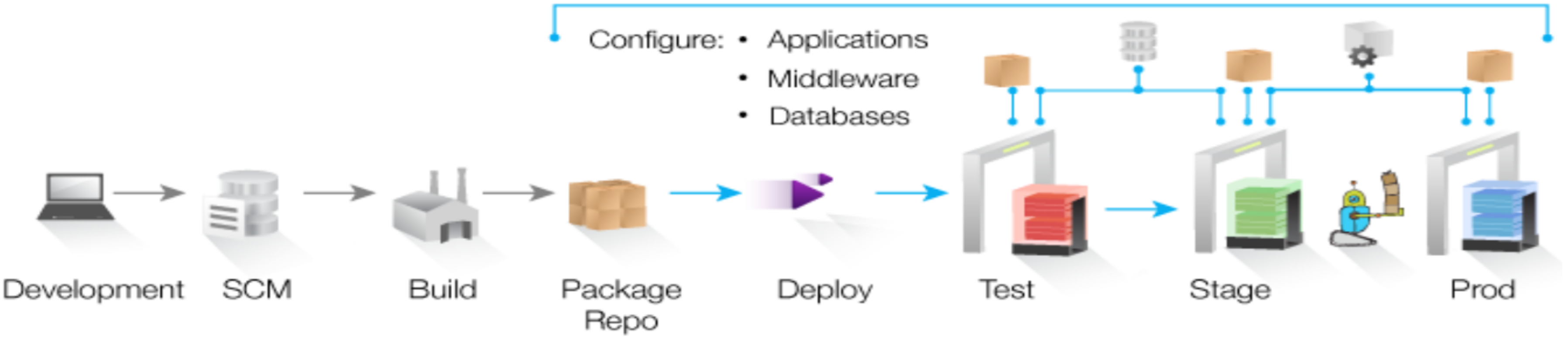
A Wiley Brand

Learn:

- The business need and value of DevOps
- DevOps capabilities and adoption paths
- How cloud accelerates DevOps
- Ten DevOps myths

Sanjeev Sharma
Bernie Coyne

DevOps delivery pipeline



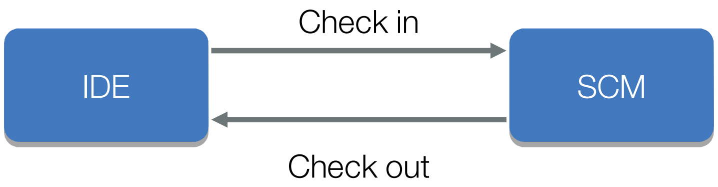
Collaborative development

Continuous testing

Continuous release and deployment

DevOps scenario

Developer



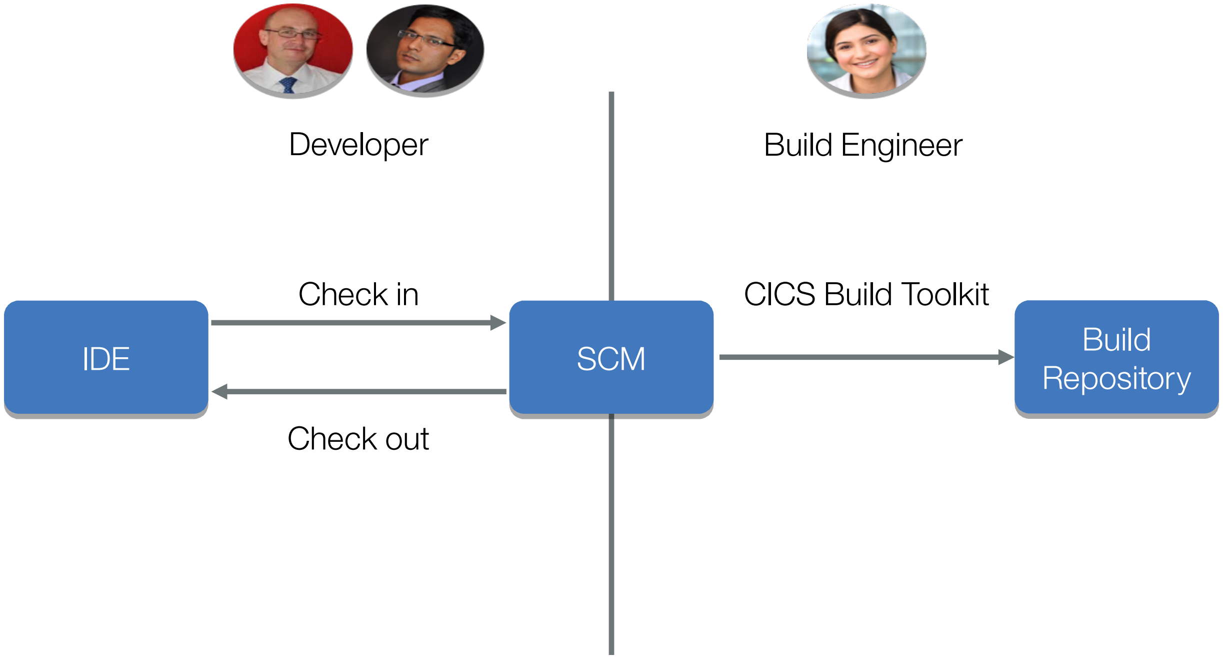
Check in

IDE

SCM

Check out

DevOps scenario



Developer

Build Engineer

Check in

Check out

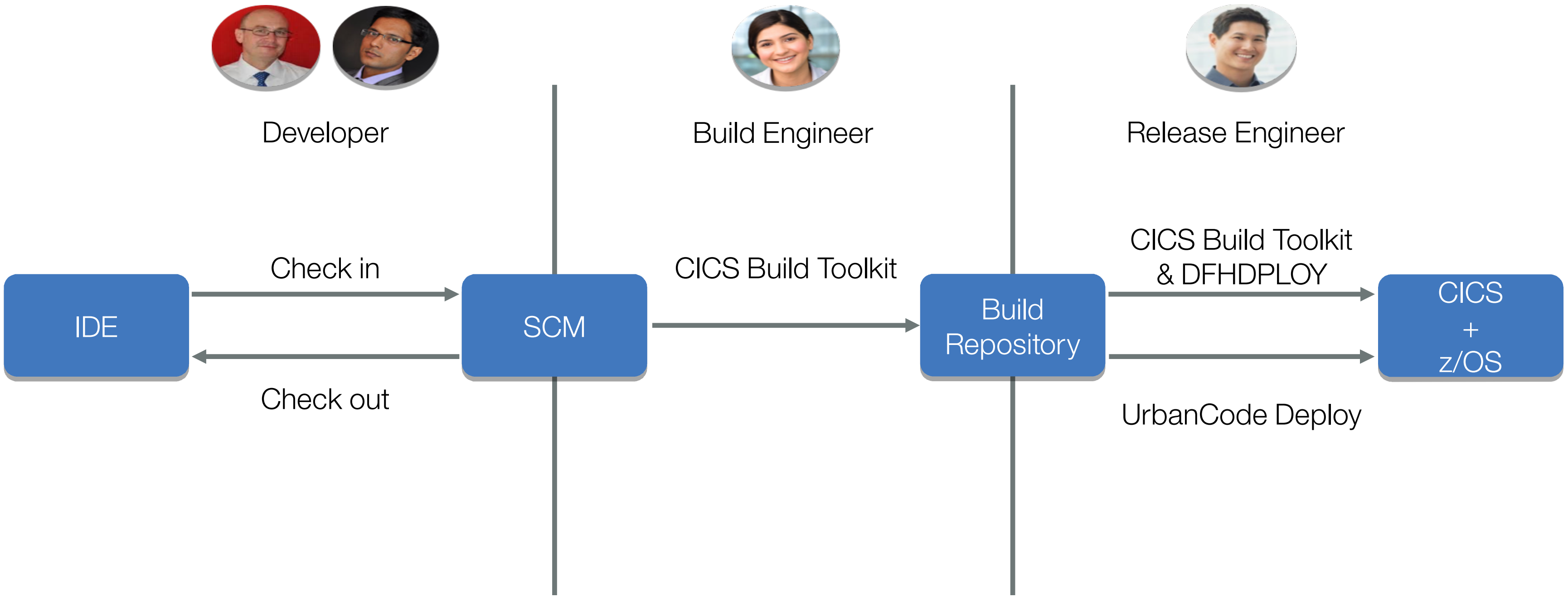
CICS Build Toolkit

IDE

SCM

Build Repository

DevOps scenario



Developer

Build Engineer

Release Engineer

IDE

Check in

Check out

SCM

CICS Build Toolkit

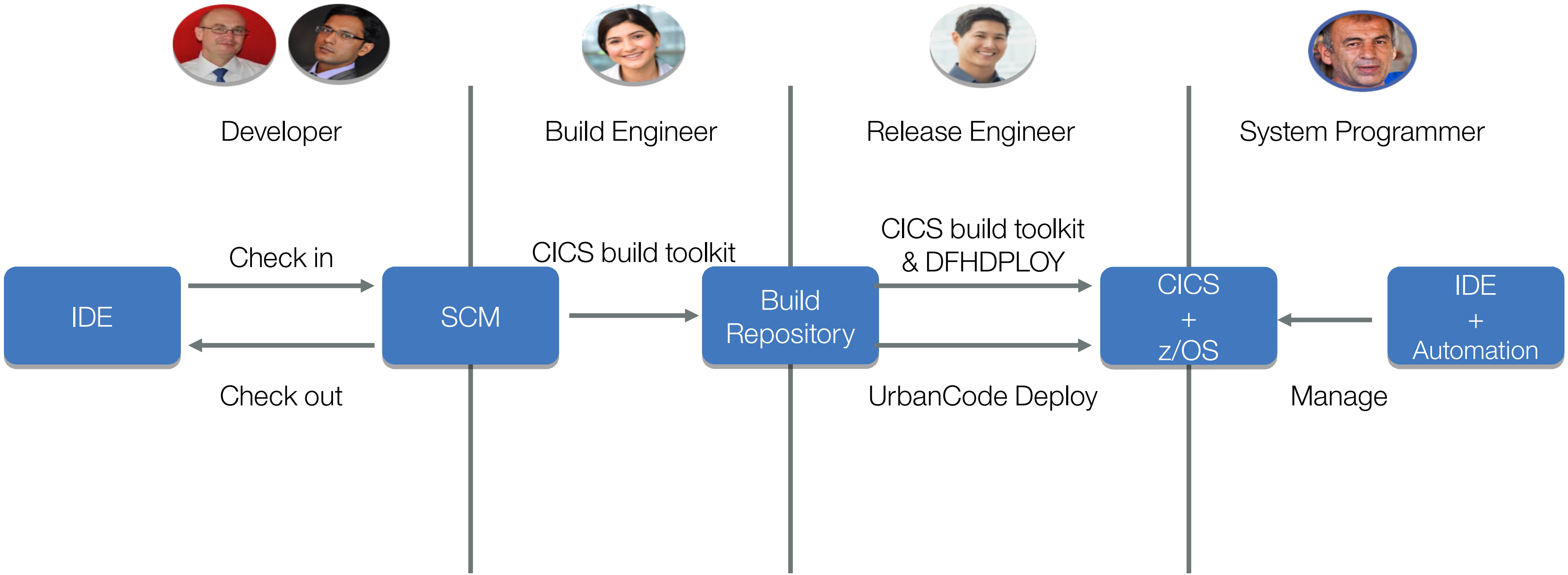
Build Repository

CICS Build Toolkit
& DFHDPLOY

UrbanCode Deploy

CICS
+
z/OS

DevOps scenario



Developer

Build Engineer

Release Engineer

System Programmer

IDE

Check in

Check out

SCM

CICS build toolkit

Build Repository

CICS build toolkit & DFHDPLOY

UrbanCode Deploy

CICS + z/OS

Manage

IDE + Automation

CICS Build Toolkit

Builds CICS projects from Eclipse source

- Cloud applications, bundles and platforms
- Java OSGi and Liberty profile components

Runs on z/OS, Linux, Microsoft Windows

For CICS TS V4.1 and later

Verbose log of activity for audit

Build

Check out the set of Eclipse projects

Optional: copy pre-built Java files in bundle

- .jar .war .eba .ear

Run cicsbt

Copy output to build repository

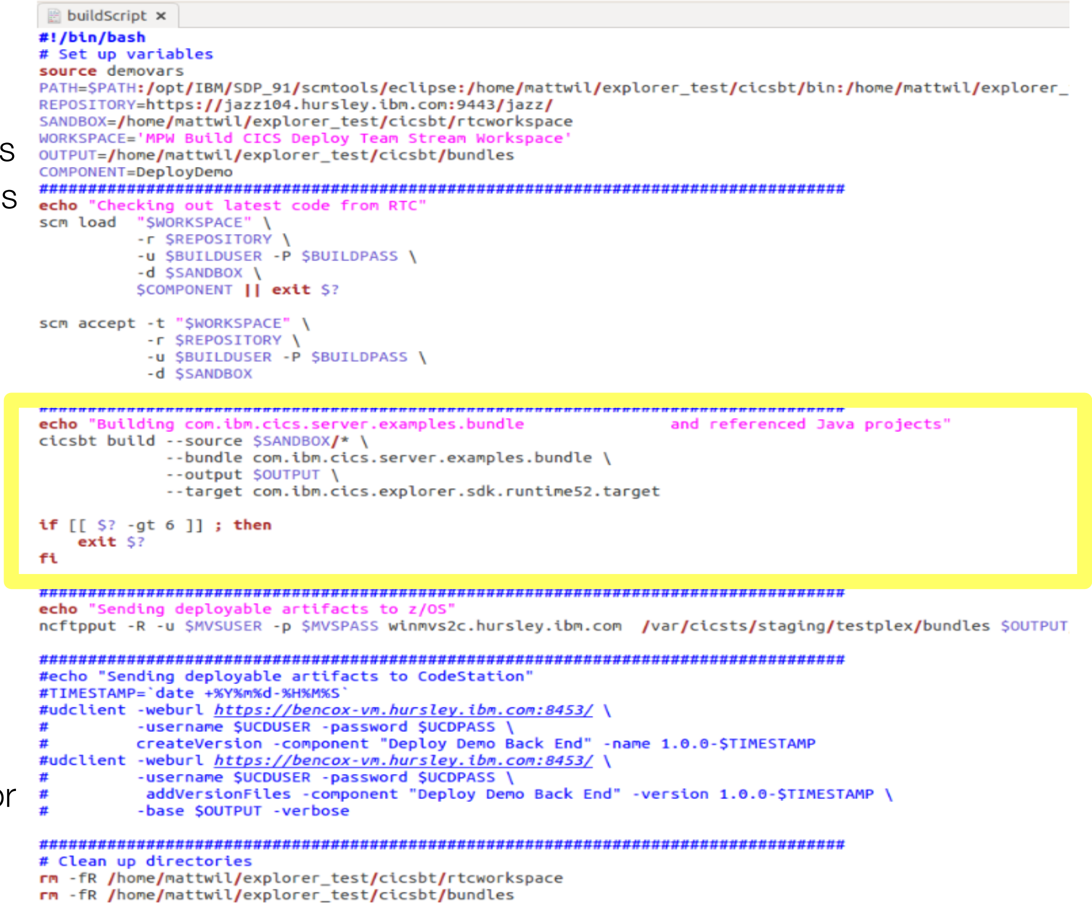
Deploy

Copy from build repository

Check out target environment properties file or application binding

Run cicsbt

Copy output to target z/OS zFS



```
#!/bin/bash
# Set up variables
source demovars
PATH=$PATH:/opt/IBM/SDP_91/scmtools/eclipse:/home/mattwil/explorer_test/cicsbt/bin:/home/mattwil/explorer_
REPOSITORY=https://jazz104.hursley.ibm.com:9443/jazz/
SANDBOX=/home/mattwil/explorer_test/cicsbt/rtcworkspace
WORKSPACE='MPW Build CICS Deploy Team Stream Workspace'
OUTPUT=/home/mattwil/explorer_test/cicsbt/bundles
COMPONENT=DeployDemo
####################################################################################
echo "Checking out latest code from RTC"
scm load  "$WORKSPACE" \
          -r $REPOSITORY \
          -u $BUILDUSER -P $BUILDPASS \
          -d $SANDBOX \
          $COMPONENT || exit $?

scm accept -t "$WORKSPACE" \
           -r $REPOSITORY \
           -u $BUILDUSER -P $BUILDPASS \
           -d $SANDBOX

####################################################################################
echo "Building com.ibm.cics.server.examples.bundle               and referenced Java projects"
cicsbt build --source $SANDBOX/* \
             --bundle com.ibm.cics.server.examples.bundle \
             --output $OUTPUT \
             --target com.ibm.cics.explorer.sdk.runtime52.target

if [[ $? -gt 6 ]] ; then
    exit $?
fi
####################################################################################
echo "Sending deployable artifacts to z/OS"
ncftpput -R -u $MVSUSER -p $MVSPASS winmvs2c.hursley.ibm.com  /var/cicsts/staging/testplex/bundles $OUTPUT

####################################################################################
#echo "Sending deployable artifacts to CodeStation"
#TIMESTAMP=`date +%Y%m%d-%H%M%S`
#udclient -weburl https://bencox-vm.hursley.ibm.com:8453/ \
#         -username $UCDUSER -password $UCDPASS \
#         createVersion -component "Deploy Demo Back End" -name 1.0.0-$TIMESTAMP
#udclient -weburl https://bencox-vm.hursley.ibm.com:8453/ \
#         -username $UCDUSER -password $UCDPASS \
#          addVersionFiles -component "Deploy Demo Back End" -version 1.0.0-$TIMESTAMP \
#         -base $OUTPUT -verbose

####################################################################################
# Clean up directories
rm -fR /home/mattwil/explorer_test/cicsbt/rtcworkspace
rm -fR /home/mattwil/explorer_test/cicsbt/bundles
```

CICS Build Toolkit - build examples

Build a CICS bundle

Bundle ID, bundle ID + version, several bundles, all bundles

```
cicsbt --input my/source/dir/*
       --build MyBundleProject
       --output my/output/dir
```

Build a CICS bundle that references an OSGi Java project

For OSGI use a CICS version .target or customize for your own set of runtime libraries

```
cicsbt --input my/source/dir/*
       --build OSGiBundleProject
       --target com.ibm.cics.explorer.sdk.runtime51.target
       --output my/output/dir
```

Build a CICS cloud application and binding

Application binding ID, binding ID + version, all applications and bindings

```
cicsbt --input my/source/dir/*
       --build MyApplicationBinding
       --output my/output/dir
```

CICS Build Toolkit - variable substitution examples

Developer declares variable defaults in bundle variables.properties

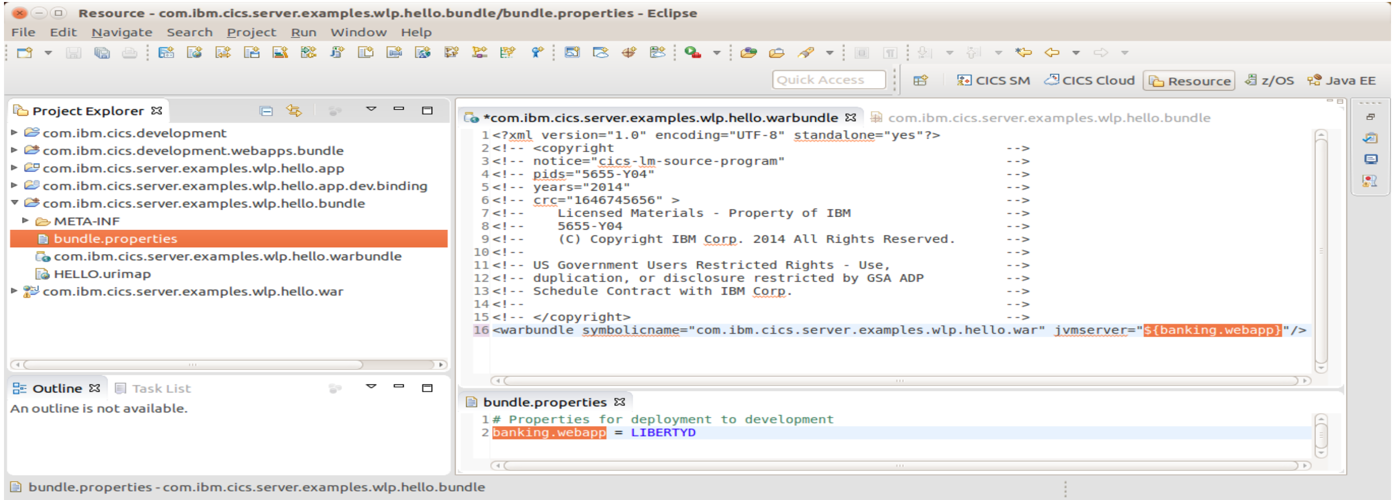
- Can reference variables in CICS bundle part attributes

Release engineer overrides defaults using a .properties

- In a stand-alone file or application binding

Example attributes that vary between target environments

- JVMSERVER in .osgibundle
- CEDF YES/NO in .program
- DSNAME in .file
- PATH in .urimap


Resource - com.ibm.cics.server.examples.wlp.hello.bundle/bundle.properties - Eclipse
File Edit Navigate Search Project Run Window Help
Quick Access
CICS SM
CICS Cloud
Resource
z/OS
Java EE
Project Explorer
com.ibm.cics.development
com.ibm.cics.development.webapps.bundle
com.ibm.cics.server.examples.wlp.hello.app
com.ibm.cics.server.examples.wlp.hello.app.dev.binding
com.ibm.cics.server.examples.wlp.hello.bundle
META-INF
bundle.properties
com.ibm.cics.server.examples.wlp.hello.warbundle
HELLO.urimap
com.ibm.cics.server.examples.wlp.hello.war
Outline
Task List
An outline is not available.
*com.ibm.cics.server.examples.wlp.hello.warbundle
com.ibm.cics.server.examples.wlp.hello.bundle
bundle.properties
bundle.properties - com.ibm.cics.server.examples.wlp.hello.bundle

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<!-- <copyright                                                  -->
<!-- notice="cics-lm-source-program"                             -->
<!-- pids="5655-Y04"                                             -->
<!-- years="2014"                                                -->
<!-- crc="1646745656" >                                          -->
<!--     Licensed Materials - Property of IBM                    -->
<!--     5655-Y04                                                -->
<!--     (C) Copyright IBM Corp. 2014 All Rights Reserved.       -->
<!--                                                             -->
<!-- US Government Users Restricted Rights - Use,                -->
<!-- duplication, or disclosure restricted by GSA ADP            -->
<!-- Schedule Contract with IBM Corp.                            -->
<!--                                                             -->
<!-- </copyright>                                                -->
<warbundle symbolicname="com.ibm.cics.server.examples.wlp.hello.war" jvmserver="${banking.webapp}"/>
```

```
# Properties for deployment to development
banking.webapp = LIBERTYD
```

DFHDPLOY

JCL utility to deploy, undeploy, and set the state of CICS bundles and applications

Provides a set of commands that you can sequence in a script

Waits for bundles and applications to reach required state before progressing

Easy to use with your existing z/OS automation, CICS Build Toolkit, and Unix scripts

- e.g. resolve bundle, copy bundle, pause workload, undeploy old bundle, deploy new bundle, unpause workload

SET CICSPLEX

Connect to CICS V5.1 and above - CICSPlex SM CMAS region

DEPLOY BUNDLE

Define a bundle resource in the CSDs or BAS

- For cold start, add CSD GROUP to a startup LIST, or RESGROUP to RESDESC

Then change state to DISABLED, ENABLED, or AVAILABLE

SET BUNDLE

Change state to AVAILABLE, UNAVAILABLE, ENABLED, or DISABLED

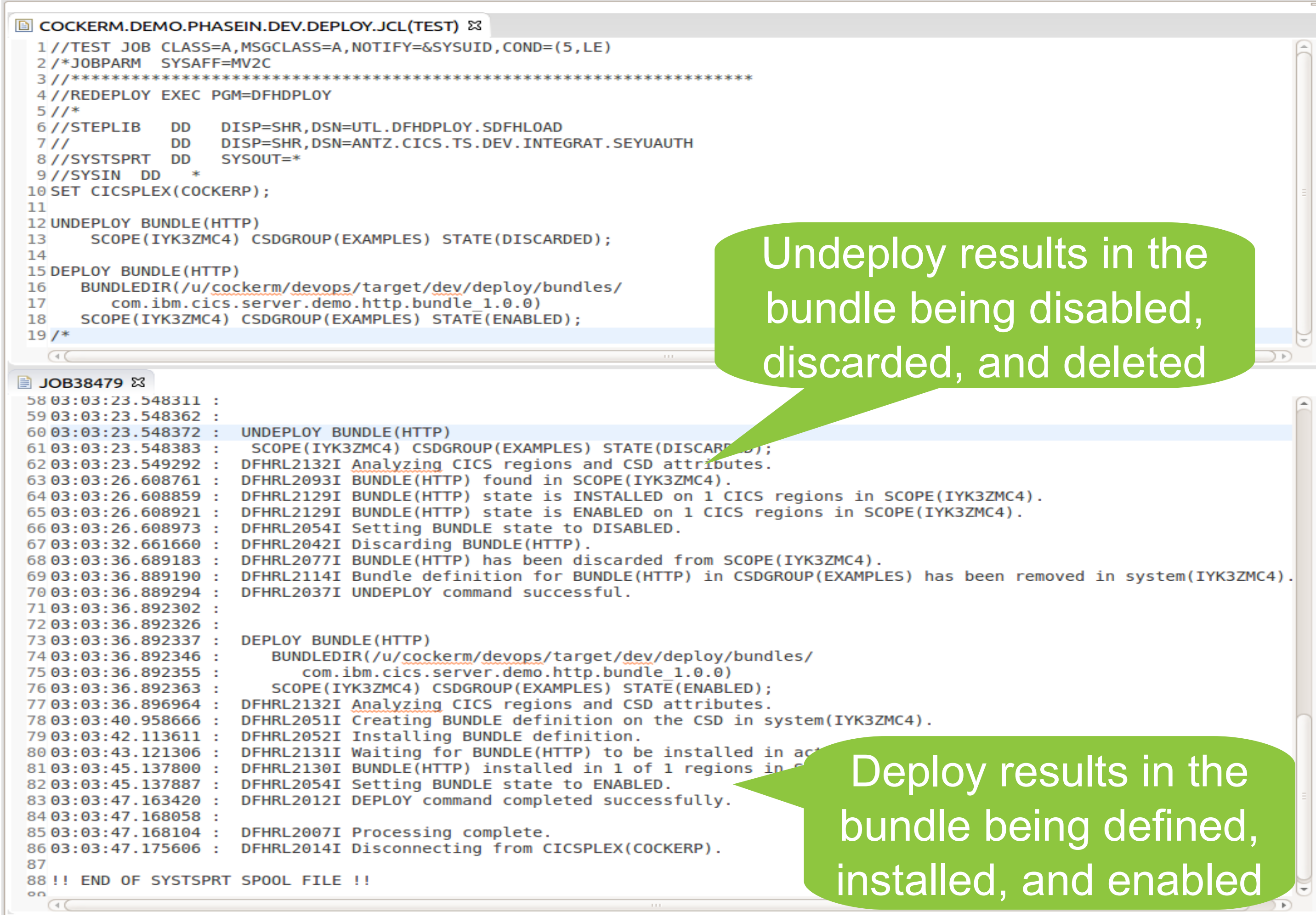
Or phase in a higher version of an OSGi bundle without disrupting active tasks

UNDEPLOY BUNDLE

Change state to UNAVAILBLE, DISABLED, or DISCARDED

DFHDPLOY

JCL job to deploy a CICS bundle



COCKERM.DEMO.PHASEIN.DEV.DEPLOY.JCL(TEST)

```
//TEST JOB CLASS=A,MSGCLASS=A,NOTIFY=&SYSUID,COND=(5,LE)
/*JOBPARM  SYSAFF=MV2C
//*********************************************************************
//REDEPLOY EXEC PGM=DFHDPLOY
//*
//STEPLIB   DD   DISP=SHR,DSN=UTL.DFHDPLOY.SDFHLOAD
//          DD   DISP=SHR,DSN=ANTZ.CICS.TS.DEV.INTEGRAT.SEYUAUTH
//SYSTSPRT  DD   SYSOUT=*
//SYSIN  DD   *
SET CICSPLEX(COCKERP);

UNDEPLOY BUNDLE(HTTP)
    SCOPE(IYK3ZMC4) CSDGROUP(EXAMPLES) STATE(DISCARDED);

DEPLOY BUNDLE(HTTP)
   BUNDLEDIR(/u/cockerm/devops/target/dev/deploy/bundles/
      com.ibm.cics.server.demo.http.bundle_1.0.0)
   SCOPE(IYK3ZMC4) CSDGROUP(EXAMPLES) STATE(ENABLED);
/*
```

Output

JOB38479

```
03:03:23.548311 :
03:03:23.548362 :
03:03:23.548372 :   UNDEPLOY BUNDLE(HTTP)
03:03:23.548383 :    SCOPE(IYK3ZMC4) CSDGROUP(EXAMPLES) STATE(DISCARDED);
03:03:23.549292 :   DFHRL2132I Analyzing CICS regions and CSD attributes.
03:03:26.608761 :   DFHRL2093I BUNDLE(HTTP) found in SCOPE(IYK3ZMC4).
03:03:26.608859 :   DFHRL2129I BUNDLE(HTTP) state is INSTALLED on 1 CICS regions in SCOPE(IYK3ZMC4).
03:03:26.608921 :   DFHRL2129I BUNDLE(HTTP) state is ENABLED on 1 CICS regions in SCOPE(IYK3ZMC4).
03:03:26.608973 :   DFHRL2054I Setting BUNDLE state to DISABLED.
03:03:32.661660 :   DFHRL2042I Discarding BUNDLE(HTTP).
03:03:36.689183 :   DFHRL2077I BUNDLE(HTTP) has been discarded from SCOPE(IYK3ZMC4).
03:03:36.889190 :   DFHRL2114I Bundle definition for BUNDLE(HTTP) in CSDGROUP(EXAMPLES) has been removed in system(IYK3ZMC4).
03:03:36.889294 :   DFHRL2037I UNDEPLOY command successful.
03:03:36.892302 :
03:03:36.892326 :
03:03:36.892337 :   DEPLOY BUNDLE(HTTP)
03:03:36.892346 :      BUNDLEDIR(/u/cockerm/devops/target/dev/deploy/bundles/
03:03:36.892355 :         com.ibm.cics.server.demo.http.bundle_1.0.0)
03:03:36.892363 :      SCOPE(IYK3ZMC4) CSDGROUP(EXAMPLES) STATE(ENABLED);
03:03:36.896964 :   DFHRL2132I Analyzing CICS regions and CSD attributes.
03:03:40.958666 :   DFHRL2051I Creating BUNDLE definition on the CSD in system(IYK3ZMC4).
03:03:42.113611 :   DFHRL2052I Installing BUNDLE definition.
03:03:43.121306 :   DFHRL2131I Waiting for BUNDLE(HTTP) to be installed in ac
03:03:45.137800 :   DFHRL2130I BUNDLE(HTTP) installed in 1 of 1 regions in S
03:03:45.137887 :   DFHRL2054I Setting BUNDLE state to ENABLED.
03:03:47.163420 :   DFHRL2012I DEPLOY command completed successfully.
03:03:47.168058 :
03:03:47.168104 :   DFHRL2007I Processing complete.
03:03:47.175606 :   DFHRL2014I Disconnecting from CICSPLEX(COCKERP).

!! END OF SYSTSPRT SPOOL FILE !!
```

Undeploy results in the bundle being disabled, discarded, and deleted

Deploy results in the bundle being defined, installed, and enabled

DFHDPLOY

DEPLOY APPLICATION

Define a CICS application

Then change state to DISABLED, ENABLED, or AVAILABLE

SET APPLICATION

Change state to AVAILABLE, UNAVAILABLE, ENABLED, or DISABLED

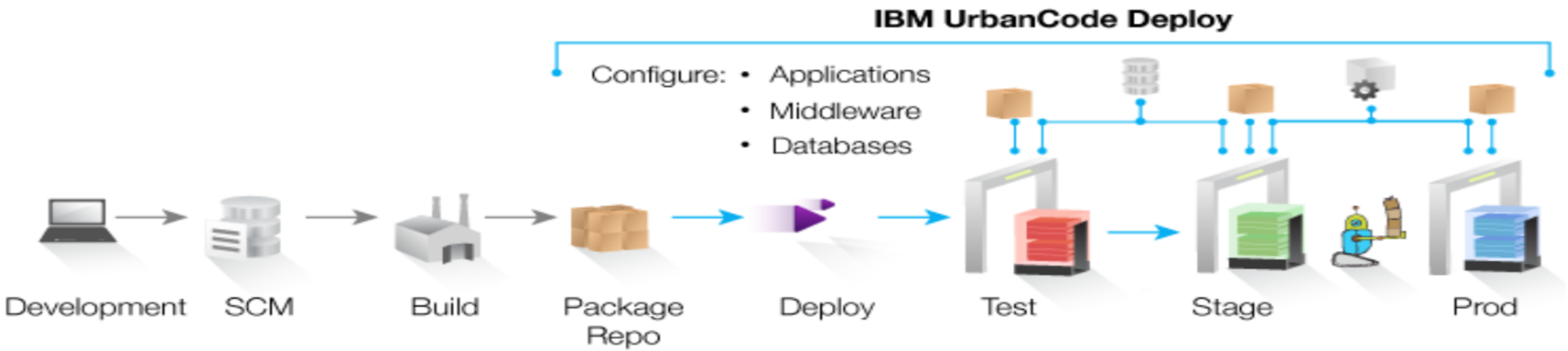
Waits for application workload to complete after UNAVAILABLE

UNDEPLOY APPLICATION

Change state to UNAVAILABLE, DISABLED, or DISCARDED

Waits for application workload to complete after UNAVAILABLE

IBM UrbanCode Deploy



Continuous Delivery

Integrate with build and test tools to automatically deploy, test and promote new builds

Production Deployments

Orchestrate a complex production deployments of applications and configuration

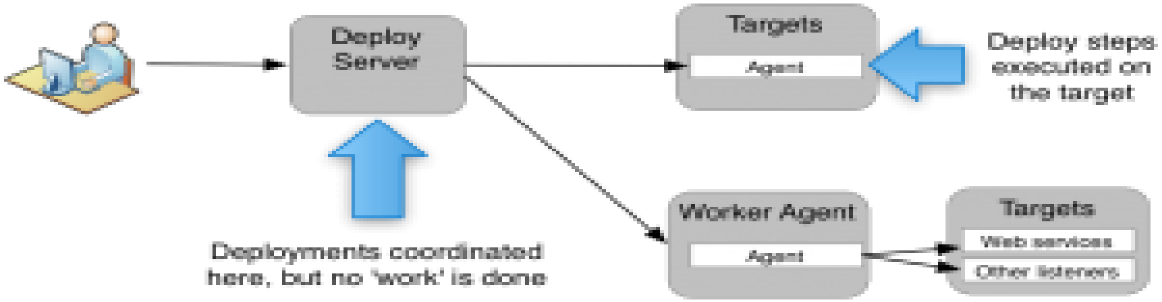
Self-Service

Grant teams rights to “push the go button” for different applications and environments

Incremental Updates

Deploy only the changed components or missing incremental (patch) versions

UrbanCode Deploy – architecture


Deploy Server
Targets
Agent
Deploy steps executed on the target
Deployments coordinated here, but no 'work' is done
Worker Agent
Agent
Targets
Web services
Other listeners

Service Tier: Web UI and command line interfaces

- Workflow engine, security service and more

Data Tier: Configuration for UrbanCode Deploy is stored database

- Flat files, including deployable artifacts and logs, are stored in a storage system known as CodeStation which is typically on network storage

Agents: perform deployment, import new versions

Agent Relays: essentially proxies and agent brokers that consolidate traffic from many agents

IBM UrbanCode Deploy – plug-ins

170 plug-ins from IBM, partners, and the community

RTC, DB2, IMS, WAS, Apache HTTP, Tomcat, Git…

… file systems, repositories, build systems, SCMs, web, SDKs, cloud, email, application servers, databases, registries, messaging, OS tools

zOS Utility

Copy, FTP, deploy, rollback

Submit and wait for jobs

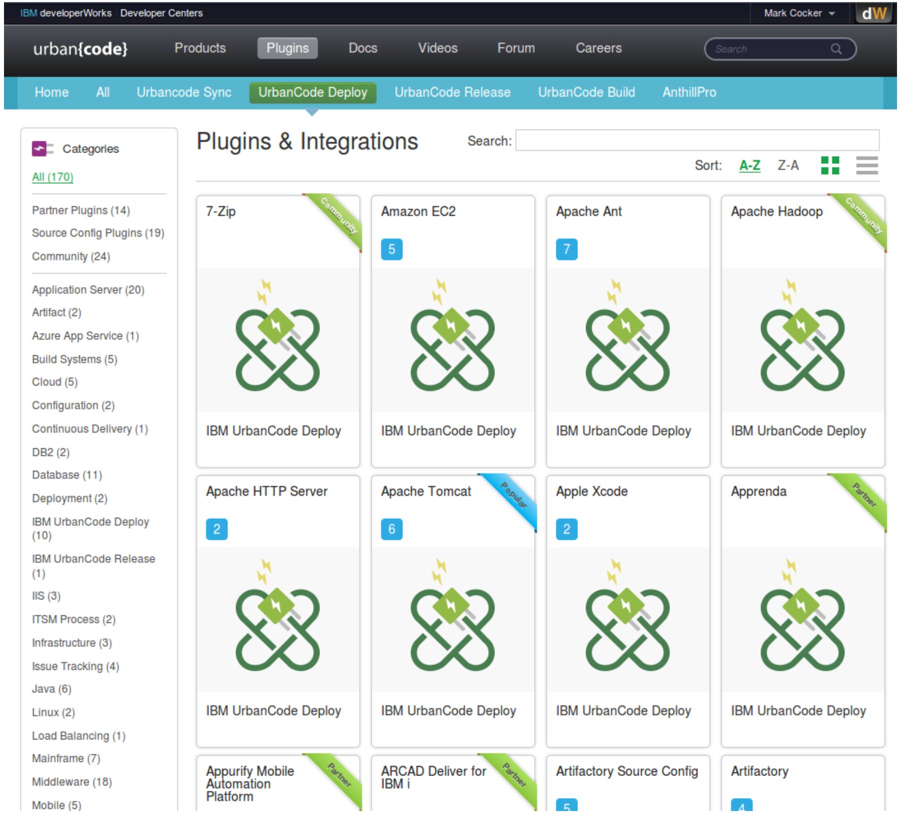
Run TSO, ISPF commands

CICS CM plug-in beta available

Create migration scheme

Ready migration package

Deploy the change package



Categories

All (170)

Partner Plugins (14)
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Plugins & Integrations

Search:

Sort: A-Z Z-A

7-Zip — Community — IBM UrbanCode Deploy

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Apple Xcode — 2 — IBM UrbanCode Deploy

Apprenda — Partner — IBM UrbanCode Deploy

Appurify Mobile Automation Platform — Partner

ARCAD Deliver for IBM i — Partner

Artifactory Source Config — 5

Artifactory — 4

CICS TS plug-in

IBM UrbanCode Deploy no-charge trial

- ibm.com/software/products/en/ucdep/

CICS TS plug-in

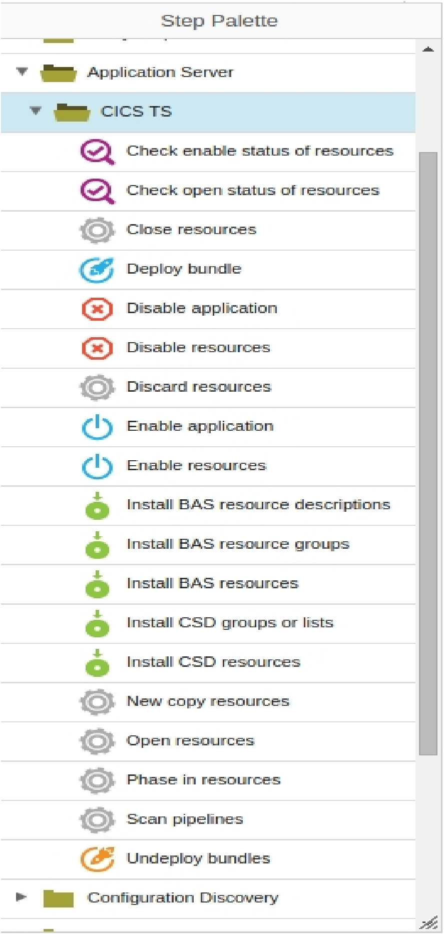
- developer.ibm.com/urbancode/plugins/ibm-urbancode-deploy/
- Install via UCD > Settings > Automation Plugins > Load Plugin
- Connects to CICS region or CPSM WUI via CMCI
- Supports CICS TS V4.1 and above

Scenarios

- Install and life-cycle resources
- Check the enable and open status of resources
- NEWCOPY and PHASEIN programs, scan pipelines

Additional scenarios with latest CICS TS plug-in beta

- Deploy and undeploy applications and bundles



Step Palette

- Application Server
  - CICS TS
    - Check enable status of resources
    - Check open status of resources
    - Close resources
    - Deploy bundle
    - Disable application
    - Disable resources
    - Discard resources
    - Enable application
    - Enable resources
    - Install BAS resource descriptions
    - Install BAS resource groups
    - Install BAS resources
    - Install CSD groups or lists
    - Install CSD resources
    - New copy resources
    - Open resources
    - Phase in resources
    - Scan pipelines
    - Undeploy bundles
- Configuration Discovery

CICS TS plug-in example combining plug-ins

zOS Utility plug-in

Copy Artifacts

- loads the artifacts that make up the z/OS component version

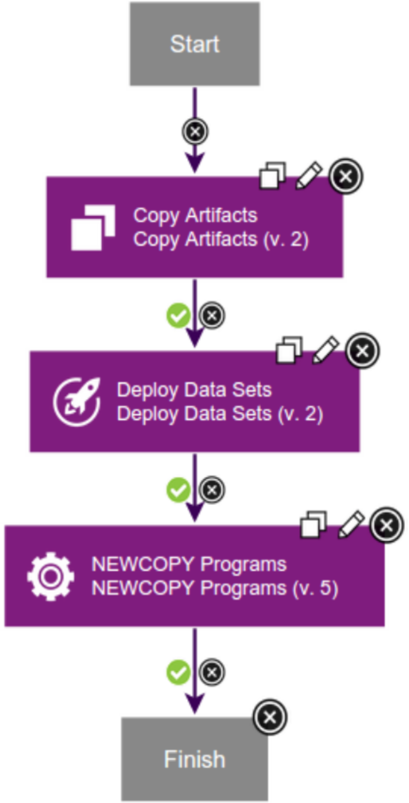
CICS TS plug-in

Deploy Data Sets

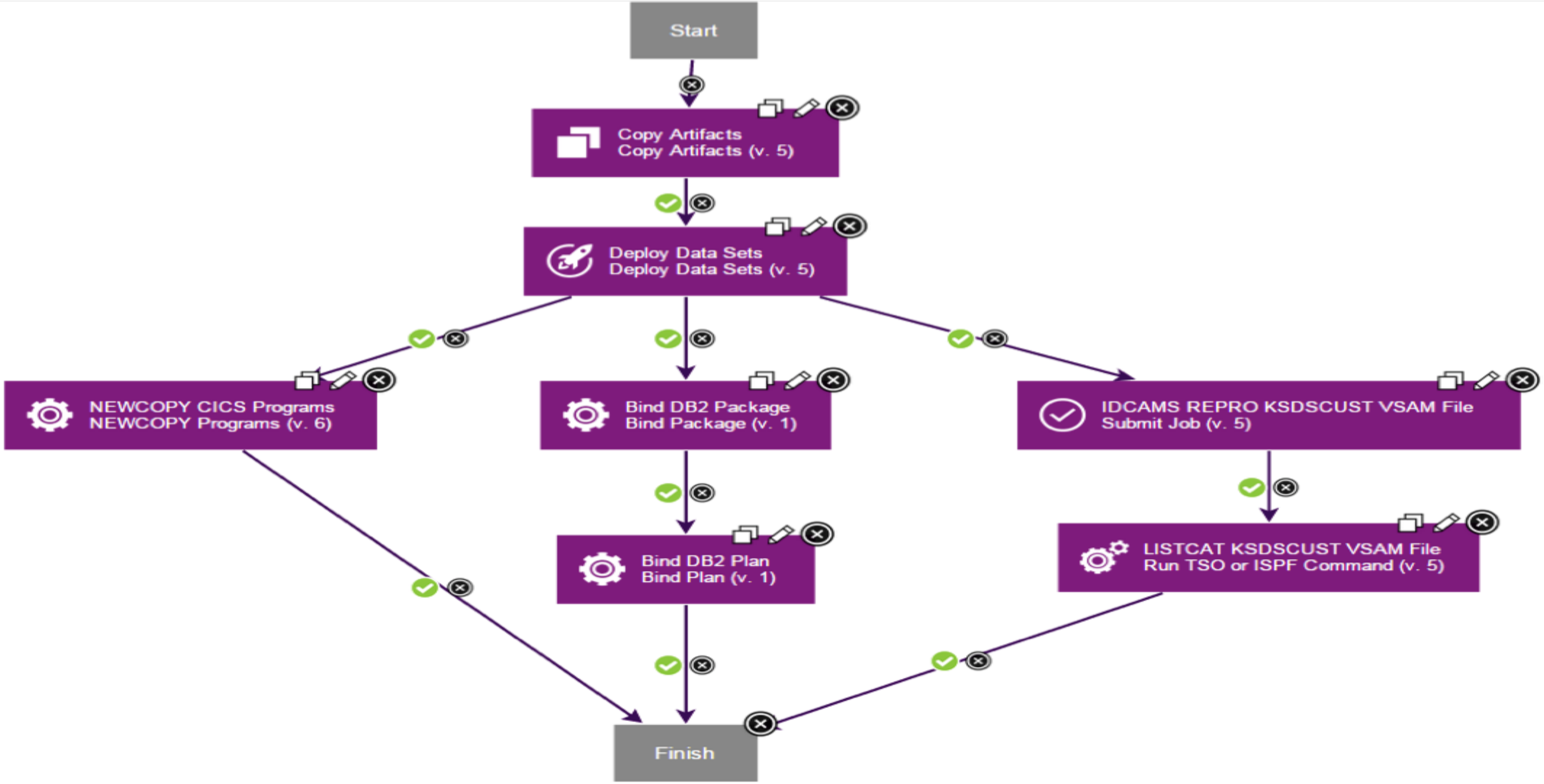
- deploy the component version to z/OS by copy datasets and members

NEWCOPY Programs

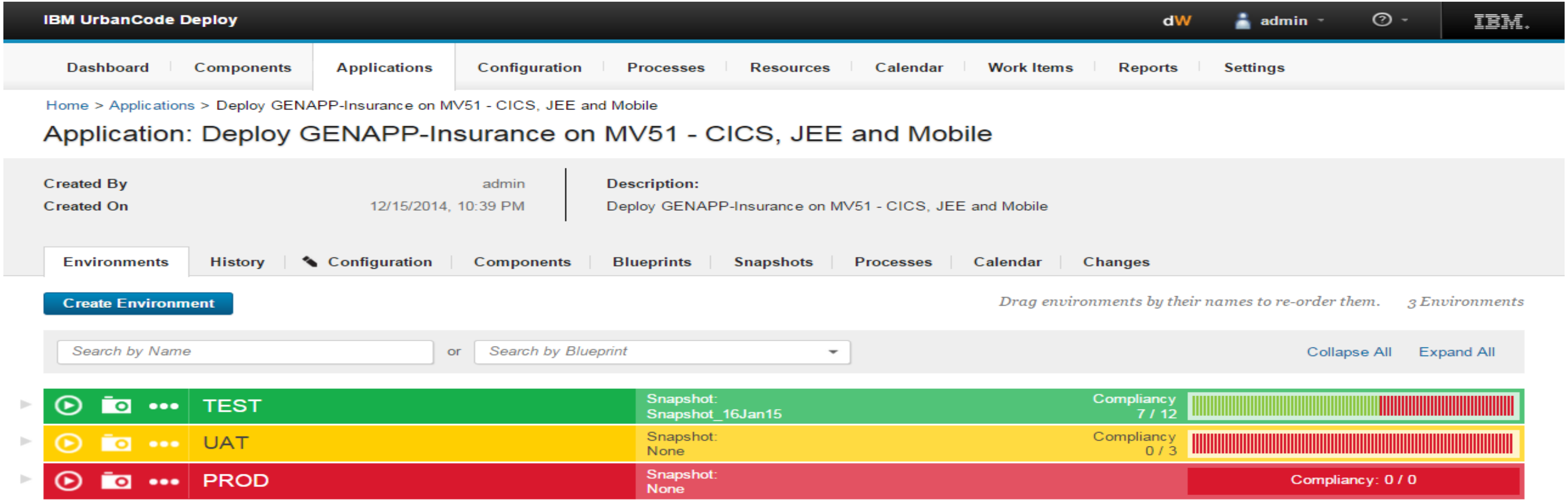
- performs a NEWCOPY for the changed members



CICS, DB2 and VSAM steps performed in parallel



Deploy the same application to different environments



Home > Applications > Deploy GENAPP-Insurance on MV51 - CICS, JEE and Mobile

Application: Deploy GENAPP-Insurance on MV51 - CICS, JEE and Mobile

Created By	admin
Created On	12/15/2014, 10:39 PM

Description:
Deploy GENAPP-Insurance on MV51 - CICS, JEE and Mobile

Drag environments by their names to re-order them. *3 Environments*

TEST	Snapshot: Snapshot_16Jan15	Compliancy 7 / 12
UAT	Snapshot: None	Compliancy 0 / 3
PROD	Snapshot: None	Compliancy: 0 / 0

DevOps scenario examples

COBOL	A traditional CICS application in COBOL, using its existing tools and build infrastructure, forms part of a coordinated deployment with other artefacts using UrbanCode Deploy.
COBOL + Policy	A traditional CICS application in COBOL, managed by policies deployed in a CICS bundle, is deployed using UrbanCode Deploy.
COBOL + OSGi	An application, mainly composed of COBOL but with modules that have been converted to OSGi, is deployed using UrbanCode Deploy.
Liberty Profile	A Java EE application with a web browser interface is deployed in a CICS bundle and using UrbanCode Deploy.
CICS cloud application	A CICS cloud-style application is built automatically and deployed using z/OS automation without loss of service.

DEMO

Deploy a web application into a Liberty JVM server in CICS.

DevOps

Applications and bundles provide a convenient way to package and manage components, resources, and dependencies in CICS

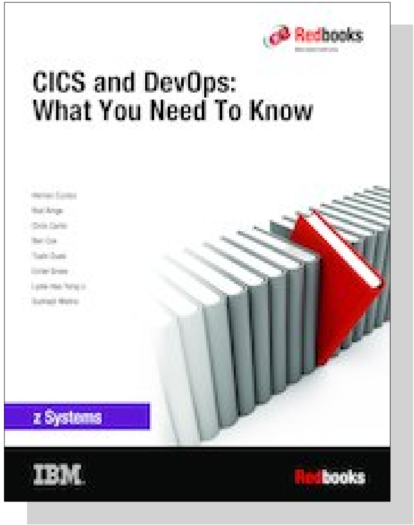
New tools to automate the reliable and repeatable deployment of CICS applications

CICS Build Toolkit

- Builds CICS cloud applications and bundles
- Resolves variables to deploy to different target environments
- Call from your build scripts as part of your continuous integration and deployments
- Works with CICS TS V4.1 and above

DFHDPLOY

- JCL utility to deploy and undeploy CICS bundles and cloud applications
- Script the deployment in a single step, without the complexity of polling



Redbooks

CICS and DevOps:
What You Need To Know

z Systems

IBM

Redbooks

CICS plug-in for UrbanCode Deploy

- Extends IBM UrbanCode Deploy to deploy and undeploy CICS applications, in coordination with other application and database components in a single action

New IBM Redbook - CICS and DevOps: What You Need to Know

Thank you!!