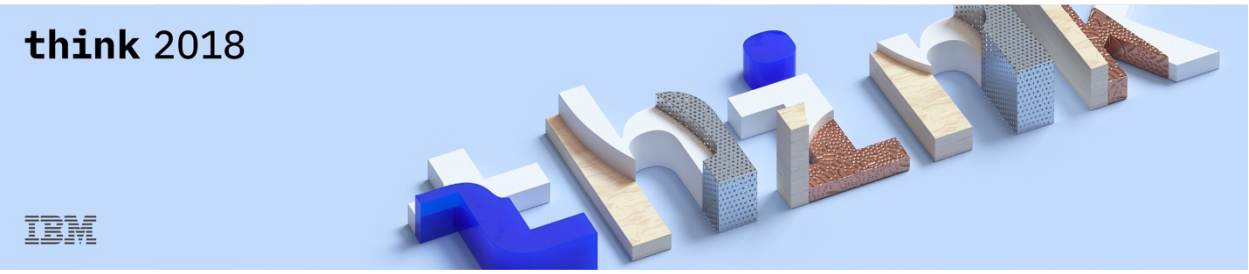


Lab Center – Hands-on Lab

Session: Scheduled Lab 2500 / Open Lab 9060

Session Title: Deploy an application to IBM Cloud and IBM Cloud Private using Kubernetes and IBM UrbanCode Deploy

Hollis Chui, IBM, hollisc@ca.ibm.com

Steven M Cotugno, IBM, steve.cotugno@us.ibm.com

Table of Contents

Disclaimer

IBM's statements regarding its plans, directions, and intent are subject to change or withdrawal without notice at IBM's sole discretion. Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision.

The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code or functionality. Information about potential future products may not be incorporated into any contract.

The development, release, and timing of any future features or functionality described for our products remains at our sole discretion I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results like those stated here.

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 per the terms and conditions of the agreements under which they are provided.

IBM products are manufactured from new parts or new and used parts.
In some cases, a product may not be new and may have been previously installed. Regardless, our warranty terms apply."

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 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 follows any law.

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 about 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 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 and [names of other referenced IBM products and services used in the presentation] 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.

U.S. Government Users Restricted Rights — use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM.

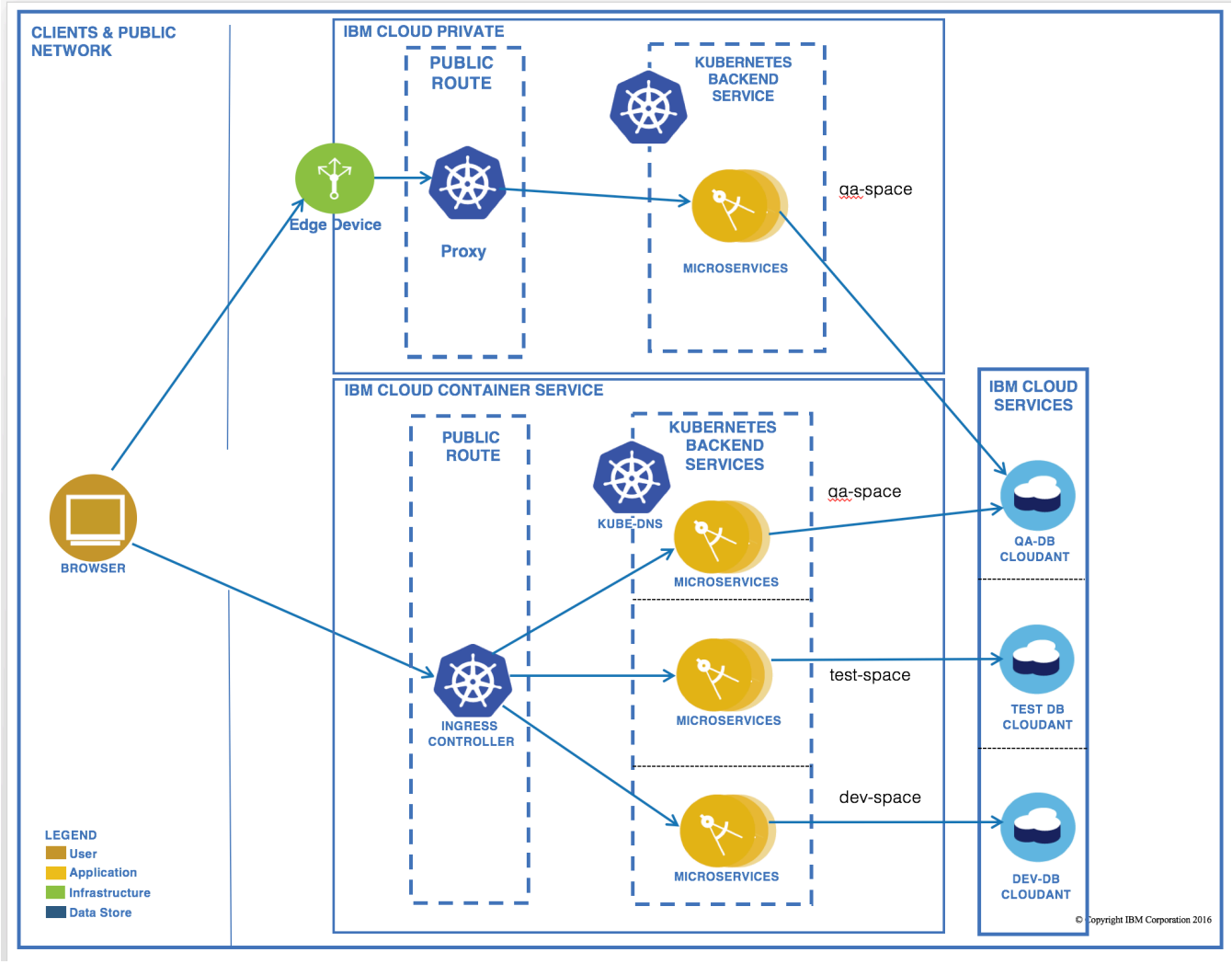
Introduction

The purpose of this lab is to walk through a multi-Cloud deployment solution using IBM UrbanCode Deploy. The lab will go over the architecture, configuration and running of the continuous integration and continuous deployment pipeline.

Business Scenario

Businesses recognize that applications being deployed to multiple Cloud platforms will be common place and a solution that can address complex deployment workflows is required. The DevOps solution covered by this lab provides a solution for deploying containerized applications on Kubernetes on both IBM Cloud Container Service and IBM Cloud Private.

Application Environment Architecture



Objectives

The objective of the lab is to run through the end to end workflow of the multi-Cloud deployment solution. The continuous integration and continuous deployment process will build a Docker image based on the latest code in GitHub, push the image into the Container Registry and IBM UrbanCode Deploy will deploy the container into Kubernetes clusters representing the different environments.

For this specific lab, the tool stack consists of:

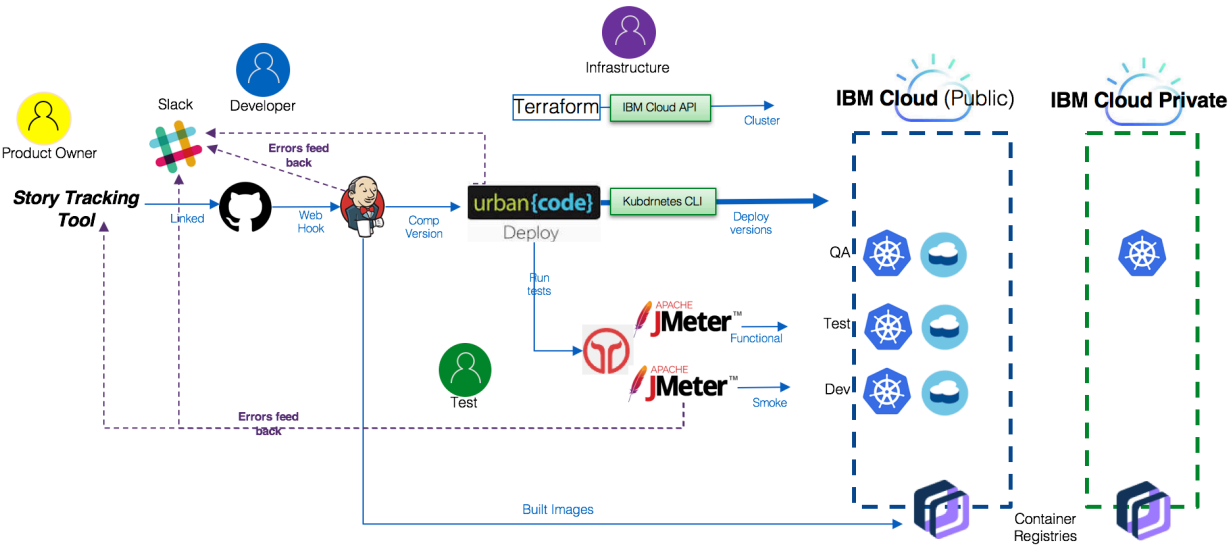
- GitHub Enterprise is the SCM system
- Jenkins is the build tool
- IBM UrbanCode Deploy is the deployment tool

The deployment process in IBM UrbanCode Deploy will perform the following:

- Deploy application container into the IBM Container Service Kubernetes cluster under the DEV namespace
- Placeholder to run smoke tests for target application
- Deploy application container into the IBM Container Service Kubernetes cluster under the TEST namespace
- Placeholder to run functional tests for target application

For the QA deployment, the application container will be deployed into the IBM Container Service Kubernetes cluster under the QA namespace as well as into IBM Cloud Private. This is a manual deploy but it can be easily automated as part of the pipeline process. This lab is meant to provide a framework to perform multiple Cloud platforms running on Kubernetes.

DevOps Architecture



Lab Overview

What is Already Completed

The lab will be run on two VMs hosted in Skytap. Below are user / password for the accounts used to access the pre-installed software.

IBM Cloud Private VM: Boot / Master Node (10.0.0.1):

- **Accounts:**
  - VM: skytap / A1rb0rn3
  - IBM Cloud Private: admin / admin

- **Installed Software:**
  - IBM Cloud Private 2.1.0.1

IBM UrbanCode Deploy VM: DevOps (10.0.0.2):

- **Accounts:**
  - VM: devops / devops
  - Jenkins: admin / admin
  - IBM UrbanCode Deploy: admin /admin

- **Installed Software:**
  - IBM UrbanCode Deploy 6.2.2 + local agent
  - Jenkins 2.19

Lab Exercises

To achieve the objectives of this lab, the following exercises must be completed:

Lab 0: Create IBM Cloud and GitHub accounts

Lab 0.1: Create IBM Cloud trial account

1. If you already have an active IBM Cloud account, skip this task.
2. Open a web browser and go to https://console.ng.bluemix.net/.
3. Click on the "**Create a free account**" button.
4. Follow the directions to fill out the form and make a note of the password specified. Note, you will need access to the email to confirm the account creation.
5. Click "**Create Account**" and IBM Cloud will send a confirmation email to the account specified.
6. Login into the email account specified and open the email with the subject: **Action Required: Confirm your IBM Cloud account**.
7. Click on the "**Confirm Account**" button.
8. You now have an active IBM Cloud trial account.
9. When specifying the name of your IBM Cloud Org, do not use any special characters.

Lab 0.2: Create GitHub account

1. If you already have a GitHub account, skip this task.
2. Open a web browser and go to https://github.com/.
3. Follow the directions to fill out the form and make a note of the password specified. Note, you will need access to the email to confirm the account creation.
4. Click on the "**Sign up for GitHub**" button and GitHub will send a confirmation email to the account specified.
5. Login into the email account specified and open the email from GitHub with the subject: **Please verify your email address**.
6. Click on the "**Verify email address**" link.
7. You now have an active GitHub account.

Lab 1: Clone Required GitHub Repositories

Lab 1.1: Clone the THINK2018_SL2500_OL9060_MultiCloud_Deployment GitHub Repository

1. Open a terminal window in the DevOps VM and change to the /home/devops directory.
2. Create a directory to store your work using the command "***mkdir <Folder name>***".
3. Change into the directory and clone the lab repository using the command "***git clone https://github.com/hollisc/THINK2018_SL2500_OL9060_MultiCloud_Deployment.git***".

Lab 1.2: Create a nodejs-cloudant-demo GitHub Repository

1. Launch a web browser and go to https://github.com.
2. Click the "Sign in" link and log in using the account created in Lab 0.
3. Click the "Start a project" button.
4. On the Create a new repository page, enter ***nodejs-cloudant-demo*** and click the "Create repository" button.

Lab 1.3: Clone nodejs-cloudant-demo GitHub repository

1. Open a terminal window and change to the /home/devops/<Folder name> directory.
2. Clone the lab repository using the command "***git clone https://github.com/hollisc/nodejs-cloudant-demo.git***".

Lab 1.4: Push clone content into your GitHub repository

1. From the terminal window, change into the clone repository directory /home/devops/<Folder name>/nodejs-cloudant-demo.
2. Push the contents into the GitHub repository created in Lab 2.1 by running the command: "***git push --mirror*** https://github.com/<GitHub_Username>/nodejs-cloudant-demo.git".
3. Enter your GitHub username and password.

```
devops@devops:~/Documents/Hollis/nodejs-cloudant-demo$ git push --mirror https://github.com/hollis-c
hui/nodejs-cloudant-demo.git
Username for 'https://github.com': hollis-chui
Password for 'https://hollis-chui@github.com':
Counting objects: 300, done.
Delta compression using up to 4 threads.
Compressing objects: 100% (140/140), done.
Writing objects: 100% (300/300), 279.39 KiB | 0 bytes/s, done.
Total 300 (delta 145), reused 300 (delta 145)
remote: Resolving deltas: 100% (145/145), done.
To https://github.com/hollis-chui/nodejs-cloudant-demo.git
 * [new branch]      master -> master
 * [new branch]      origin/HEAD -> origin/HEAD
 * [new branch]      origin/master -> origin/master
```

Lab 1.5: Delete the clone repository directory

1. From the terminal window, change to the /home/devops/<Folder name> directory.
2. Remove the directory by running the command '***rm -rf nodejs-cloudant-demo***'.

```
devops@devops:~/Documents/Hollis$
devops@devops:~/Documents/Hollis$ rm -rf nodejs-cloudant-demo/
devops@devops:~/Documents/Hollis$
```

Lab 1.6: Clone your GitHub repository as a local workspace

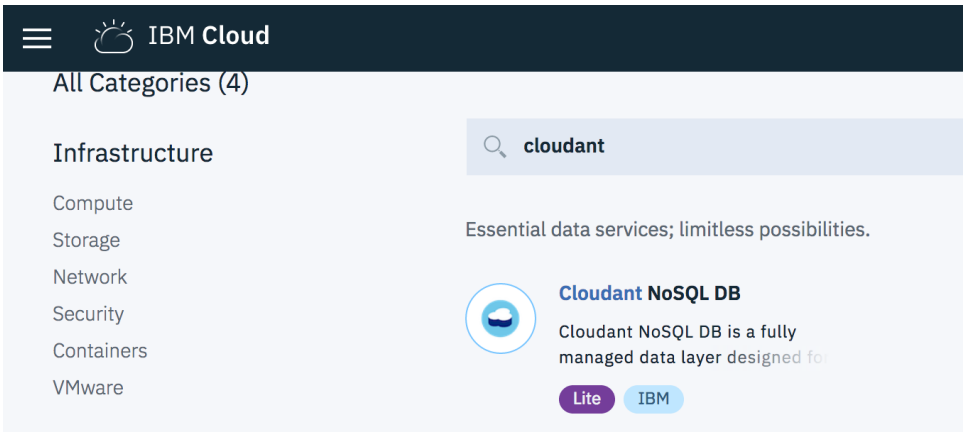
1. From the terminal window, change to the /home/devops/<Folder name> directory.

2. Clone your GitHub repository using the command "***git clone*** https://github.com/<GitHub_Username>/nodejs-cloudant-demo.git".

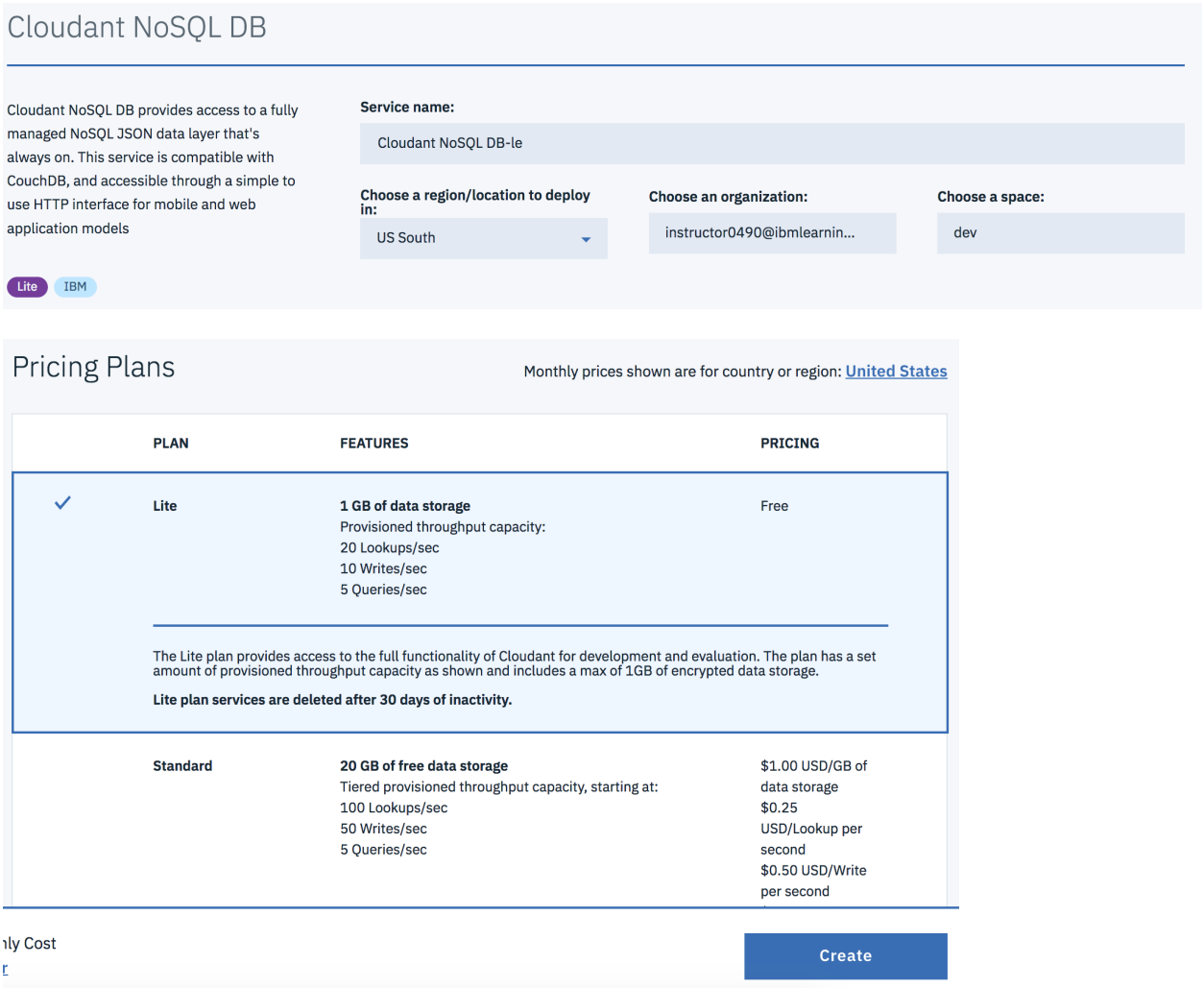
```
devops@devops:~/Documents/Hollis$ git clone https://github.com/hollis-chui/nodejs-cloudant-demo.git
Cloning into 'nodejs-cloudant-demo'...
remote: Counting objects: 300, done.
remote: Compressing objects: 100% (140/140), done.
remote: Total 300 (delta 145), reused 300 (delta 145), pack-reused 0
Receiving objects: 100% (300/300), 279.39 KiB | 0 bytes/s, done.
Resolving deltas: 100% (145/145), done.
Checking connectivity... done.
```

Lab 2: Provision an instance of Cloudant and create a Service Credential

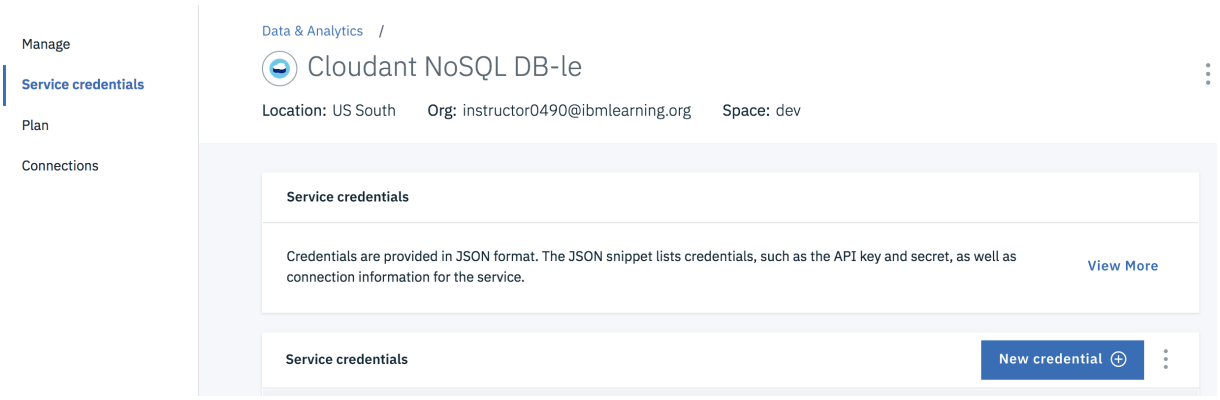
1. From the IBM Cloud dashboard, click on Catalog and search for the Cloudant NoSQL DB tile.



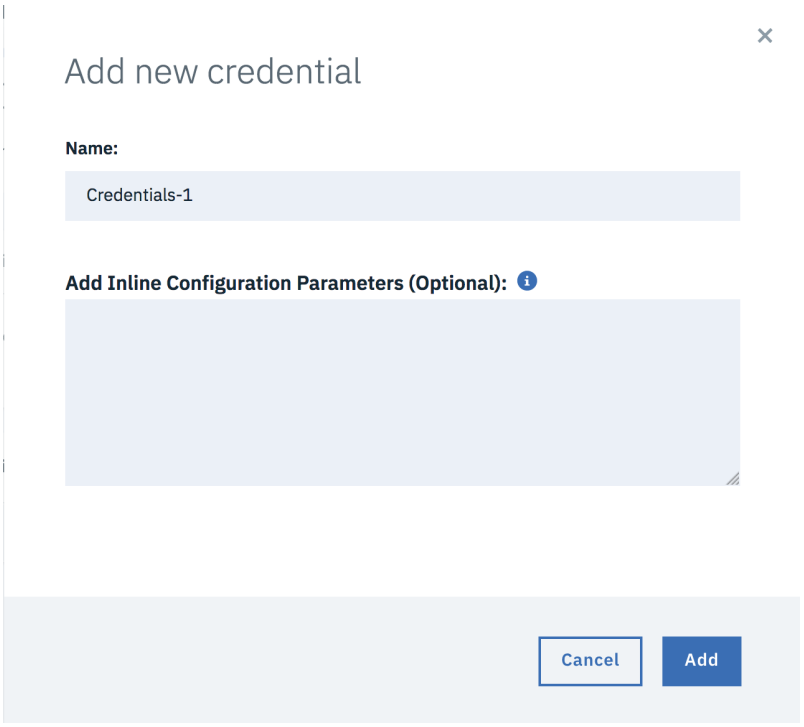
2. Use the default options, select the Lite pricing plan and click Create.



3. On the browser, select “Service credentials” and click “New credential”.



4. Use the default name and click Add.



5. Copy the json of the generated Cloudant service credential and paste the contents into the <path to THINK2018_SL2500_OL9060>/Cloudant_Credentials/binding file.

KEY NAME	DATE CREATED	ACTIONS
Credentials-1	Mar 16, 2018 - 04:09:09	View credentials ▲


```
-
  "username": "dcc57faf-4ef0-4fba-88ca-9ef80a9126cf-bluemix",
  "password": "e3035cd0cc8f7dadfe0d217baf3bfad65baf23daea57669dd8f8f8b132dae36f",
  "host": "dcc57faf-4ef0-4fba-88ca-9ef80a9126cf-bluemix.cloudant.com",
  "port": 443,
  "url": "https://dcc57faf-4ef0-4fba-88ca-9ef80a9126cf-bluemix:e3035cd0cc8f7dadfe0
d217baf3bfad65baf23daea57669dd8f8f8b132dae36f@dcc57faf-4ef0-4fba-88ca-9ef80a9126cf
-bluemix.cloudant.com"
}
```

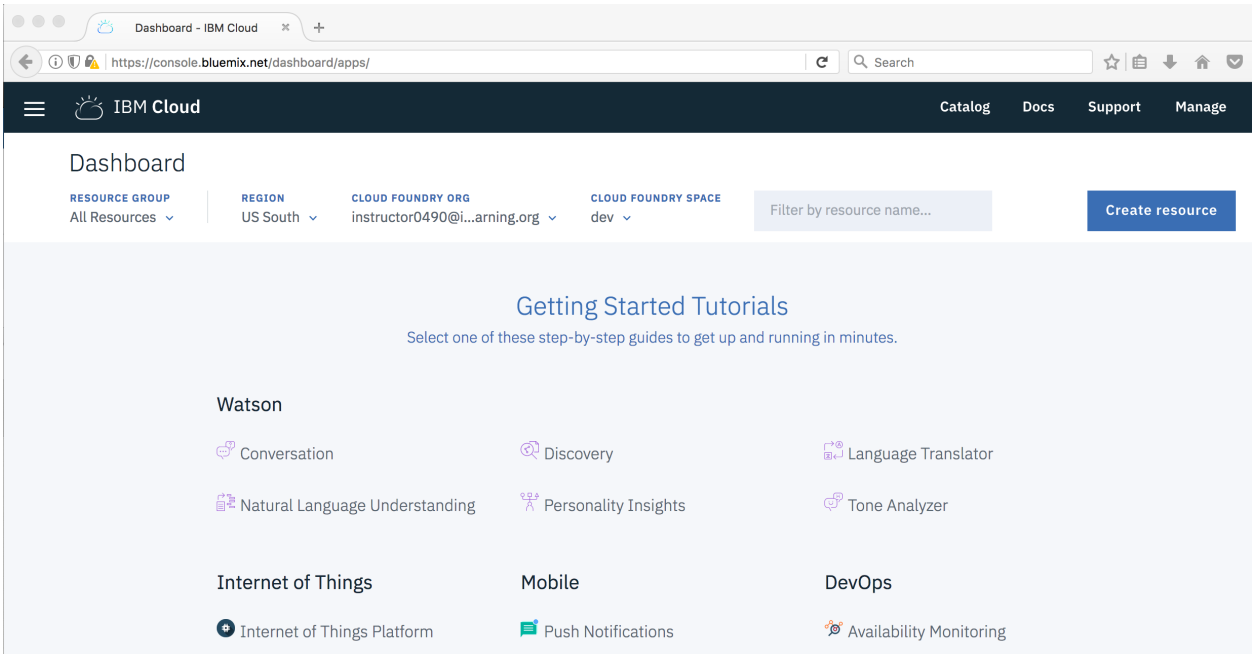


```
devops@devops:~/Lab2500/THINK2018_SL2500_OL9060_MultiCloud_Deployment/Cloudant_Credentials$ cat binding
{
  "username": "dcc57faf-4ef0-4fba-88ca-9ef80a9126cf-bluemix",
  "password": "e3035cd0cc8f7dadfe0d217baf3bfad65baf23daea57669dd8f8f8b132dae36f",
  "host": "dcc57faf-4ef0-4fba-88ca-9ef80a9126cf-bluemix.cloudant.com",
  "port": 443,
  "url": "https://dcc57faf-4ef0-4fba-88ca-9ef80a9126cf-bluemix:e3035cd0cc8f7dadfe0d217baf3bfad65baf23daea57669dd8f8
f8b132dae36f@dcc57faf-4ef0-4fba-88ca-9ef80a9126cf-bluemix.cloudant.com"
}
```

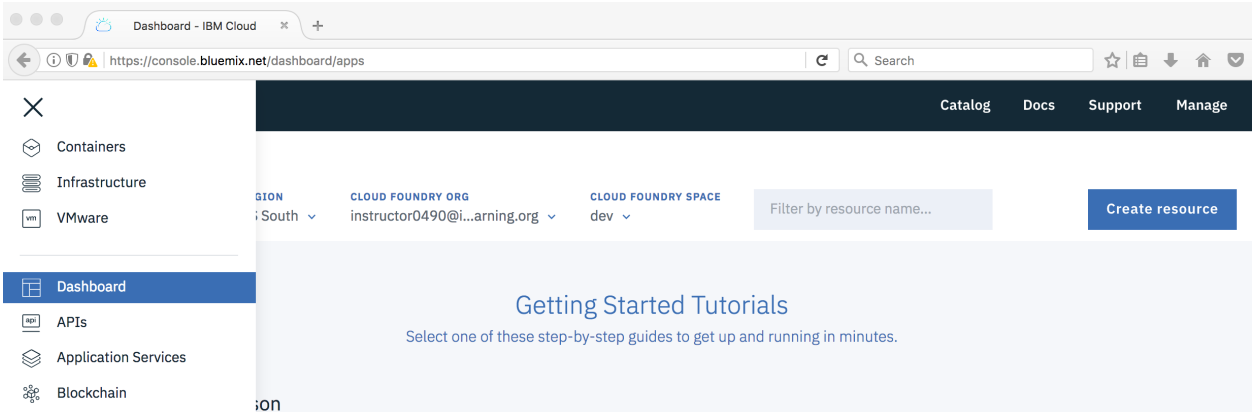
Lab 3: Create and configure a Kubernetes cluster in IBM Cloud

Lab 3.1: Create a Kubernetes cluster in IBM Cloud

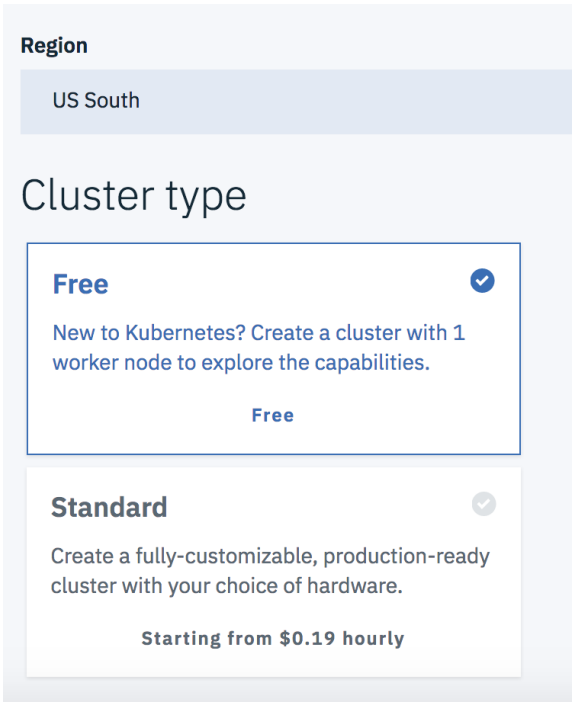
1. Open a web browser and log in to IBM Cloud (https://console.ng.bluemix.net/) using your account. This will bring you to the IBM Cloud Dashboard.

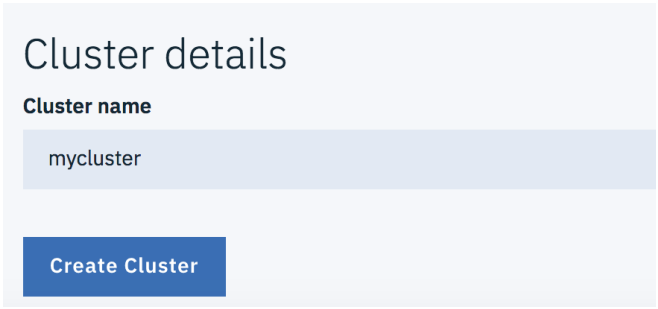


2. From the dashboard, click on the hamburger menu on the top left and select Containers.

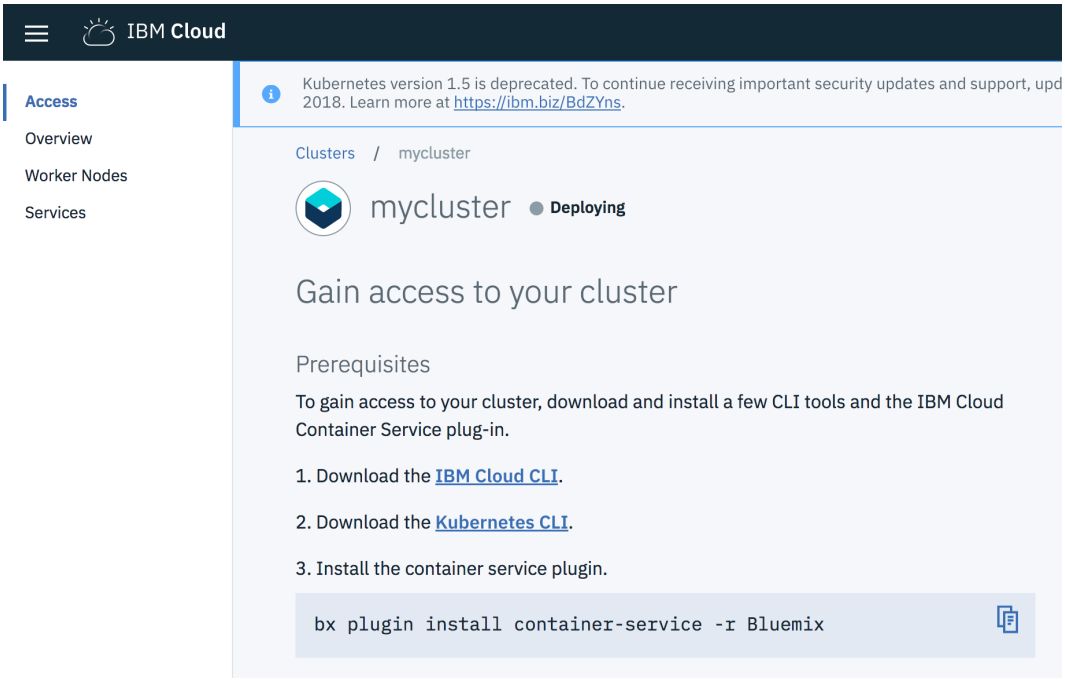


3. Select “Cluster type = Free” and “Cluster name = mycluster”.

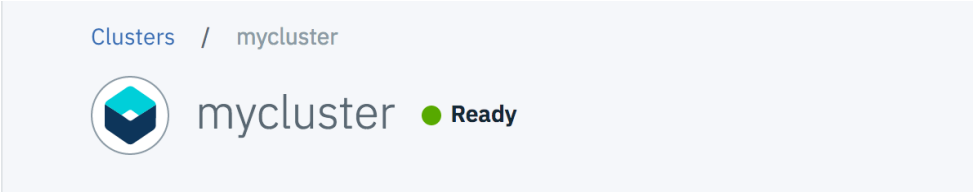




4. Click Create Cluster.

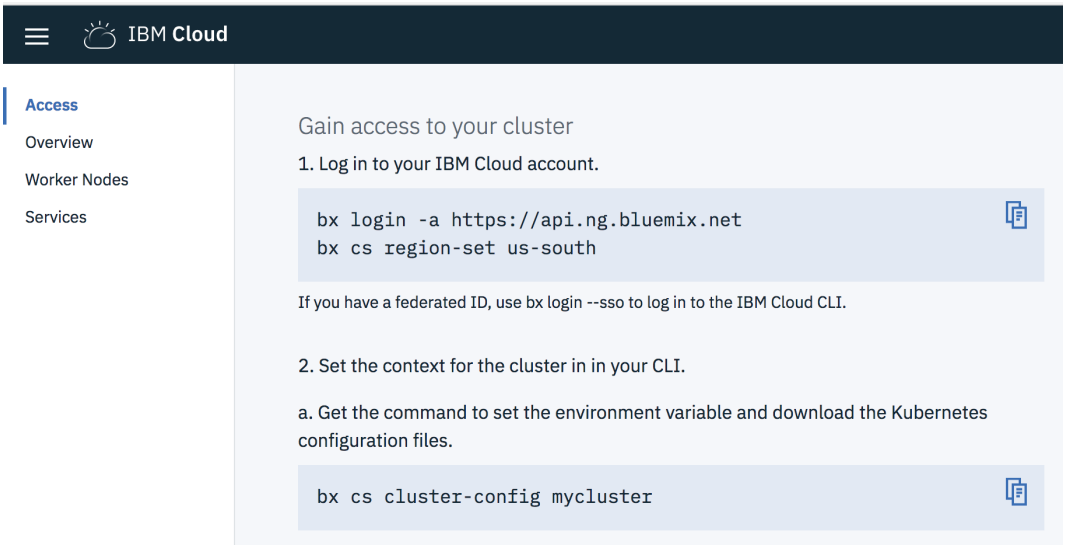


5. The cluster will take ~ 25 minutes to provision and the cluster will have an indicator of “Ready” status when it complete.



Lab 3.2: Configure the Kubernetes cluster in IBM Cloud with a DEV Namespace

1. From the browser, select “mycluster” on the IBM Cloud Clusters Overview page and select “Access” on the left menu.



2. Open a terminal window and run as the root user via “sudo bash”. Follow the instructions under the “Gain access to your cluster” section using a terminal window to access the Kubernetes cluster.

3. Create a DEV namespace in the cluster using the command.

   kubectl create -f dev_namespace.yml

```
root@devops:~/Lab2500/THINK2018_SL2500_OL9060_MultiCloud_Deployment/Kubernetes_YAML# kubectl create -f dev_namespac
e.yml
namespace "dev-space" created
```

4. Create a pull image secret for the DEV namespace.

   kubectl get secret bluemix-default-secret -o yaml | sed 's/default/dev-space/g' | kubectl -n dev-space create -f -

```
root@devops:~/Lab2500/THINK2018_SL2500_OL9060_MultiCloud_Deployment/Kubernetes_YAML# kubectl get secret bluemix-def
ault-secret -o yaml | sed 's/default/dev-space/g' | kubectl -n dev-space create -f -
secret "bluemix-dev-space-secret" created
```

5. Patch the existing service account with the pull image secret for the DEV namespace.

   kubectl patch serviceaccount default -p '{"imagePullSecrets": [{"name": "bluemix-dev-space-secret"}]}' --namespace=dev-space

```
root@devops:~/Lab2500/THINK2018_SL2500_OL9060_MultiCloud_Deployment/Kubernetes_YAML# kubectl patch serviceaccount d
efault -p '{"imagePullSecrets": [{"name": "bluemix-dev-space-secret"}]}' --namespace=dev-space
serviceaccount "default" patched
```

6. Create a Kubernetes Secret to store the Cloudant credentials.

   kubectl create secret generic binding-rates-cloudant-cred1 --from-file=./binding --namespace=dev-space

```
root@devops:~/Lab2500/THINK2018_SL2500_OL9060_MultiCloud_Deployment/Cloudant_Credentials# kubectl create secret gen
eric binding-rates-cloudant-cred1 --from-file=./binding --namespace=dev-space
secret "binding-rates-cloudant-cred1" created
```

Lab 3.3: Configure the Kubernetes cluster in IBM Cloud with a TEST Namespace

1. Create a TEST namespace in the cluster using the command.

   kubectl create -f test_namespace.yml

```
root@devops:~/Lab2500/THINK2018_SL2500_OL9060_MultiCloud_Deployment/Kubernetes_YAML# kubectl create -f test_namespa
ce.yml
namespace "test-space" created
```

2. Create a pull image secret for the TEST namespace.

   kubectl get secret bluemix-default-secret -o yaml | sed 's/default/test-space/g' | kubectl -n test-space create -f -

```
root@devops:~/Lab2500/THINK2018_SL2500_OL9060_MultiCloud_Deployment/Kubernetes_YAML# kubectl get secret bluemix-def
ault-secret -o yaml | sed 's/default/test-space/g' | kubectl -n test-space create -f -
secret "bluemix-test-space-secret" created
```

3. Patch the existing service account with the pull image secret for the TEST namespace.

   kubectl patch serviceaccount default -p '{"imagePullSecrets": [{"name": "bluemix-test-space-secret"}]}' --namespace=test-space

```
root@devops:~/Lab2500/THINK2018_SL2500_OL9060_MultiCloud_Deployment/Kubernetes_YAML# kubectl patch serviceaccount d
efault -p '{"imagePullSecrets": [{"name": "bluemix-test-space-secret"}]}' --namespace=test-space
serviceaccount "default" patched
```

4. Create a Kubernetes Secret to store the Cloudant credentials.

   kubectl create secret generic binding-rates-cloudant-cred1 --from-file=./binding --namespace=test-space

```
root@devops:~/Lab2500/THINK2018_SL2500_OL9060_MultiCloud_Deployment/Cloudant_Credentials# kubectl create secret gen
eric binding-rates-cloudant-cred1 --from-file=./binding --namespace=test-space
secret "binding-rates-cloudant-cred1" created
```

Lab 3.4: Configure the Kubernetes cluster in IBM Cloud with a QA Namespace

1. Create a QA namespace in the cluster using the command.

   kubectl create -f qa_namespace.yml

```
root@devops:~/Lab2500/THINK2018_SL2500_OL9060_MultiCloud_Deployment/Kubernetes_YAML# kubectl create -f qa_namespace
.yml
namespace "qa-space" created
```

2. Create a pull image secret for the QA namespace.

   kubectl get secret bluemix-default-secret -o yaml | sed 's/default/qa-space/g' | kubectl -n qa-space create -f -

```
root@devops:~/Lab2500/THINK2018_SL2500_OL9060_MultiCloud_Deployment/Kubernetes_YAML# kubectl get secret bluemix-def
ault-secret -o yaml | sed 's/default/qa-space/g' | kubectl -n qa-space create -f -
secret "bluemix-qa-space-secret" created
```

3. Patch the existing service account with the pull image secret for the QA namespace.

   kubectl patch serviceaccount default -p '{"imagePullSecrets": [{"name": "bluemix-qa-space-secret"}]}' --namespace=qa-space

```
root@devops:~/Lab2500/THINK2018_SL2500_OL9060_MultiCloud_Deployment/Kubernetes_YAML# kubectl patch serviceaccount d
efault -p '{"imagePullSecrets": [{"name": "bluemix-qa-space-secret"}]}' --namespace=qa-space
serviceaccount "default" patched
```

4. Create a Kubernetes Secret to store the Cloudant credentials.

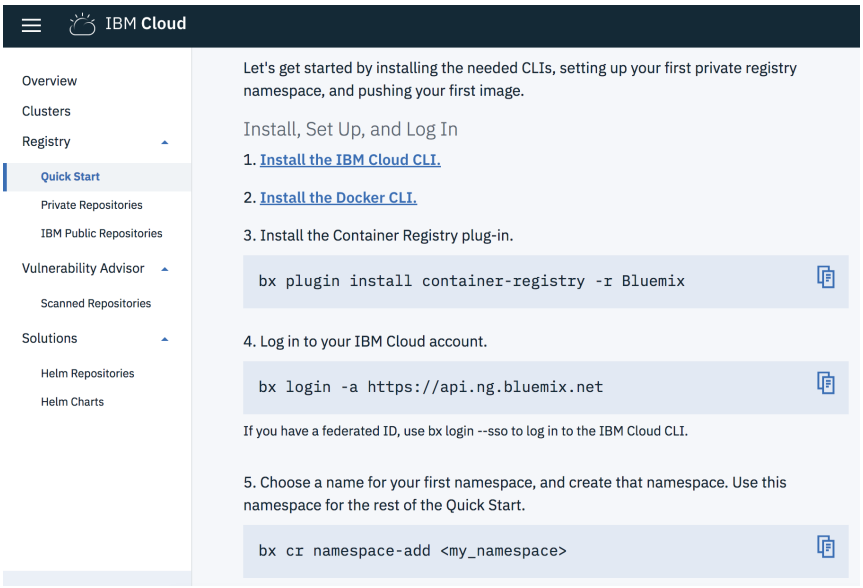
   kubectl create secret generic binding-rates-cloudant-cred1 --from-file=./binding --namespace=qa-space

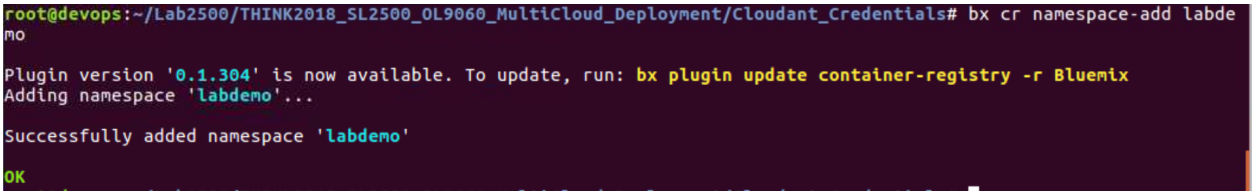
```
root@devops:~/Lab2500/THINK2018_SL2500_OL9060_MultiCloud_Deployment/Cloudant_Credentials# kubectl create secret gen
eric binding-rates-cloudant-cred1 --from-file=./binding --namespace=qa-space
secret "binding-rates-cloudant-cred1" created
```

Lab 4: Create a Registry Namespace, generate an API key and find the IBM Account ID

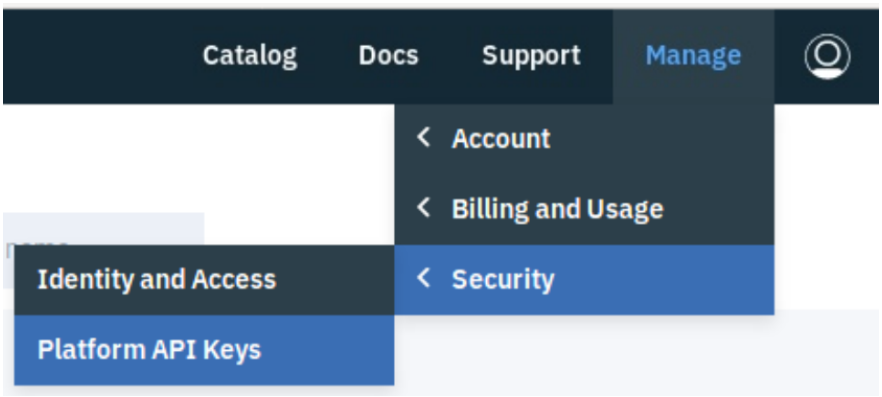
1. From the IBM Cloud dashboard, click on the hamburger menu on the top left and select Containers.
2. Click on Registry > Quick Start (https://console.bluemix.net/containers-kubernetes/registry/start) and follow the instructions to add a custom IBM Container Service Namespace.

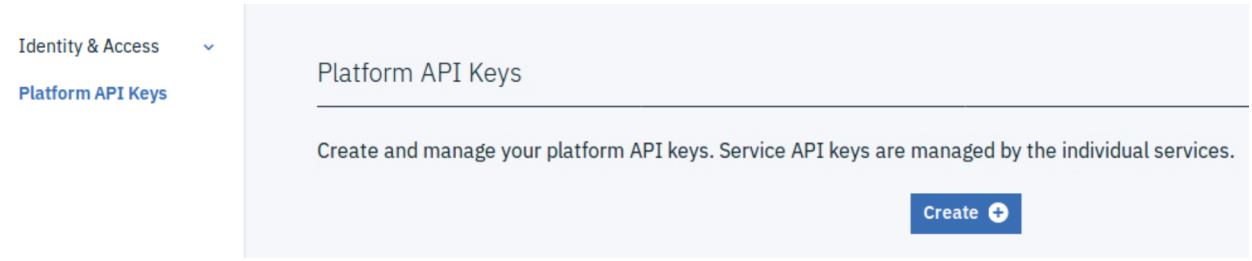
   bx cr namespace-add <IBM Container Service Namespace>



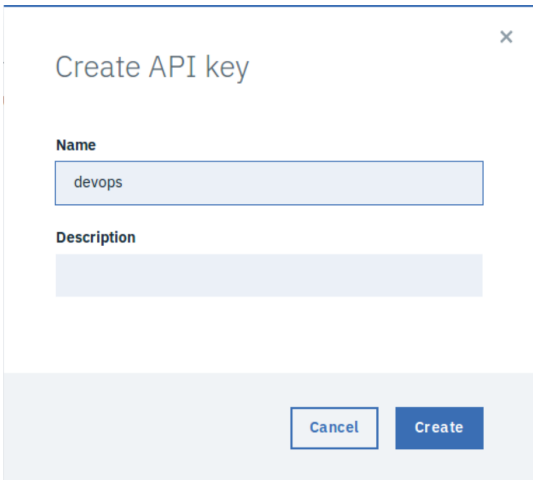


3. On the IBM Cloud dashboard, click Manage > Security > Platform API Keys and click Create.

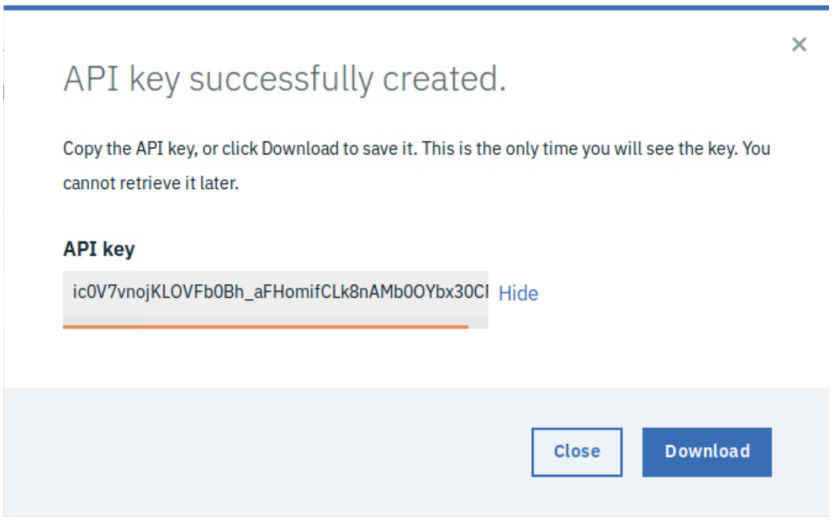




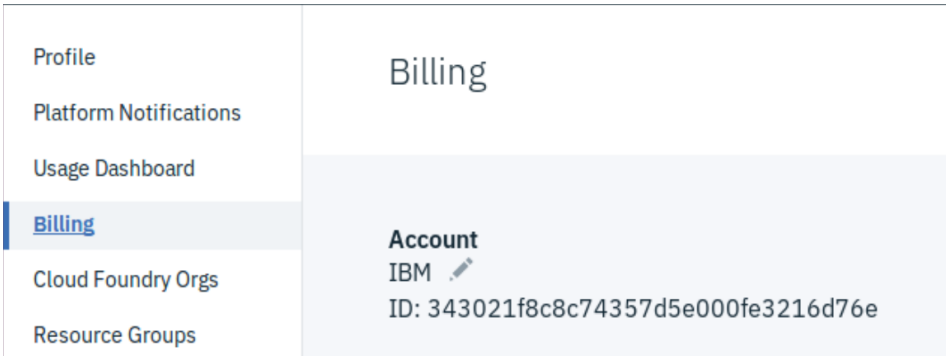
4. Enter a name for the API key and click Create.



5. Click the Show button and download the API Key. This will be needed in Lab 7.



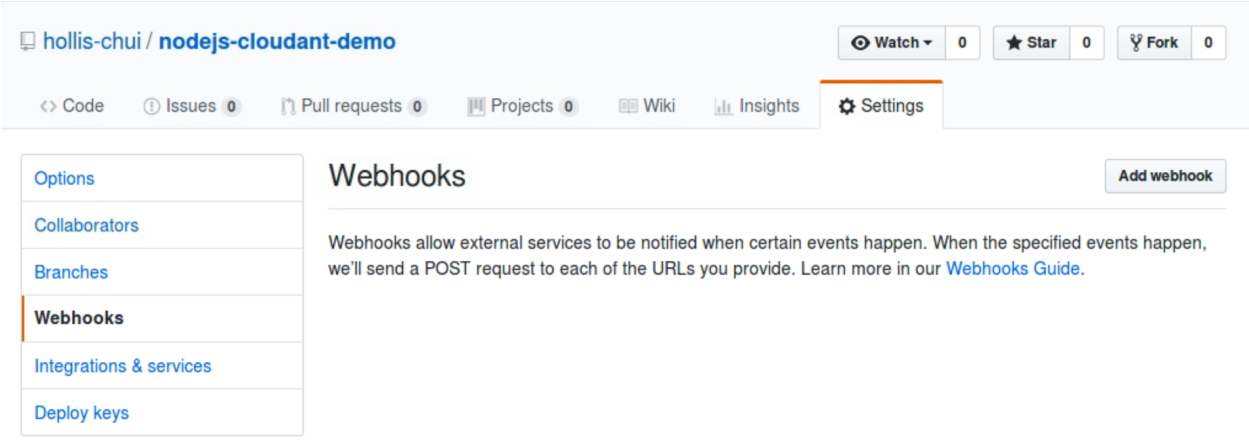
6. On the IBM Cloud dashboard, click Manage > Billing and Usage and select Billing on the left menu. Note down the Account ID as this will be used in Lab 7.


Profile
Platform Notifications
Usage Dashboard
Billing
Cloud Foundry Orgs
Resource Groups
Billing
Account
IBM
ID: 343021f8c8c74357d5e000fe3216d76e

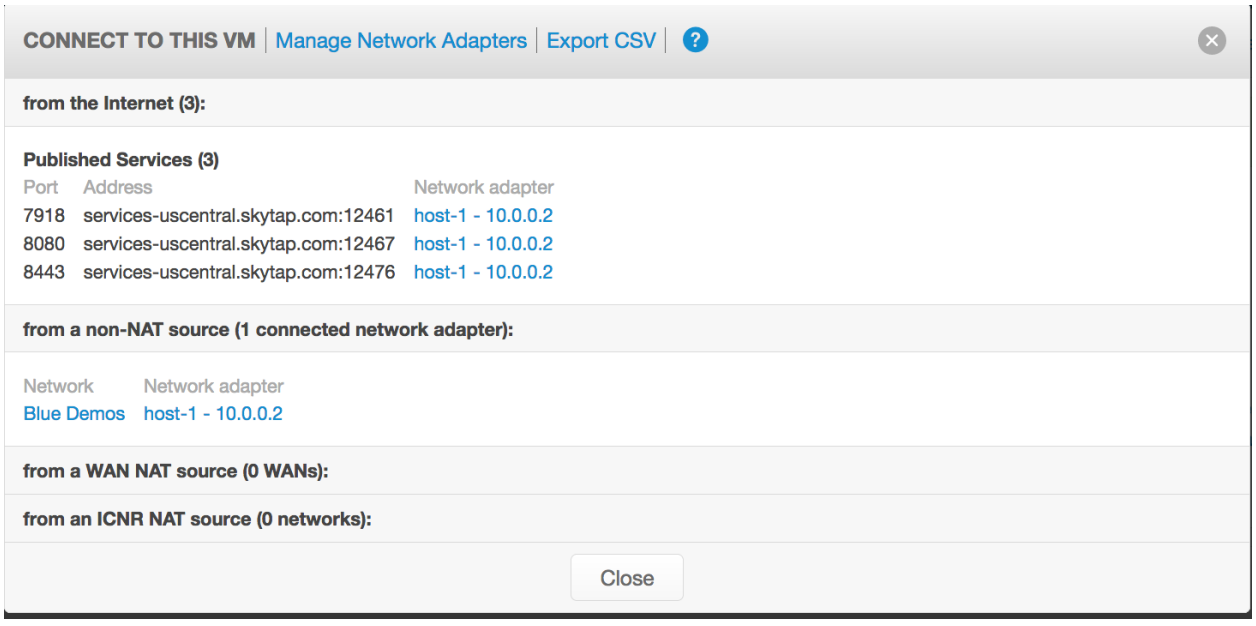
Lab 5: GitHub and Jenkins integration

Lab 5.1: Configure the GitHub and Jenkin integration

1. Launch a web browser and go to https://github.com.
2. Click the "**Sign in**" link and log in using the account created in Lab 0.
3. Click the dropdown menu on the top right corner and select "**Your profile**".
4. Select the Repositories tab and click on the "**nodejs-cloudant-demo**" repository. Select the Settings tab and click on "**Webhooks**".



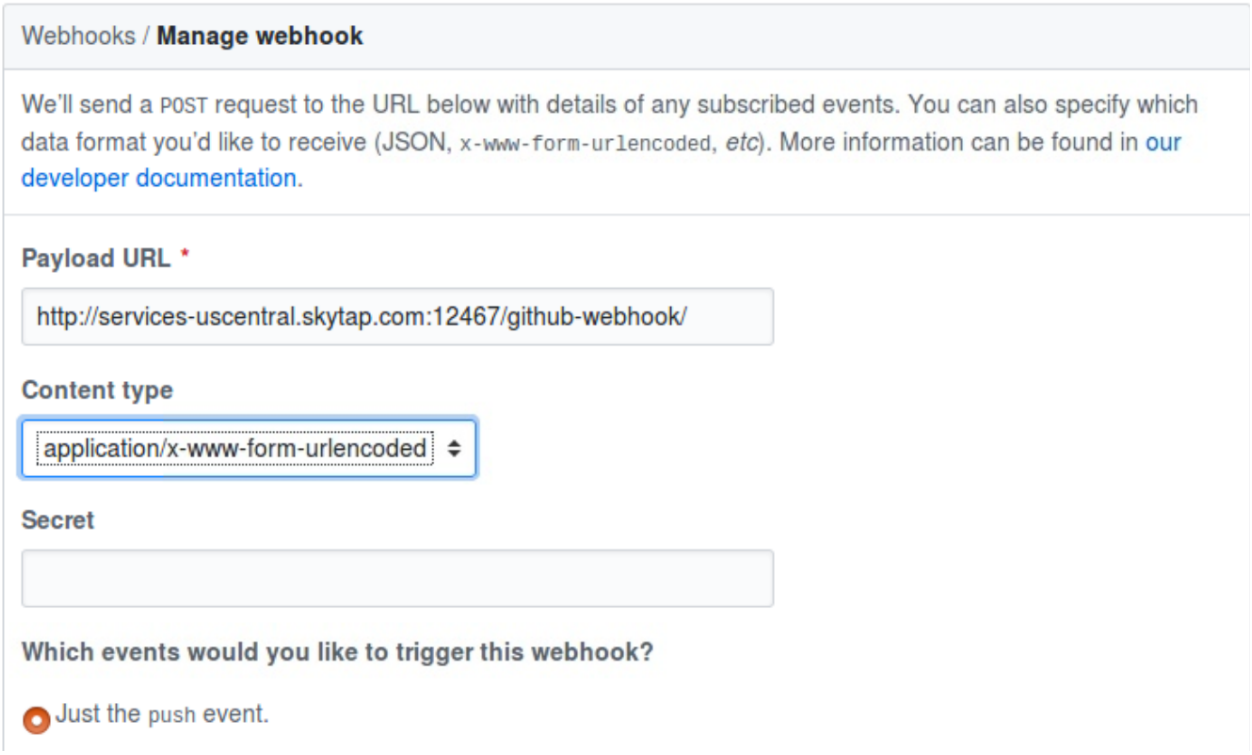
5. The URL for Jenkins is published as a service from the Skytap VM. This URL is unique for each VM instance. Follow the steps below to find the published service URL for Jenkins on your VM instance. Note, if you are using an on-premise install of Jenkins, simply use the URL to access the Jenkins UI.
6. Go to the IBM Cloud Conference Scheduler with the link to launch your VM.
7. There is a table listing the internal ports and corresponding external IP and ports. The Jenkins application is using port 8080 on the VM. The corresponding external IP and Port will be used for the Webhook URL.



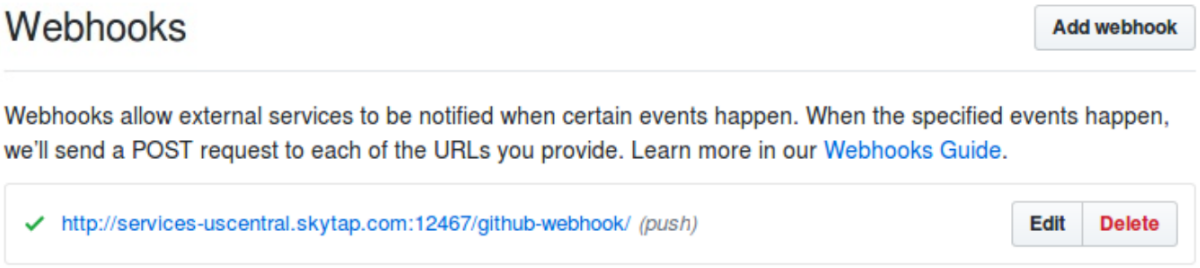
8. Go back to your web browser and click the 

button.

9. In the Payload URL, enter the Published Service URL 'http://<External IP>:<External Port>/github-webhook/' and click the "**Add webhook**" button. Note, the ending "/" is required in the URL.



10. Verify that a green checkmark appears beside the added webhook.



Lab 6: IBM UrbanCode Deploy and Jenkins integration

Lab 6.1: Start IBM UrbanCode Deploy Server and Agent as root

1. Open a terminal window and type in "**sudo bash**" to run as root. When prompted for the password for the devops user, enter devops.
2. Go to the UCD Server bin directory (**/opt/ibm-ucd/server/bin**) and run '**./server start**' to start the server.

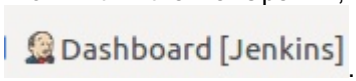
```
root@devops:/opt/ibm-ucd/server/bin# ./server start
root@devops:/opt/ibm-ucd/server/bin#
```

3. Go to the UCD Agent bin directory (**/opt/ibm-ucd/agent/bin**) and run '**./agent start**' to start the agent.

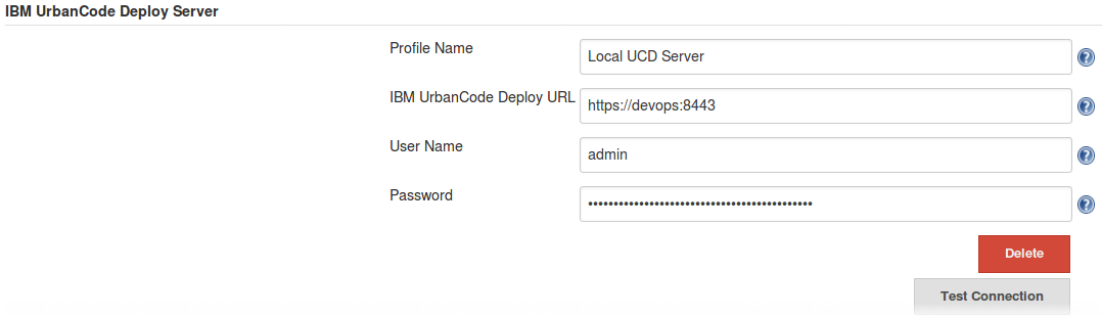
```
root@devops:/opt/ibm-ucd/agent/bin# ./agent start
root@devops:/opt/ibm-ucd/agent/bin#
```

Lab 6.2: Configure the IBM UrbanCode Deploy and Jenkins integration

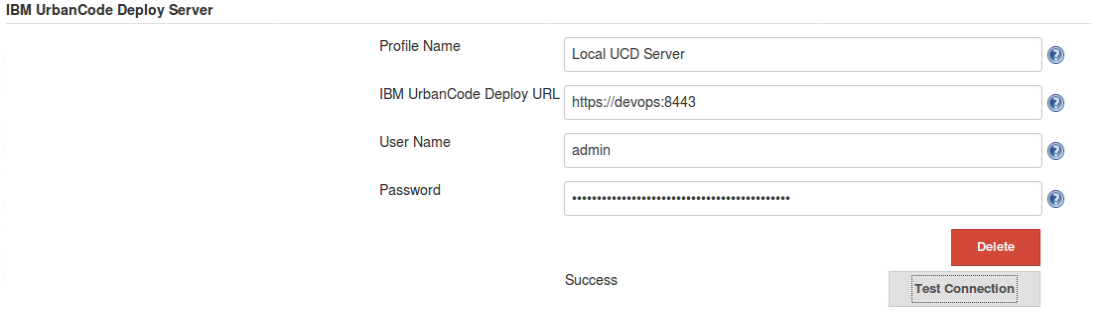
1. From within the DevOps VM, launch the Firefox browser and click on the Jenkins bookmark



2. Login to Jenkins using **admin** / **admin**.
3. Select the "**Manage Jenkins**" link and click on the "**Configure System**" link.
4. Search for "**IBM UrbanCode Deploy Server**" and verify the properties match the following:
   i) Profile Name = Local UCD Server
   ii) IBM UrbanCode Deploy URL = https://devops:8443
   iii) User Name = admin
   iv) Password = admin



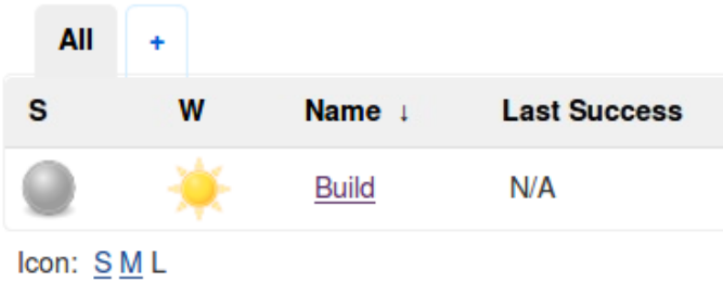
5. Click the "**Test Connection**" button and verify there is a successful connection.



Lab 7: Jenkins Configuration

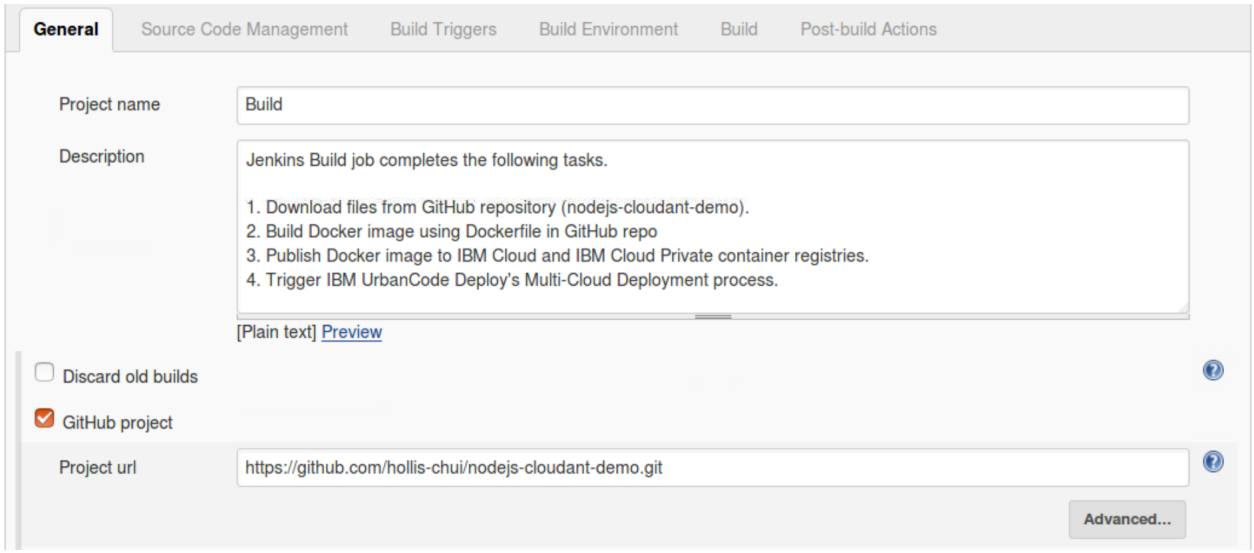
Lab 7.1: Update Jenkins Job

1. From the Firefox browser, bring up the Jenkins Dashboard and click on the "**Build**" link.



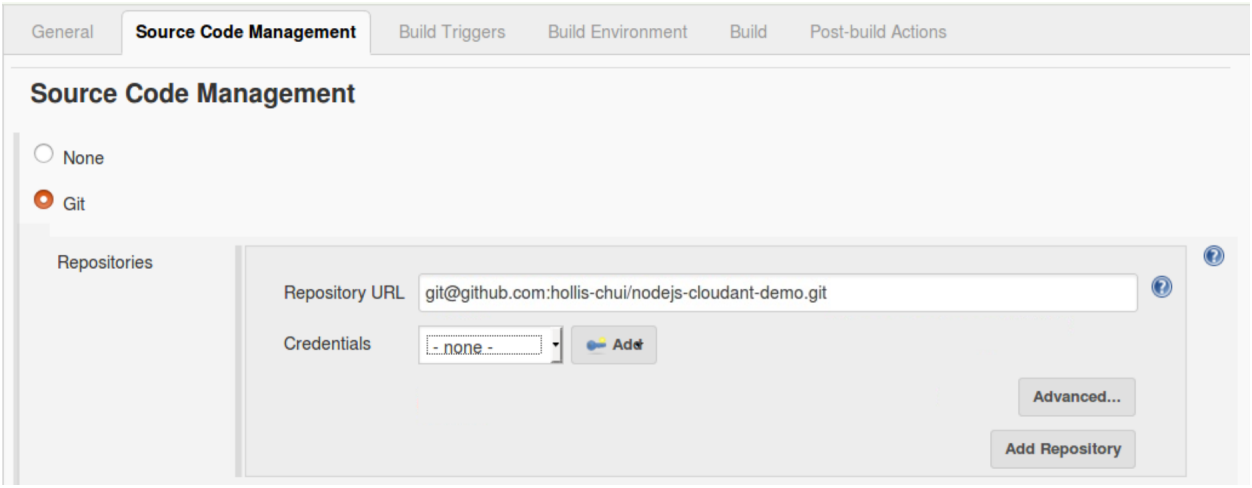
2. Click on the "**Configure**" link on the left menu.

3. On the "**General**" tab, update the "**GitHub project > Project url**" property with your GitHub repository URL in HTTPS format.



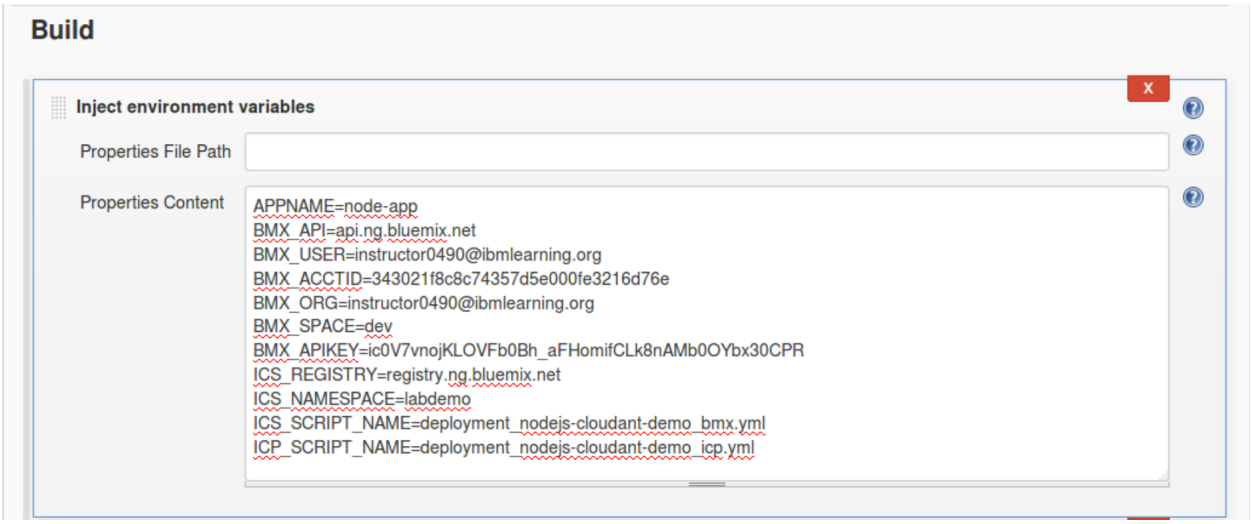
Note: The GitHub repository URL in HTTPS format can be found on the GitHub repository page and clicking on the "**Clone or download**" button. Ensure HTTPS is selected.

4. Click on the "**Source Code Management**" tab and update the Git Repository URL property with your GitHub repository URL in SSH format.



Note: The GitHub repository URL can be found by going to the GitHub repository page and clicking on the "**Clone or download**" button. Ensure SSH is selected.

5. Click the "Build" tab > Inject environment variables section and update the following variables in the Properties Content.
    - BMX_USER=<IBM Cloud account>
    - BMX_ACCTID=<IBM Account ID>
    - BMX_ORG=<IBM Cloud account email>
    - BMX_SPACE=dev
    - BMX_APIKEY=<API Key>
    - ICS_NAMESPACE=<IBM Container Service Namespace>

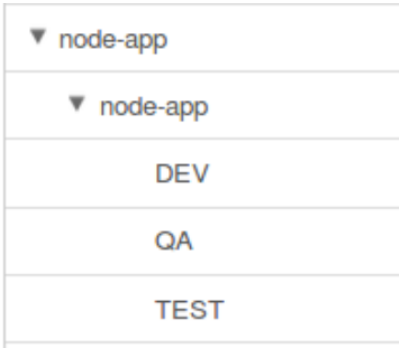


6. Click the "**Save**" button.

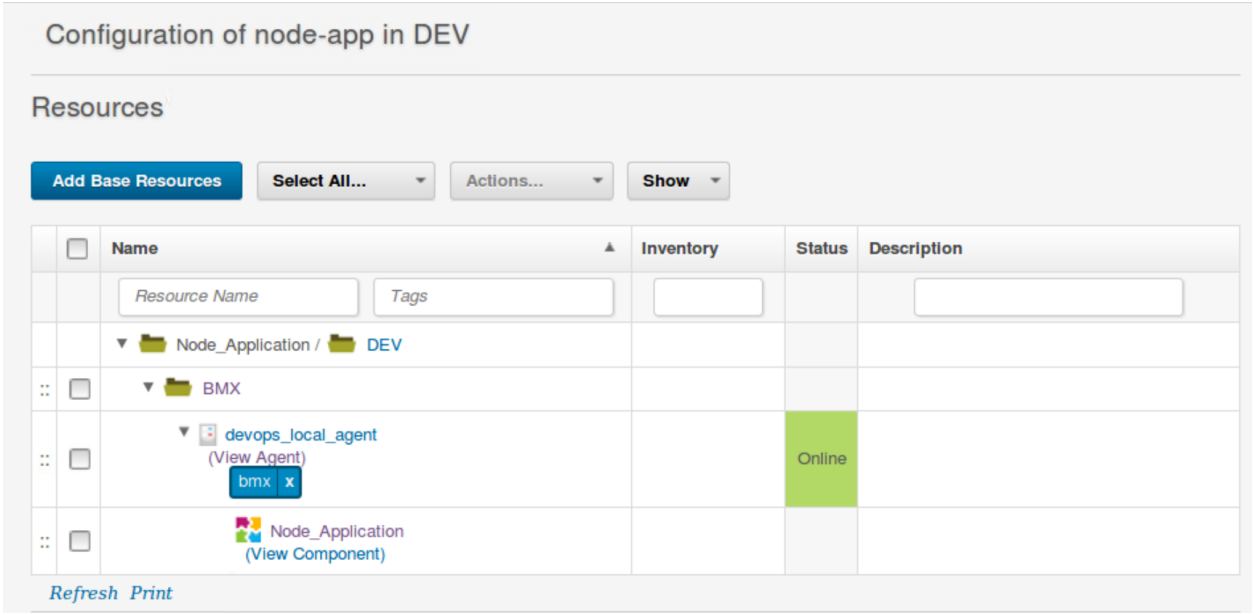
Lab 8: IBM UrbanCode Deploy Configuration

Lab 8.1: Update Environment Properties for DEV environment

1. From within the DevOps VM, launch the Firefox browser and click on the IBM UCD bookmark.
2. Login to IBM UrbanCode Deploy using **admin** / **admin**.
3. Select the "**Configuration**" tab and verify there are 3 environments listed under node-app.

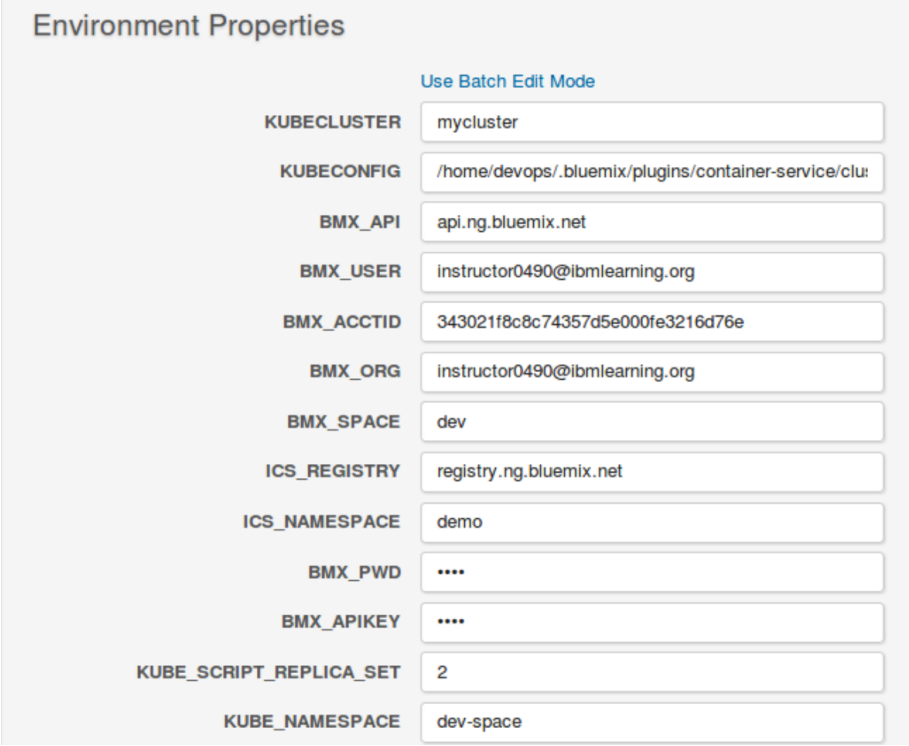


4. Click on DEV environment and check that the "**Resources**" section matches the configuration in the screen capture.



5. In the "**Environment Properties**" section, update the value for the following properties.

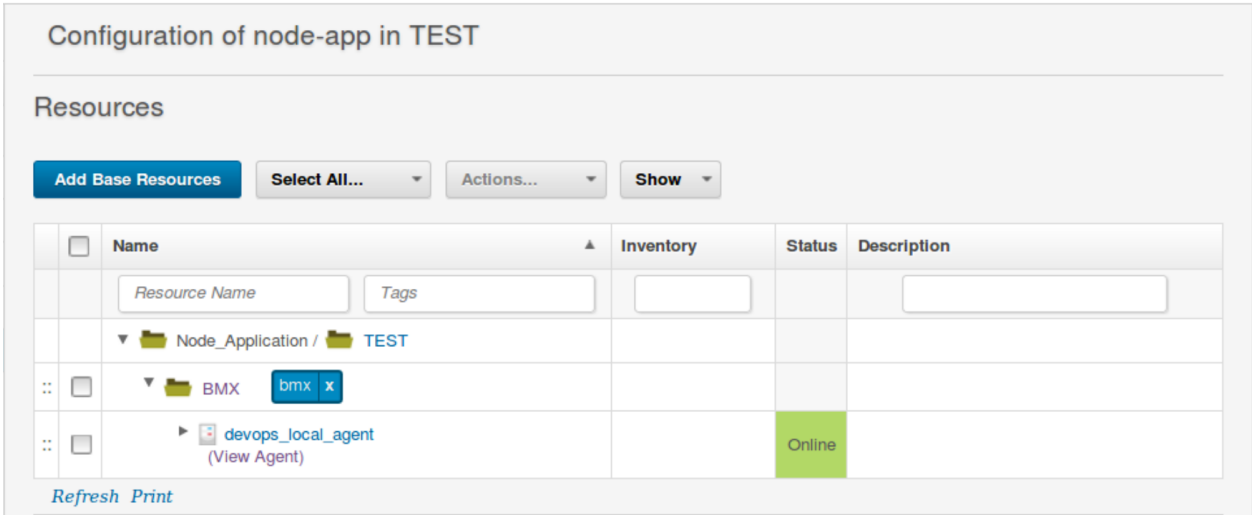
   a. BMX_USER = <IBM Cloud User Email>
   b. BMX_ACCTID = <use the IBM Cloud Account ID from Lab 4 Step 6>
   c. BMX_ORG = <the default value is the same as the BMX_USER value>
   d. ICS_NAMESPACE = <IBM Container Service Namespace>
   e. BMX_APIKEY = <use the API Key generated from Lab 4 Step 5>
   f. KUBENAMESPAE = dev-space



6. In the “Environment Properties (All Components)” section, check that the property matches the property defined in the screen capture.

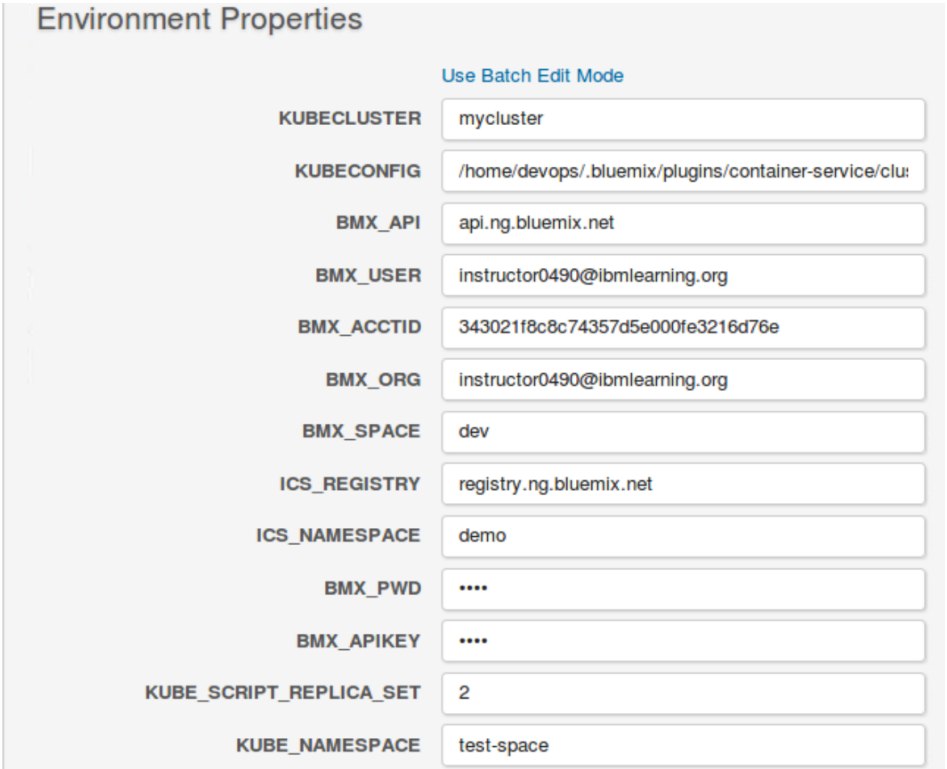
Lab 8.2: Update Environment Properties for TEST environment

1. Click on TEST environment and check that the “**Resources**” section matches the configuration in the screen capture.



2. In the "**Environment Properties**" section, update the value for the following properties.

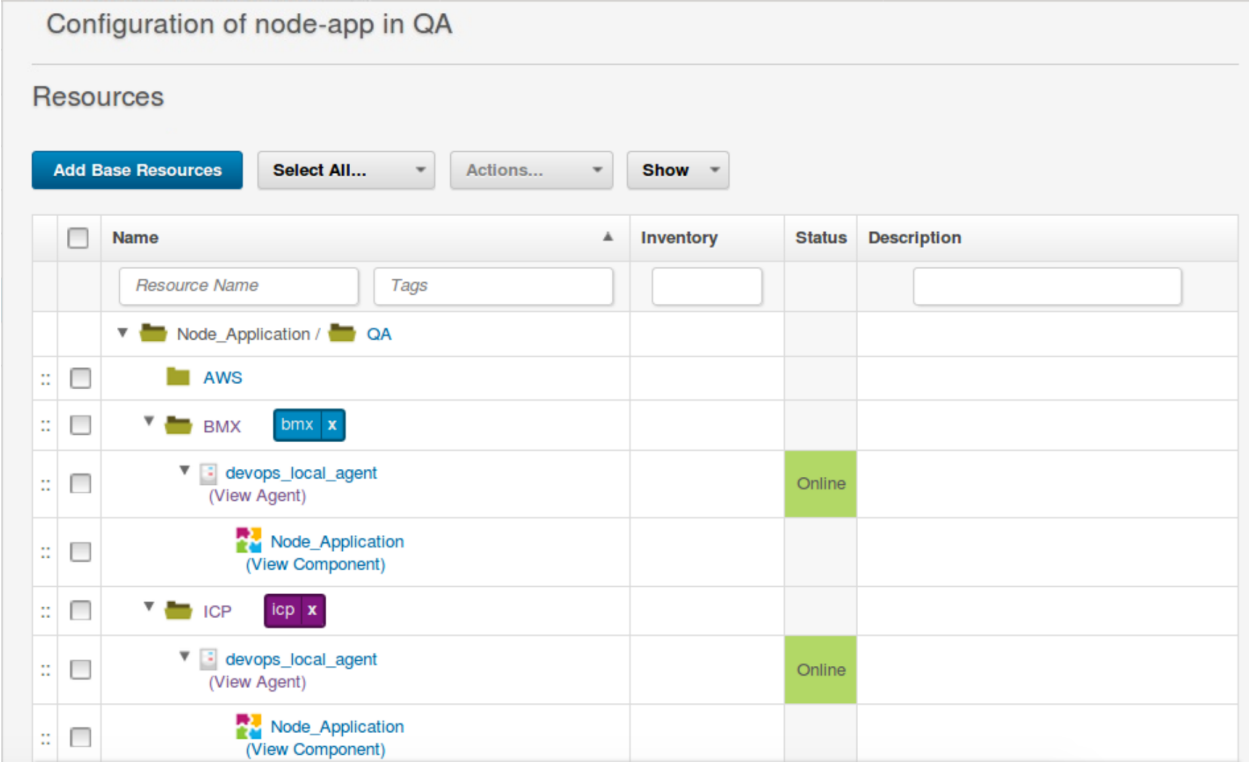
   a. BMX_USER = <IBM Cloud User Email>
   b. BMX_ACCTID = <use the IBM Cloud Account ID from Lab 4 Step 6>
   c. BMX_ORG = <the default value is the same as the BMX_USER value>
   d. ICS_NAMESPACE = <IBM Container Service Namespace>
   e. BMX_APIKEY = <use the API Key generated from Lab 4 Step 5>
   f. KUBENAMESPAE = test-space



3. In the “Environment Properties (All Components)” section, check that the property matches the property defined in the screen capture.

Lab 8.3: Update Environment Properties for QA environment

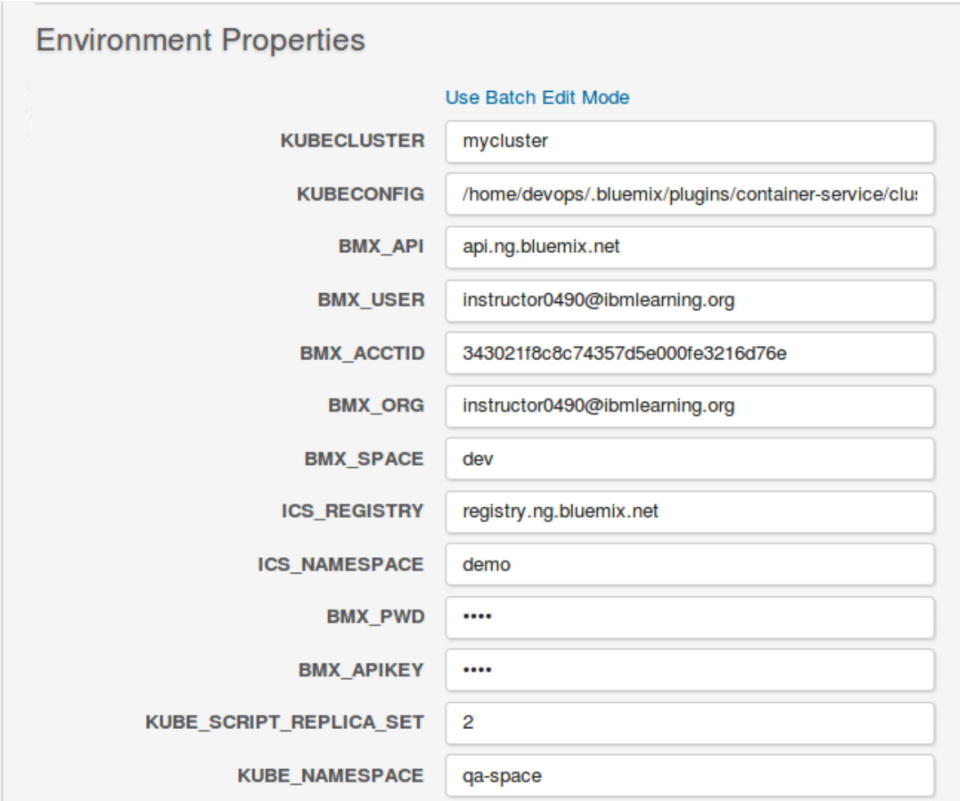
1. Click on TEST environment and check that the “**Resources**” section matches the configuration in the screen capture.



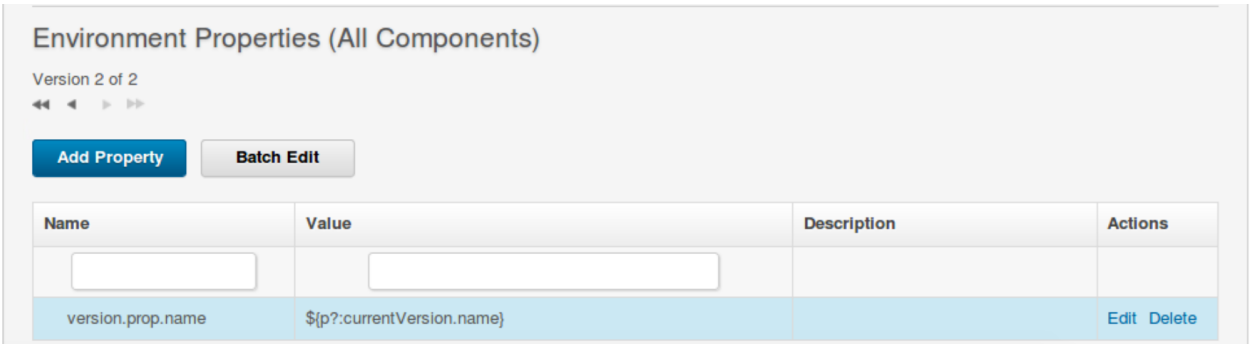
2. In the “**Environment Properties**” section, update the value for the following properties.

   a. BMX_USER = <IBM Cloud User Email>
   b. BMX_ACCTID = <use the IBM Cloud Account ID from Lab 4 Step 6>
   c. BMX_ORG = <the default value is the same as the BMX_USER value>
   d. ICS_NAMESPACE = <IBM Container Service Namespace>
   e. BMX_APIKEY = <use the API Key generated from Lab 4 Step 5>

f. KUBENAMESPAE = dev-space

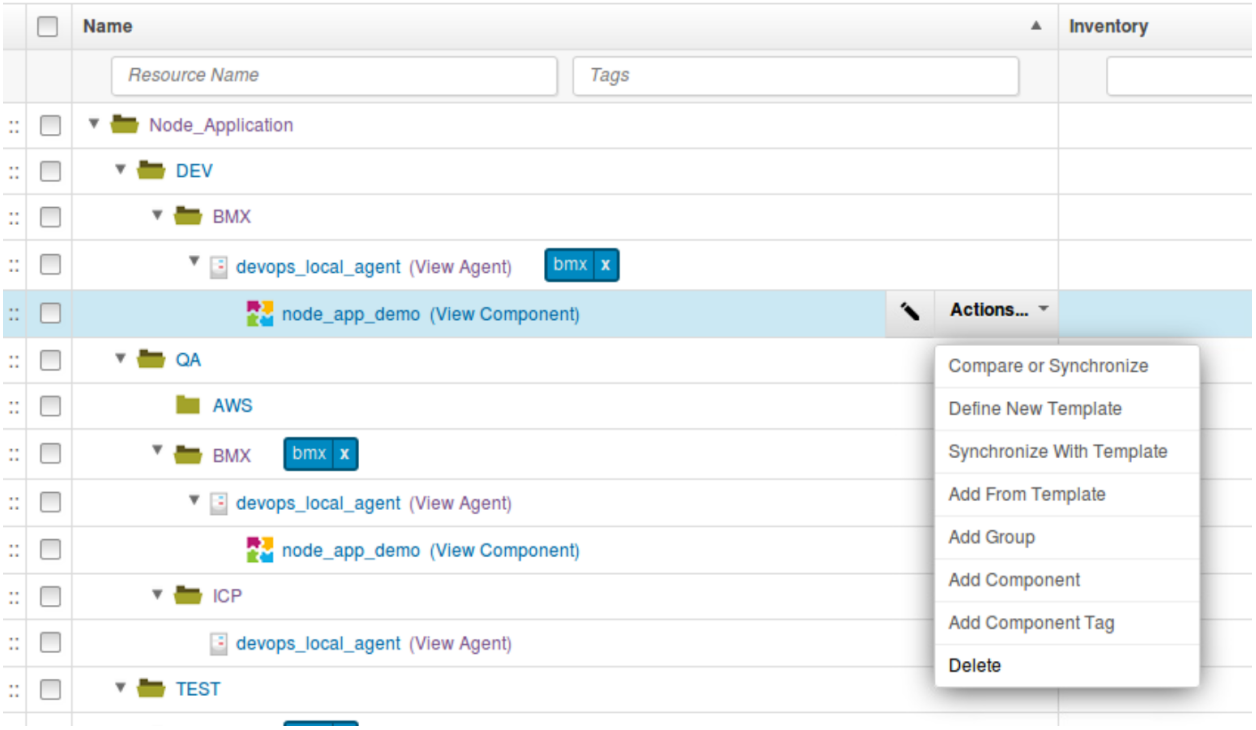


3. In the “Environment Properties (All Components)” section, check that the property matches the property defined in the screen capture.

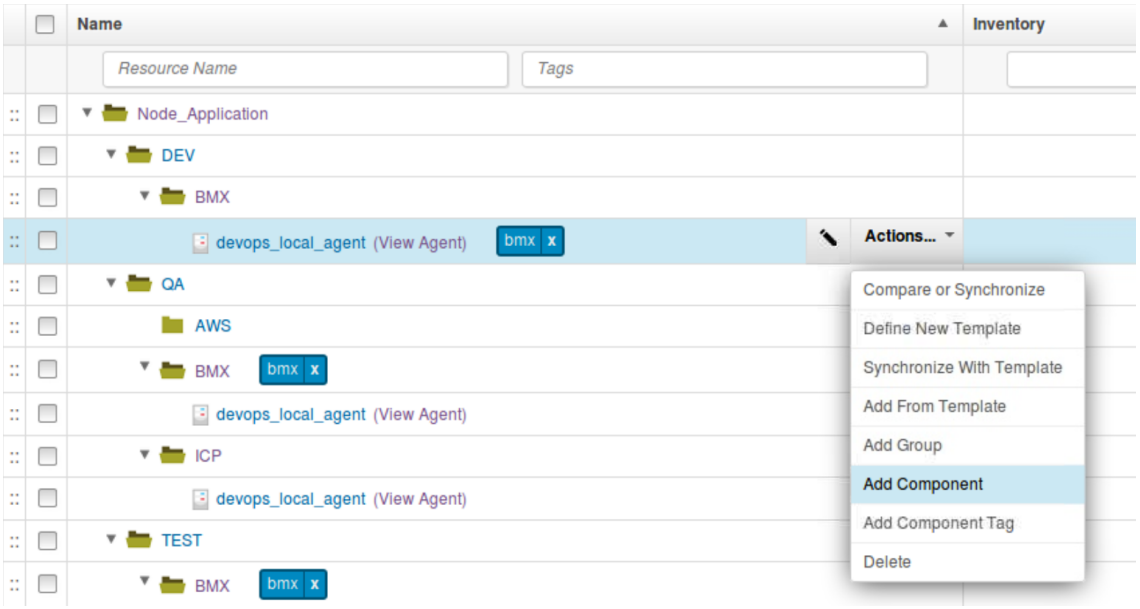


Lab 9: Update IBM UrbanCode Deploy Resource

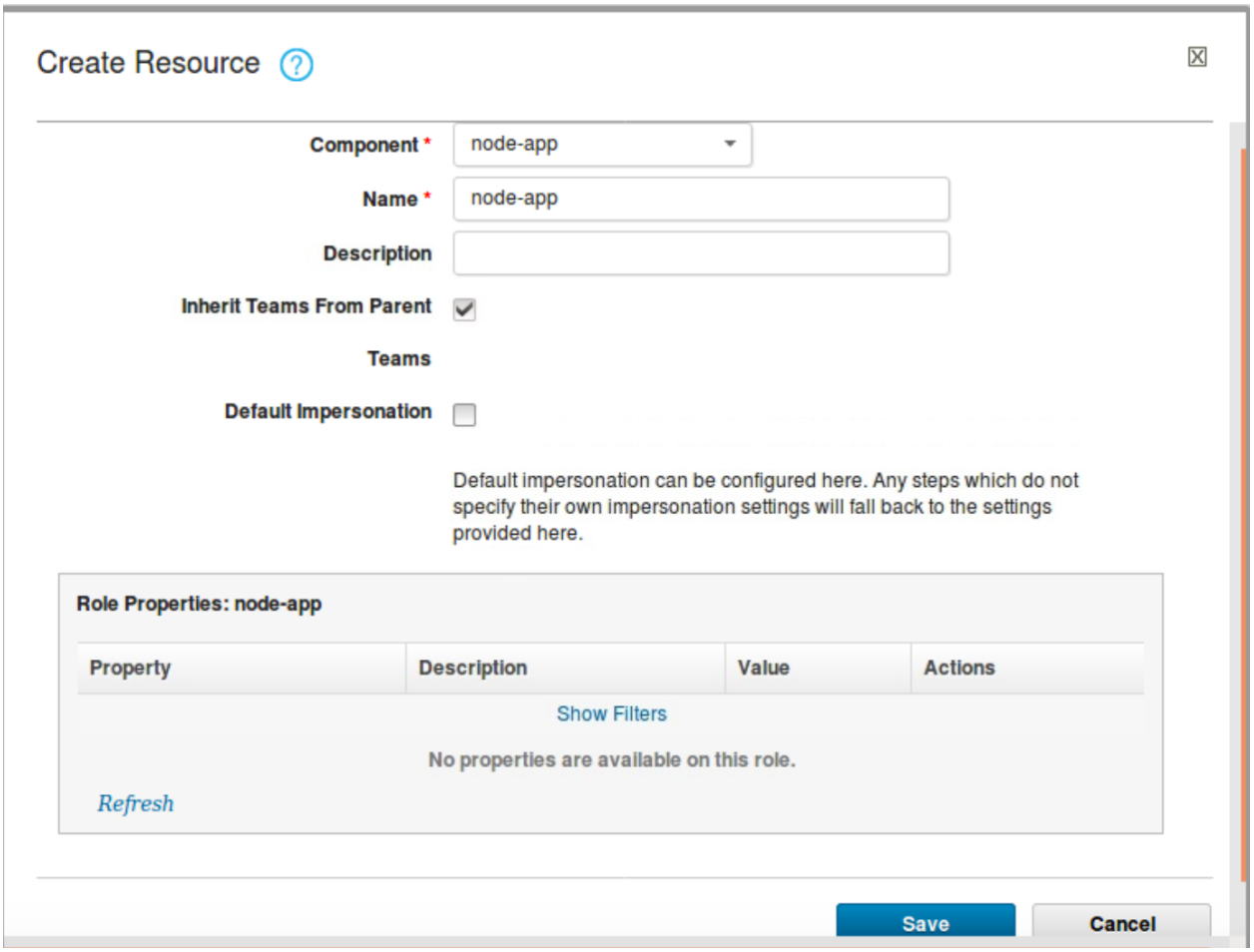
1. From within the DevOps VM, launch the Firefox browser and click on the IBM UCD bookmark.
2. Login to IBM UrbanCode Deploy using **admin** / **admin.**
3. Click on Resources tab and delete the “node_app_demo” component under <Environment> > BMX > devops_local_agent path where Environment = DEV, TEST and QA.



4. Add the “node-app” component to the resource tree for DEV environment. Hover the mouse over the “devops_local_agent” and click on Actions > Add Component.



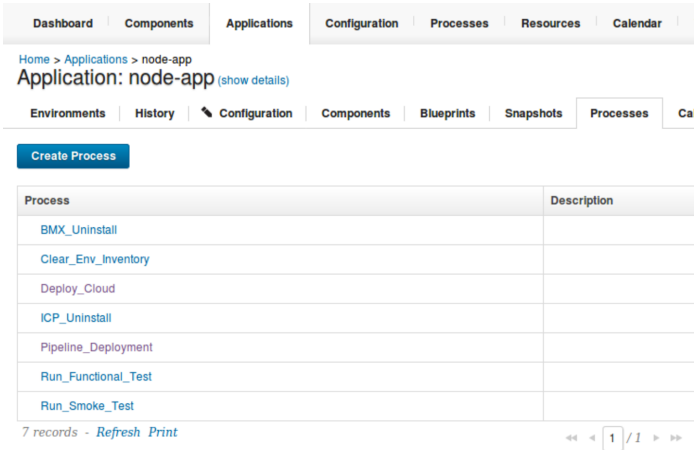
Select Component = node-app and click Save.



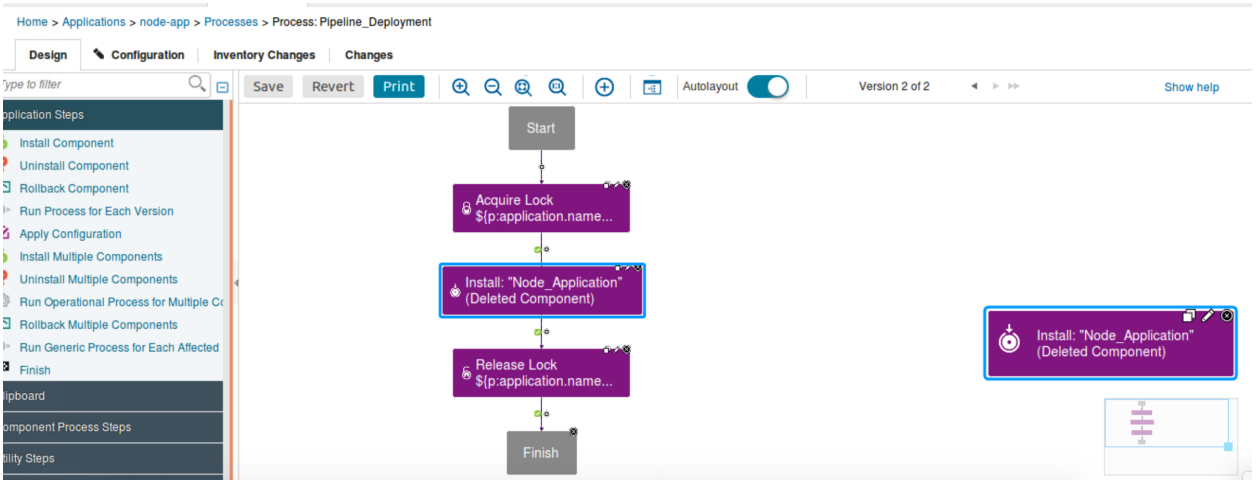
Repeat the steps for the TEST and QA resource tree.

5. In the UCD UI, update the Application processes to reference the updated component.

   For example, lick on Applications > node-app > processes and select Pipeline_Deployment.

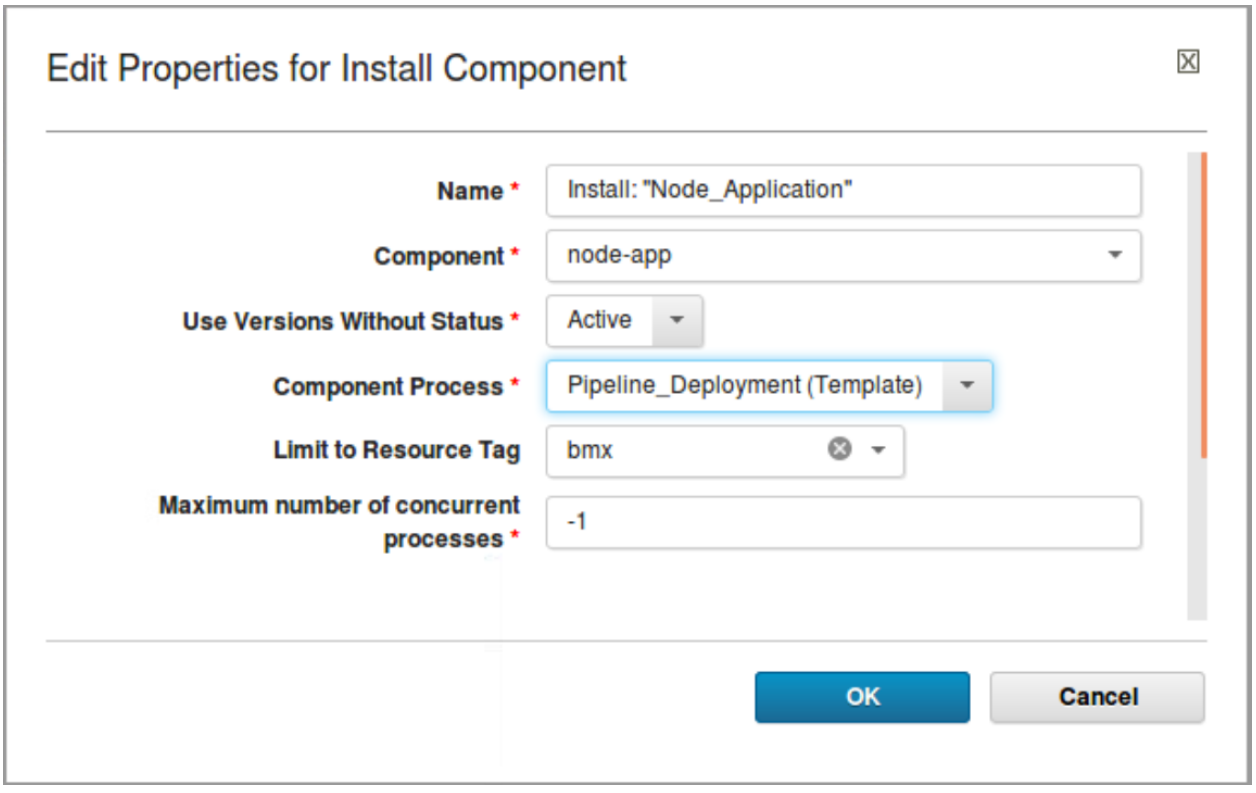


Select the “Install: Node_Application” step and click the pencil icon to edit the step.



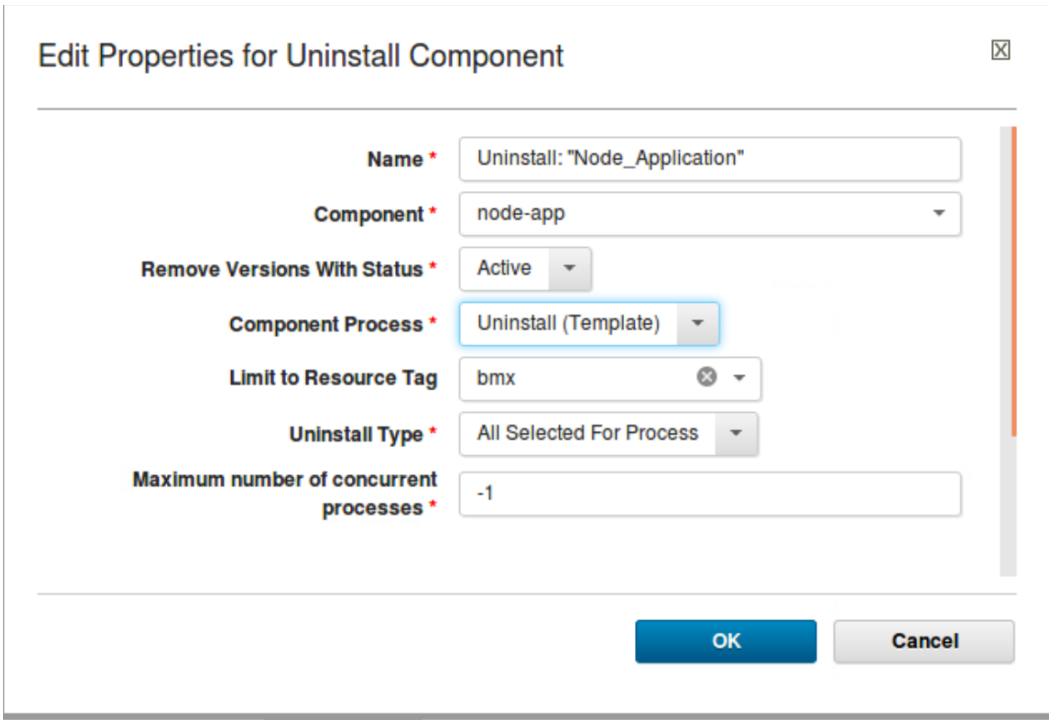
Select the following and click OK, then click Save.

Component = node-app
Component Process = Pipeline_Deployment (Template)



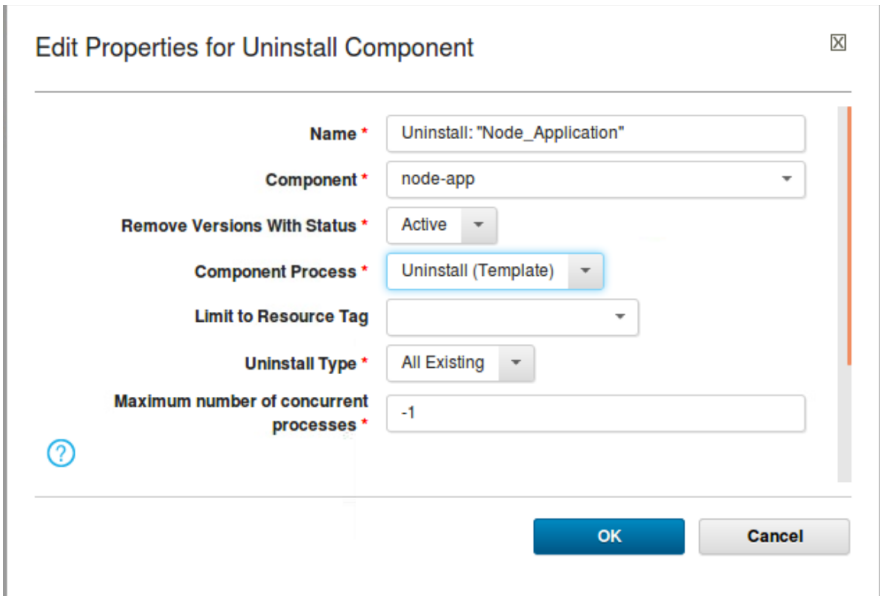
6. Repeat the steps to update the Component for the following Application processes:
    a. BMX_Uninstall:

        Component = node-app
        Component Process = Uninstall (Template)



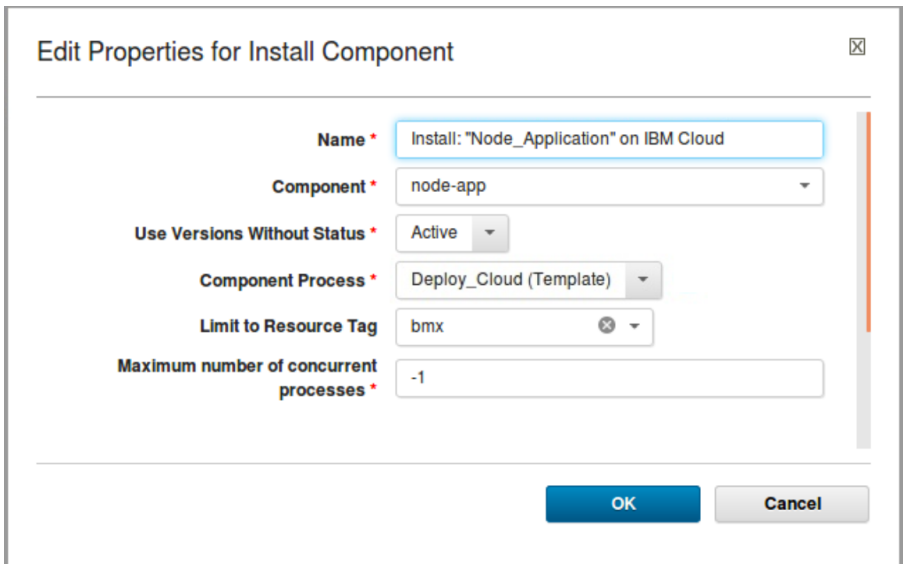
b. Clear_Env_Inventory

Component = node-app
Component Process = Uninstall (Template)

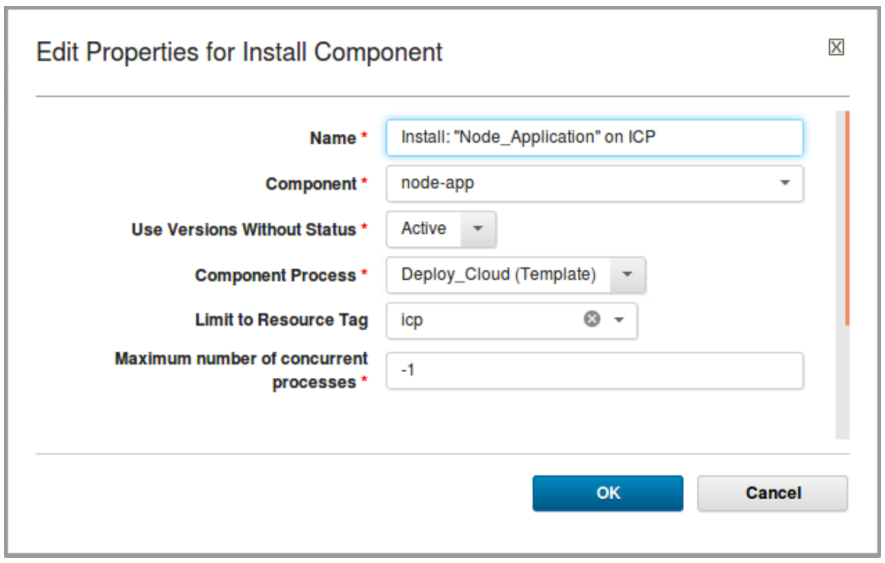


c. Deploy_Cloud

Component = node-app
Component Process = Deploy_Cloud (Template)

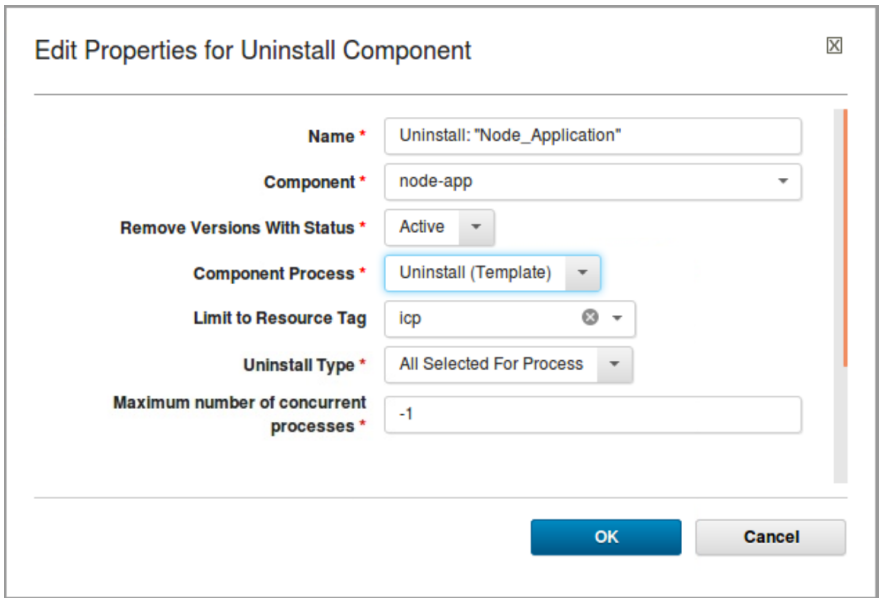


Component = node-app
Component Process = Deploy_Cloud (Template)



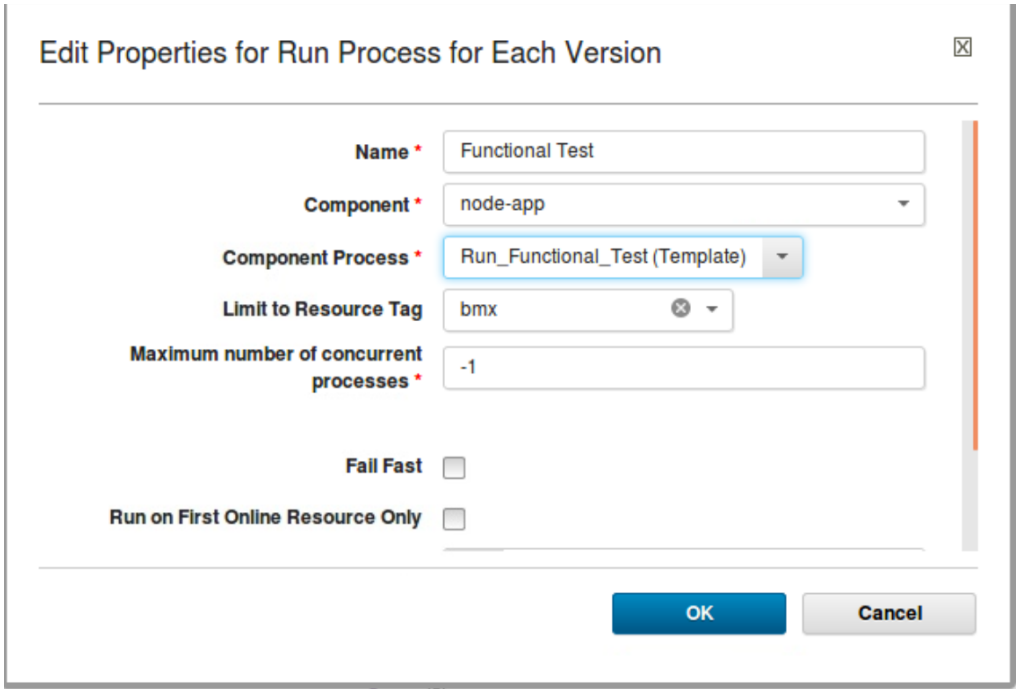
d. ICP_Uninstall

Component = node-app
Component Process = Uninstall (Template)



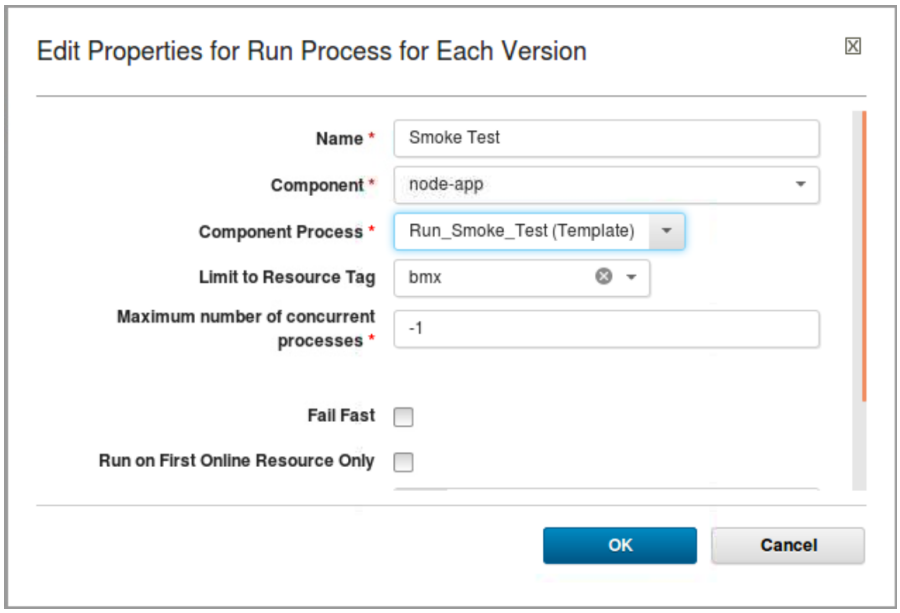
e. Run_Functional_Test

Component = node-app
Component Process = Run_Functional_Test (Template)

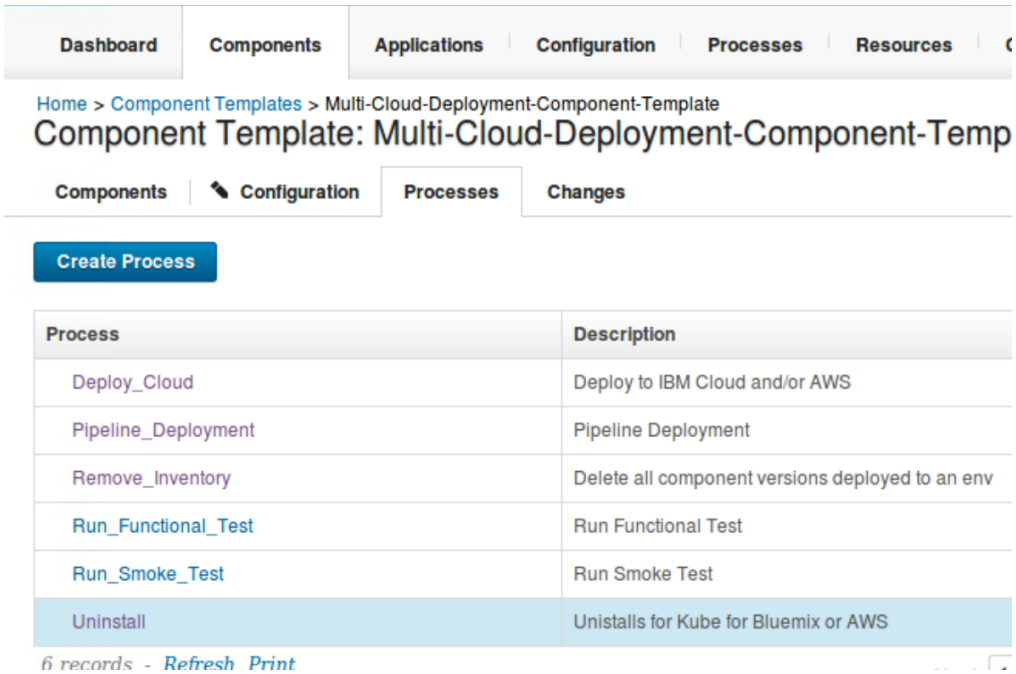


f. Run_Smoke_Test

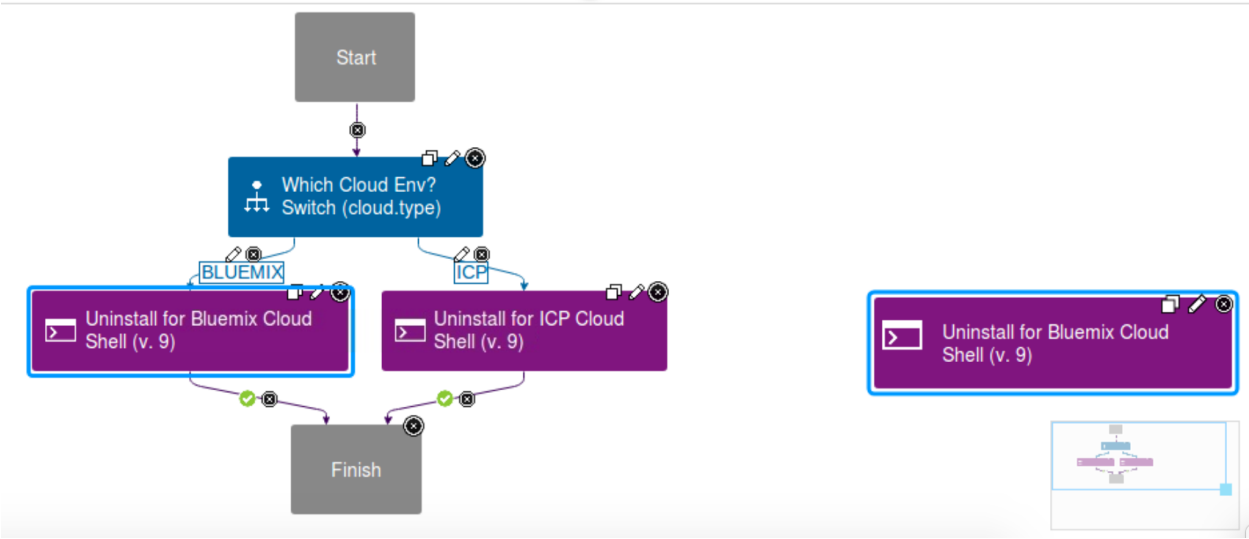
Component = node-app
Component Process = Run_Smoke_Test (Template)



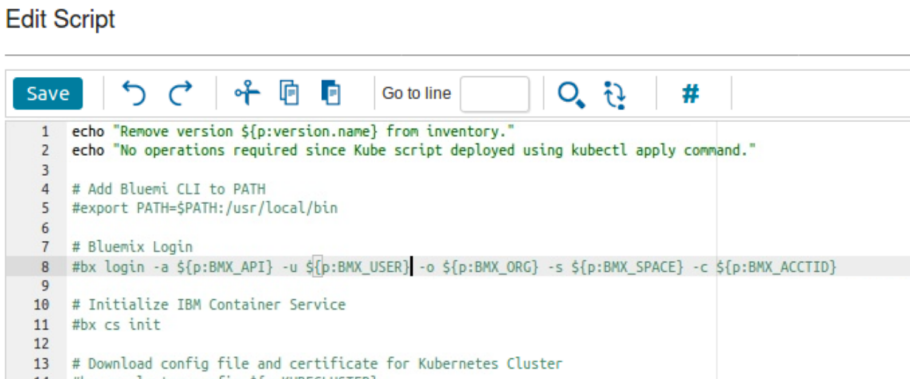
7. Click on Components > Templates > Multi-Cloud-Deployment-Component-Template > Processes and select the Uninstall process.



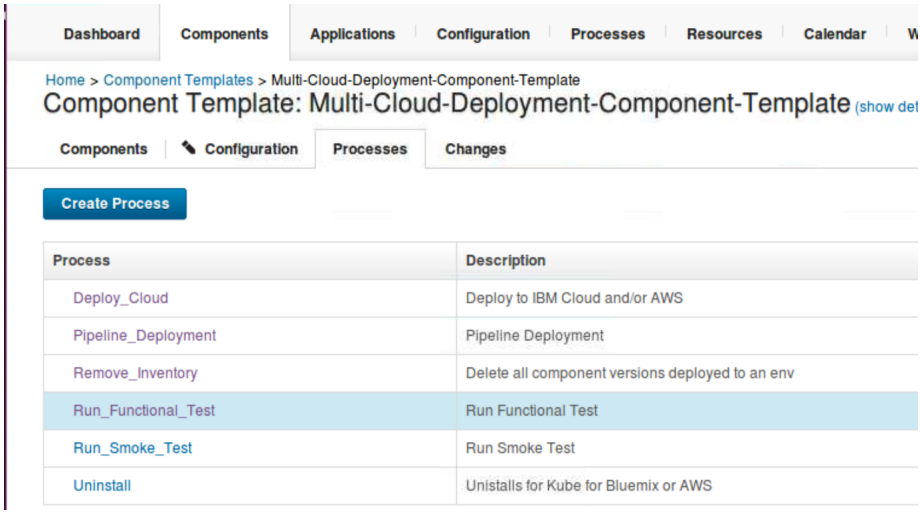
Click Edit and select the “Uninstall for IBM Cloud” process step. Click the pencil icon to edit.



Select the Shell Script and delete “-p ${p:BMX_PWD}” from the bx login command.

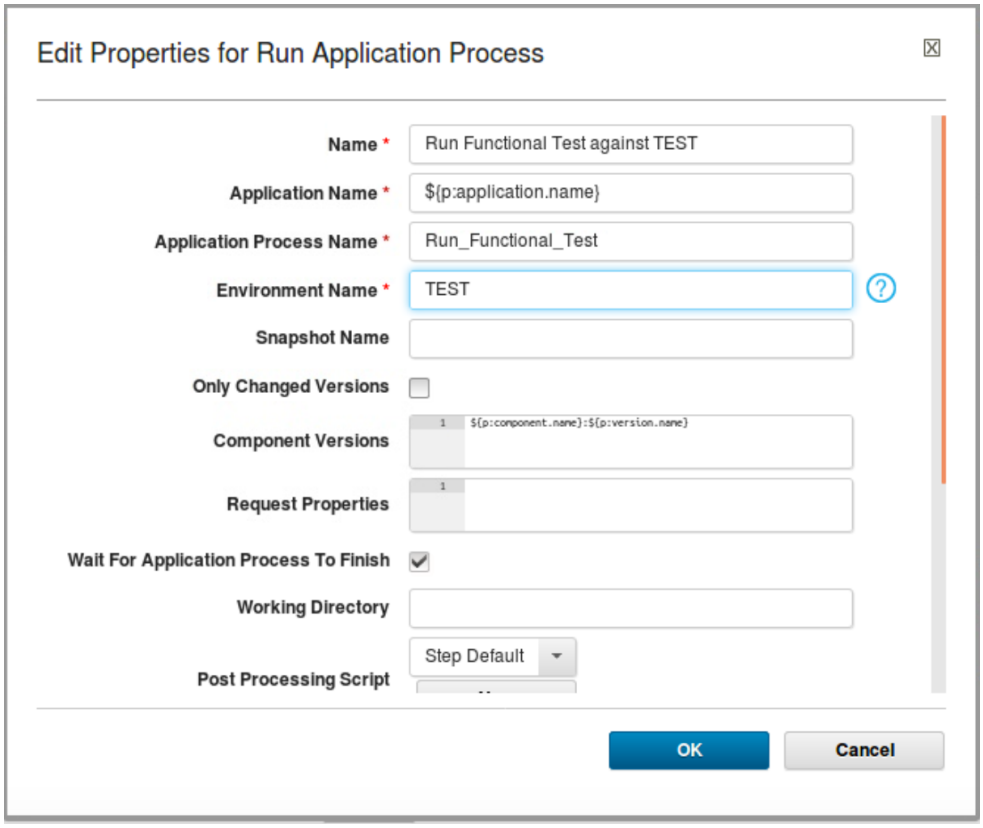


8. Update the Pipeline_Deployment component process. Fom the UCD UI, select Component > Templates > Multi-Cloud-Deployment-Component-Template > Processes > Pipeline_Deployment.

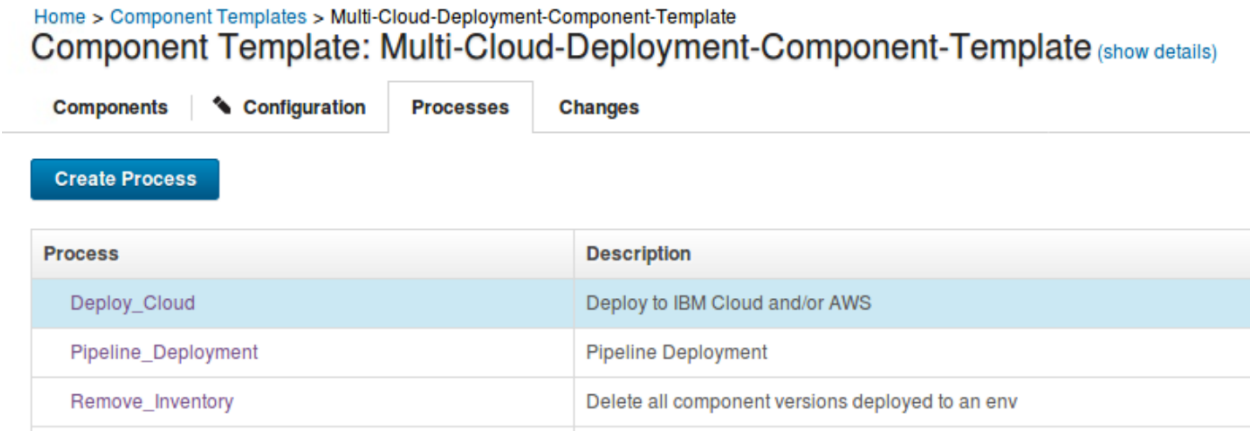


Edit the “Run Functional Test against TEST” component process step and edit Environment Name to

"TEST". Click OK and Save.



Assign custom port to DEV vs TEST vs QA for the nodePort deployment using Kubernetes. Fom the UCD UI, select Component > Templates > Multi-Cloud-Deployment-Component-Template > Processes > Deploy_Cloud and click Edit.



Click the "Retrieve Kube cluster config from IBM Cloud" process step and select the pencil icon to edit the step. Within the shell script, replace the following script and click Save, OK and Save.

Before:

```
if [[ ${p:environment.name} == "TEST" ]];
```

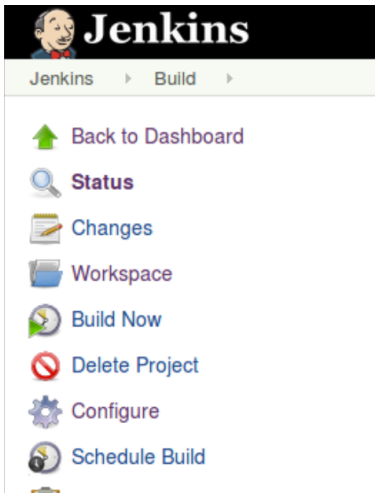
```
then
        echo "Set port = 30081 for TEST"
        sed -i.bak s%nodePort: 30080%nodePort: 30081%g ${ICS_SCRIPT_NAME}
elif [[ ${p:environment.name} == "QA" ]];
then
        echo "Set port = 30082 for QA"
        sed -i.bak s%nodePort: 30080%nodePort: 30082%g ${ICS_SCRIPT_NAME}
else
        # Leave port = 30080 for DEV
        echo "Set port to 30080 for DEV"
fi
```

After:

```
if [[ ${p:environment.name} == "TEST" ]];
then
        echo "Set port = 30081 for TEST"
        sed -i.bak s%30080%30081%g ${ICS_SCRIPT_NAME}
elif [[ ${p:environment.name} == "QA" ]];
then
        echo "Set port = 30082 for QA"
        sed -i.bak s%30080%30082%g ${ICS_SCRIPT_NAME}
else
        # Leave port = 30080 for DEV
        echo "Set port to 30080 for DEV"
fi
```

Lab 10: Run the CICD pipeline

1. On the DevOps VM, open a browser and click on the Jenkins bookmark. Select the Build job and click “Build now”.



2. Click on the new build and review the Console Output.

```
604c78617f34: Pushed
53c779688d06: Layer already exists
60a0858edcd5: Layer already exists
b6ca02dfe5e6: Layer already exists
fa18e5ffd316: Pushed
1: digest: sha256:9c6765a126dfb18af99c5d5d55995ff1a829447f1e57bebcf39320c31306aea2 size: 2423
Logging out...
OK
Update Kubernetes script files for Bluemix and AWs
Creating new component version 'node-app:1' on component 'node-app'
Successfully created component version with UUID 'abd97701-2a6d-4964-9eb2-65c1eb0bd35e'
Uploading files to version 'node-app:1' on component 'node-app'
Successfully uploaded files
Setting properties for version 'node-app:1' on component 'node-app'
Creating component version link 'Jenkins Build #1' to URL 'http://devops:8080/job/Build/1/'
Deploying component versions '{node-app=[node-app:1]}'
Starting deployment process 'Pipeline_Deployment' of application 'node-app' in environment 'DEV'
Deployment request id is: '1623a742-6e39-4ddf-96bb-a200839b91b8'
Deployment is running. Waiting for UCD Server feedback.
Finished the deployment in 6 seconds
The deployment result is SUCCEEDED. See the UrbanCode Deploy deployment logs for details.
Finished: SUCCESS
```

3. Using the IBM Cloud cli, check to make sure a Docker image for the application got pushed into the Container Registry. The command to retrieve the list of images is:

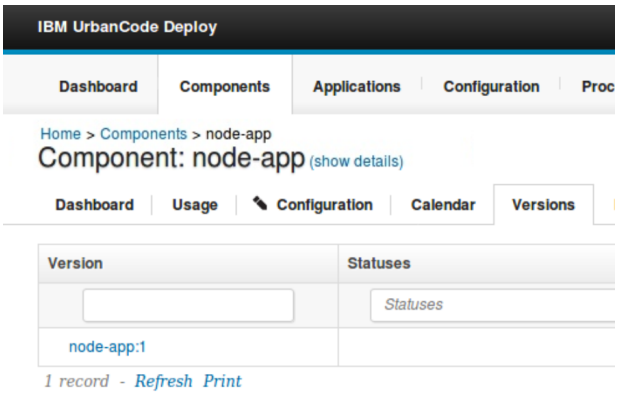
bx cr login
bx cr images

```
root@devops:~# bx cr images

Plugin version '0.1.304' is now available. To update, run: bx plugin update container-registry -r Bl
uemix
Listing images...

REPOSITORY                                NAMESPACE   TAG   DIGEST         CREATED         SIZE
 VULNERABILITY STATUS
registry.ng.bluemix.net/labdemo/node-app  labdemo     1     9c6765a126df   5 minutes ago   263 MB
 Vulnerable
```

4. Go to the IBM UrbanCode Deploy bookmark from a browser and click Components > node-app > Versions and verify that a component version for “node-app:<build number>” has been created.

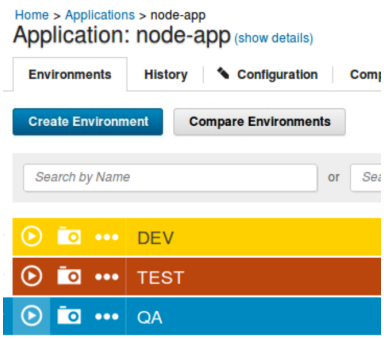


5. From the browser, review the IBM UrbanCode Deploy pipeline process that got triggered by Jenkins. Click Applications > node-app > History. The pipeline process will have deployed the application to DEV, run smoke tests, deploy the application to TEST, and run functional tests.

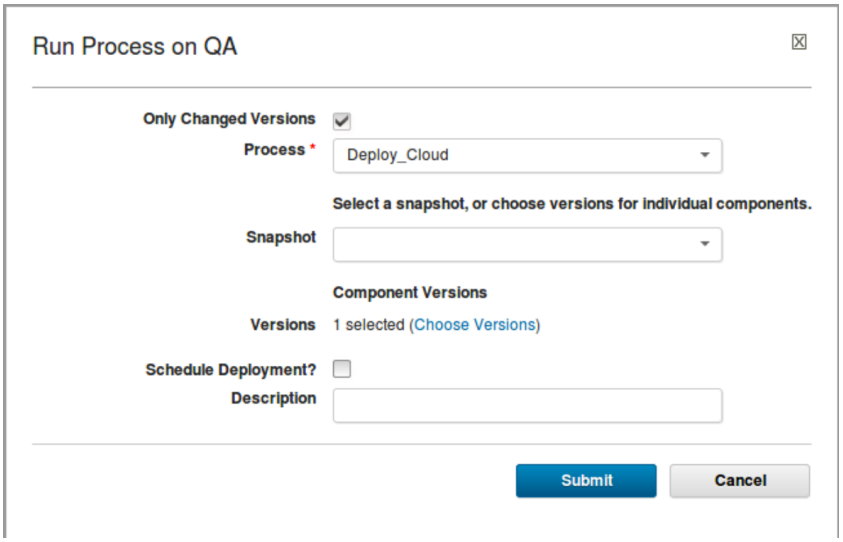
Process	Environment	Snapshot	Scheduled For	By	Status	Actions
Run_Functional_Test	TEST		3/18/2018, 3:38 PM	admin	Success	View Request
BMX_Uninstall	TEST		3/18/2018, 3:37 PM	admin	Success	View Request
Deploy_Cloud	TEST		3/18/2018, 3:37 PM	admin	Success	View Request
Run_Smoke_Test	DEV		3/18/2018, 3:36 PM	admin	Success	View Request
BMX_Uninstall	DEV		3/18/2018, 3:36 PM	admin	Success	View Request
Deploy_Cloud	DEV		3/18/2018, 3:35 PM	admin	Success	View Request
Pipeline_Deployment	DEV		3/18/2018, 3:35 PM	admin	Success	View Request

6. Assuming the deployment to QA is manual and not automated, a user can run the deployment process in IBM UrbanCode Deploy to promote the build to the QA environment.

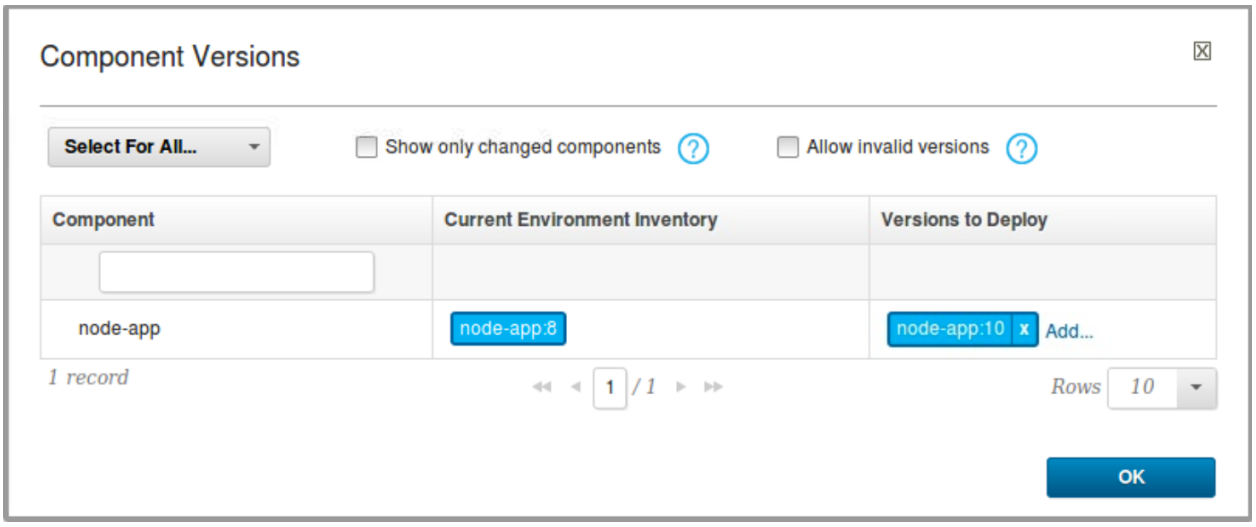
   In the UCD UI, select Applications > node-app and click the play button for the QA environment.



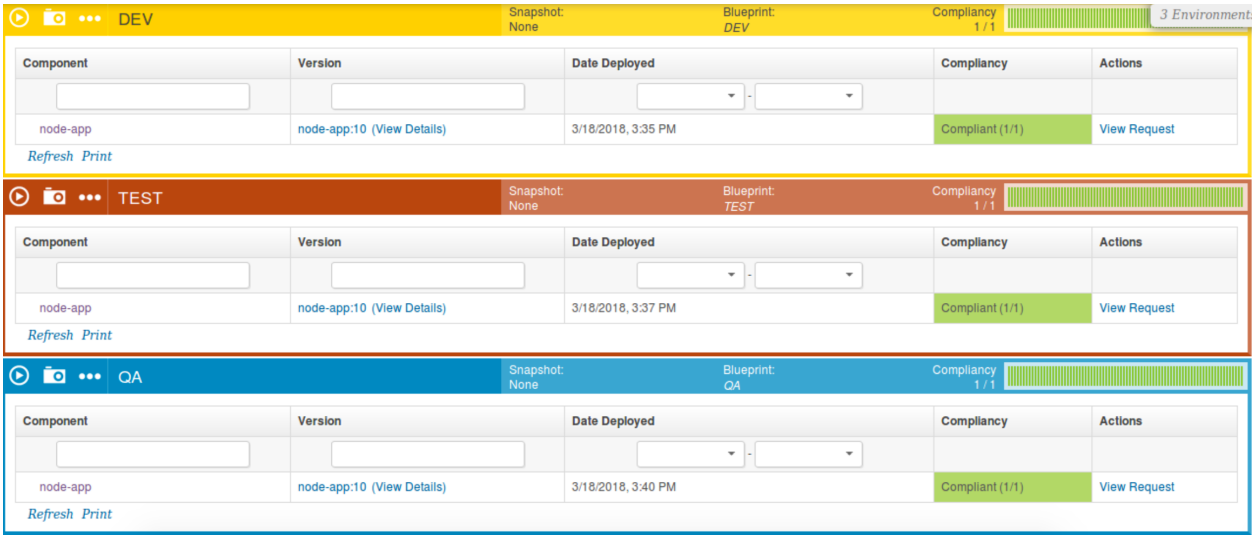
In the “Run Process on QA” window, select the “**Deploy_Cloud**” process and click Choose Version.



Under the “Select For All…” dropdown, select the “Latest available” and click OK and Submit.



Once the process finishes running, check the component versions in the UCD Environments and the same node-app version should be deployed on all the environments now.



7. Check the pods running in the “dev-space”, “test-space” and “qa-space” namespace within the IBM Cloud Kubernetes cluster and verify kubernetes pods are running successfully.

   Using the IBM Cloud cli commands from earlier, verify the pods are running successfully in each of the three namespaces.

   kubectl get pods --namespace=dev-space

```
root@devops:~/Documents/Hollis/nodejs-cloudant-demo# kubectl get pods --namespace=dev-space
NAME                                              READY     STATUS    RESTARTS   AGE
nodejs-cloudant-demo-deployment-cd778f68-25sht    1/1       Running   0          5m
nodejs-cloudant-demo-deployment-cd778f68-prpkf    1/1       Running   0          5m
```

   kubectl get pods --namespace=test-space

```
root@devops:~/Documents/Hollis/nodejs-cloudant-demo# kubectl get pods --namespace=test-space
NAME                                              READY     STATUS    RESTARTS   AGE
nodejs-cloudant-demo-deployment-cd778f68-hkqzf    1/1       Running   0          6m
nodejs-cloudant-demo-deployment-cd778f68-ml5df    1/1       Running   0          6m
```

   kubectl get pods --namespace=qa-space

```
root@devops:~/Documents/Hollis/nodejs-cloudant-demo# kubectl get pods --namespace=qa-space
NAME                                              READY     STATUS    RESTARTS   AGE
nodejs-cloudant-demo-deployment-cd778f68-cgw7m    1/1       Running   0          4m
nodejs-cloudant-demo-deployment-cd778f68-slhnm    1/1       Running   0          4m
```

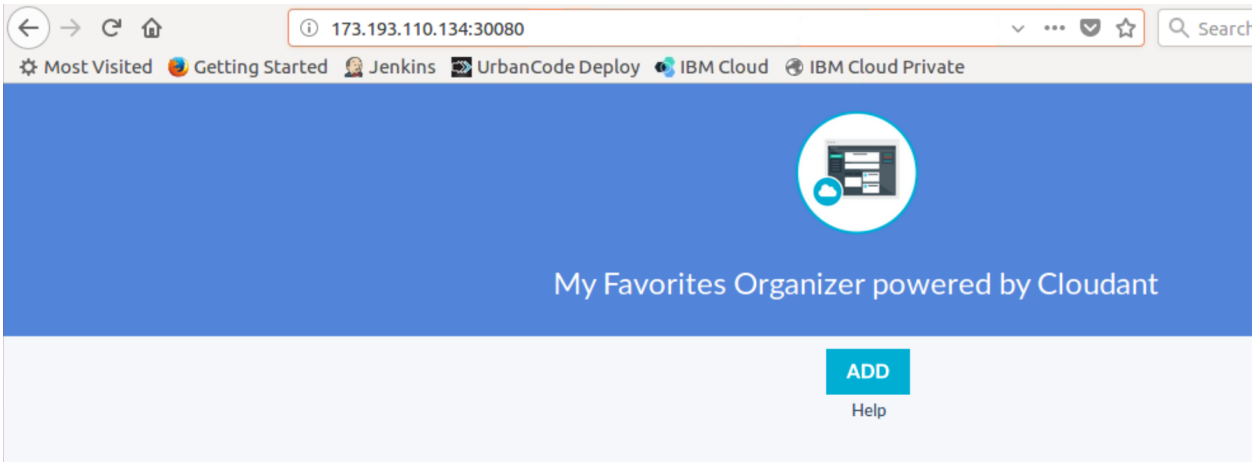
8. Retrieve the public ip of the worker node and the nodePort used to access the running application. bring up the URL to the node.js application using nodePort.

   bx cs workers mycluster

```
root@devops:~/Documents/Hollis/nodejs-cloudant-demo# bx cs workers mycluster
OK
ID                                                 Public IP        Private IP     Machine Type   State    Status   Zone    Version
kube-hou02-pa63b83389868a4cf4b3f1f592b8caee63-w1   173.193.110.134  10.47.79.241   free           normal   Ready    hou02   1.8.8_1507
```

   Here are the ports used for the different environments DEV (30080), TEST (30081) and QA (30082).

Open a browser and go to the URL http://<Worker node public ip>:<nodePort> to get to the application in the different environments.



Congratulations, you have completed all the lab exercises.

We Value Your Feedback!

- Don’t forget to submit your Think 2018 session and speaker feedback! Your feedback is very important to us – we use it to continually improve the conference.
- Access the Think 2018 agenda tool to quickly submit your surveys from your smartphone, laptop or conference kiosk.