

# Day 5

## Info - What is an ImageStream in OpenShift?

- ImageStream is a resource supported only in OpenShift
- ImageStream is connected with OpenShift's Internal Container Image Registry
- We can store multiple versions of same container image within an ImageStream

## Lab - Buildconfig

- This is a new feature added in Openshift and not supported in Kubernetes
- In this lab exercise, we will create an imagestream to push our custom docker image
- We will create a buildconfig using Docker strategy
- Build config with docker strategy will pick the Dockerfile present in our Day5/BuildConfig and starts the build
- The Dockerfile is a multi-stage Dockerfile, in the first stage it builds the springboot sample microservice source code to create the application executable jar file. The second stage copies the application jar and builds the final custom container image.
- The container image is saved to ImageStream.
- As the image stream is pointing to Openshift's Internal Container Image Registry, eventually the image is stored in Openshift's Internal Container Image Registry.
- The output of this Buildconfig is a Docker image, which will be pushed to openshift's Internal Container Image registry.

Let's create an image stream

```
cd ~/openshift-3june-2024
git pull
cd Day5/BuildConfig

oc apply -f imagestream.yml
oc get imagestreams
oc get imagestream
oc get is
```

Let's create the buildconfig

```

cd ~/openshift-3june-2024
git pull
cd Day5/BuildConfig
oc delete -f buildconfig.yml
oc apply -f buildconfig.yml
oc get buildconfigs
oc get buildconfig
oc get bc

oc get builds
oc get build

oc logs -f bc/spring-hello

```

You can deploy the application after replacing the image name with your image name ( replace 'jegan' with your project name)

```

oc apply -f hello-deploy-from-openshift-image-registry.yml
oc get po
oc expose deploy/hello --port=8080
oc expose svc/hello
oc get route
curl http://hello-jegan.apps.ocp4.tektutor.org.labs

```

### Expected output

```

jegan@tektutor.org ~/openshift-3june-2024/Day5/BuildConfig $ main ● ls -l
total 40
-rw-r--r-- 1 jegan jegan 500 Jun 7 10:02 buildconfig-pushto-artifactory.yml
-rw-r--r-- 1 jegan jegan 424 Jun 7 10:03 buildconfig.yml
-rw-r--r-- 1 jegan jegan 217 Jun 7 10:02 Dockerfile
-rw-r--r-- 1 jegan jegan 358 Jun 7 10:06 hello-deploy-from-openshift-image-registry.yml
-rw-r--r-- 1 jegan jegan 428 Jun 7 10:02 hello-deploy.yml
-rw-r--r-- 1 jegan jegan 219 Jun 7 10:02 hello-route.yml
-rw-r--r-- 1 jegan jegan 227 Jun 7 10:02 hello-svc.yml
-rw-r--r-- 1 jegan jegan 132 Jun 7 11:40 imagestream.yml
-rw-r--r-- 1 jegan jegan 581 Jun 7 10:02 Jenkinsfile
-rw-r--r-- 1 jegan jegan 1715 Jun 7 10:02 pom.xml
drwxr-xr-x 3 jegan jegan 18 Jun 7 10:02 src

jegan@tektutor.org ~/openshift-3june-2024/Day5/BuildConfig $ main ● oc apply -f imagestream.yml
imagestream.image.openshift.io/tektutor-spring-hello created
jegan@tektutor.org ~/openshift-3june-2024/Day5/BuildConfig $ main ● oc apply -f buildconfig.yml
buildconfig.build.openshift.io/spring-hello created
jegan@tektutor.org ~/openshift-3june-2024/Day5/BuildConfig $ main ● oc get buildconfigs
NAME      TYPE   FROM          LATEST
spring-hello  Docker Git@main  1

jegan@tektutor.org ~/openshift-3june-2024/Day5/BuildConfig $ main ● oc get buildconfig
NAME      TYPE   FROM          LATEST
spring-hello  Docker Git@main  1

jegan@tektutor.org ~/openshift-3june-2024/Day5/BuildConfig $ main ● oc get bc
NAME      TYPE   FROM          LATEST
spring-hello  Docker Git@main  1

jegan@tektutor.org ~/openshift-3june-2024/Day5/BuildConfig $ main ● oc get builds
NAME          TYPE   FROM          STATUS    STARTED          DURATION
spring-hello-1  Docker Git@8b8b9e9  Running   18 seconds ago
jegan@tektutor.org ~/openshift-3june-2024/Day5/BuildConfig $ main ● oc get build
NAME          TYPE   FROM          STATUS    STARTED          DURATION
spring-hello-1  Docker Git@8b8b9e9  Running   20 seconds ago
jegan@tektutor.org ~/openshift-3june-2024/Day5/BuildConfig $ main ● #oc logs -f bc/spring-hello
jegan@tektutor.org ~/openshift-3june-2024/Day5/BuildConfig $ main ● oc logs -f build/spring-hello-1
Cloning "https://github.com/tektutor/openshift-3june-2024.git" ...
  commit: 0b00000000000000000000000000000000000000 (Added imagestream to Dave buildconfig lab exercise)

```

```
jegan@tektutor.org
spring-hello-1 Docker Git@8b8b9e9 Running 18 seconds ago
jegan@tektutor.org > ~/openshift-3june-2024/Day5/BuildConfig > main ● oc get build
NAME      TYPE    FROM          STATUS   STARTED   DURATION
spring-hello-1 Docker  Git@8b8b9e9  Running  20 seconds ago
jegan@tektutor.org > ~/openshift-3june-2024/Day5/BuildConfig > main ● #oc logs -f bc/spring-hello
jegan@tektutor.org > ~/openshift-3june-2024/Day5/BuildConfig > main ● oc logs -f build/spring-hello-1
Cloning "https://github.com/tektutor/openshift-3june-2024.git" ...
Commit: 8b8b9e9a080f7c15d8aaa919fcebab87ebf2df21 (Added imagestream to Day5 buildconfig lab exercise)
Author: Jeganathan Swaminathan <mail2jegan@gmail.com>
Date: Fri Jun 7 11:41:02 2024 +0530
time="2024-06-07T06:13:50Z" level=info msg="Not using native diff for overlay, this may cause degraded performance for building images:
kernel has CONFIG_OVERLAY_FS_REDIRECT_DIR enabled"
I0607 06:13:50.399641       1 defaults.go:112] Defaulting to storage driver "overlay" with options [mountopt=metacopy=on].
Caching blobs under "/var/cache/blobs".
Pulling image docker.io/maven:3.6.3-jdk-11 ...
Trying to pull docker.io/library/maven:3.6.3-jdk-11...
Getting image source signatures
Copying blob sha256:6c215442f70bd949a6f2e8092549943905e2d4f9c87a4f532d7740ae8647d33a
Copying blob sha256:234b70d0479d7f16d7ee8d04e4ffdacc57d7d14313faf59d332f18b2e9418743
Copying blob sha256:shab1c6a57603cb4f321a861a08105a81bcc6b01b0ec2b78c8523a5
Copying blob sha256:48c2faf66abec3dce9f54d6722ff592fce6dd4fb58a0db72282936c6598a3b3
Copying blob sha256:004f1eed87df3f75f5e2a1a649fa7edd7f713d1300532fd0909bb39cd48437d7
Copying blob sha256:d7eb6c022a4e6128219b32a8e07c8c22c89624ff440ebac1506121794bc15ccc
Copying blob sha256:355e8215390faee903502a9fddfc65cd823f1606f053376ba2575adce66974a1
Copying blob sha256:c5fe43522f68d7e2347e19ad70dadcf1594d25b792ede0464c2936ff902c4c6
Copying blob sha256:4fee0489a65b64056f81358639bfe85fd87776630830fd02ce8c15e34928bf9c
Copying blob sha256:413646e6fa5d7bcd9722d3e400fc080a77deb505baed79afa5fedae23583af25
Copying config sha256:e23b595c92ada5c9f20a27d547ed980a445f644eb1cbcde/cfb27478fa38c4691
Writing manifest to image destination

Pulling image registry.access.redhat.com/ubi8/openjdk-11 ...
Trying to pull registry.access.redhat.com/ubi8/openjdk-11:latest...
Getting image source signatures
Copying blob sha256:b535d8b70f04742b578e92c010e3c35661bd2f129f0ccbe9e0acf226a40138d1
Copying blob sha256:8b8b9e9a080f7c15d8aaa919fcebab87ebf2df21

jegan@tektutor.org
[INFO] Finished at: 2024-06-07T06:14:43Z
[INFO] -----
--> 4e27d5241a34
[2/2] STEP 1/6: FROM registry.access.redhat.com/ubi8/openjdk-11
[2/2] STEP 2/6: COPY --from=stage1 target/*.jar app.jar
--> 777b99922bca
[2/2] STEP 3/6: EXPOSE 8080
--> 3562af91b9ab
[2/2] STEP 4/6: ENTRYPOINT ["java","-jar","app.jar"]
--> 2c89ee1e084c
[2/2] STEP 5/6: ENV "OPENSHIFT_BUILD_NAME"="spring-hello-1" "OPENSHIFT_BUILD_NAMESPACE"="jegan" "OPENSHIFT_BUILD_SOURCE"="https://github.com/tektutor/openshift-3june-2024.git" "OPENSHIFT_BUILD_REFERENCE"="main" "OPENSHIFT_BUILD_COMMIT"="8b8b9e9a080f7c15d8aaa919fcebab87ebf2df21"
--> 9b543017196e
[2/2] STEP 6/6: LABEL "io.openshift.build.commit.author"="Jeganathan Swaminathan <mail2jegan@gmail.com>" "io.openshift.build.commit.date"="Fri Jun 7 11:41:02 2024 +0530" "io.openshift.build.commit.id"="8b8b9e9a080f7c15d8aaa919fcebab87ebf2df21" "io.openshift.build.commit.message"="Added imagestream to Day5 buildconfig lab exercise" "io.openshift.build.commit.ref"="main" "io.openshift.build.name"="spring-hello-1" "io.openshift.build.namespace"="jegan" "io.openshift.build.source-context-dir"="Day5/BuildConfig" "io.openshift.build.source-location"="https://github.com/tektutor/openshift-3june-2024.git"
[2/2] COMMIT temp.builder.openshift.io/jegan/spring-hello-1:67c5ba29
--> 32acd6e63112
Successfully tagged temp.builder.openshift.io/jegan/spring-hello-1:67c5ba29
32acd6e631125fe29e91632982e4d0a376e7102c5765b16d0cc5a889d1568ca6

Pushing image image-registry.openshift-image-registry.svc:5000/jegan/tektutor-spring-hello:latest ...
Getting image source signatures
Copying blob sha256:97765fb4bc26e04b9409a092dc3a7e21a7fef947d2f7ffd641e8d38a95f9d48
Copying blob sha256:b535d8b70f04742b578e92c010e3c35661bd2f129f0ccbe9e0acf226a40138d1
Copying blob sha256:9d49001ad6c59e36ffff8fa74763be0954414b6ad5333f7855bb70fa0d6e86cb6
Copying config sha256:32acd6e631125fe29e91632982e4d0a376e7102c5765b16d0cc5a889d1568ca6
Writing manifest to image destination
Successfully pushed image-registry.openshift-image-registry.svc:5000/jegan/tektutor-spring-hello@sha256:cb8f42a44a625c8664efcbc4736a1843872d666a0af9d32c17fb0177b906a5ef
Push successful
jegan@tektutor.org > ~/openshift-3june-2024/Day5/BuildConfig > main ● 
```

BuildConfigs - Red Hat OpenShift - Google Chrome

Not secure https://console.openshift-console.apps.ocp4.tektutor.org.labs/k8s/ns/jegan/build.openshift.io-v1~BuildConfig

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You are logged in as a temporary administrative user. Update the cluster OAuth configuration to allow others to log in.

Project: jegan

## BuildConfigs

Create BuildConfig

Filter Name Search by name...

Name	Last run	Last run status	Last run time	Last run duration
BC spring-hello	B spring-hello-1	Complete	7 Jun 2024, 11:43	1 minute 9 seconds

BuildConfigs - Red Hat OpenShift - Google Chrome

Not secure https://console.openshift-console.apps.ocp4.tektutor.org.labs/k8s/ns/jegan/build.openshift.io-v1~BuildConfig

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Project: jegan

## BuildConfigs

Create BuildConfig

Filter Name Search by name...

Name	Last run	Last run status	Last run time	Last run duration
BC spring-hello	B spring-hello-1	Complete	7 Jun 2024, 11:43	1 minute 9 seconds

spring-hello-1 - Build - Details - Red Hat OpenShift - Google Chrome

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Builds > Build details

**B spring-hello-1** Complete

Details Metrics YAML Environment Logs Events

**Build details**

Name	spring-hello-1	Status	Complete
Namespace	jegan	BuildConfig	BC spring-hello
Labels	buildconfig=spring-hello, name=spring-hello, openshift.io/build-config.name=spring-hello, openshift.io/build.start-policy=Serial	Start time	7 Jun 2024, 11:43
Annotations	3 annotations	Completion time	7 Jun 2024, 11:44
		Duration	1 minute 9 seconds

spring-hello-1 - Build - Logs - Red Hat OpenShift - Google Chrome

Not secure https://console.openshift-console.apps.ocp4.tektutor.org.labs/k8s/ns/jegan/builds/spring-hello-1/logs

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Details Metrics YAML Environment Logs Events

⚠ Some lines have been abridged because they are exceptionally long.  
To view unabridged log content, you can either open the raw file in another window or download it.

Log stream ended. Search Show full log Wrap lines Raw Download Expand

```
1000 lines
989 Successfully tagged temp.builder.openshift.to/jegan/spring-hello-1:67c5ba29
990 32acd6e631125fe29e91632982e4d0a376e7102c5765b16d0cc5a889d1568ca6
991
992 Pushing image image-registry.openshift-image-registry.svc:5000/jegan/tektutor-spring-hello:latest ...
993 Getting image source signatures
994 Copying blob sha256:97765fb4bc26e04b9409a092dc3a7e21a7fef947d2f7ffdf641e8d38a95f9d48
995 Copying blob sha256:b535d8b70f04742b578e92c01e3c35661bd2f129fc0ccb9e0acf226a40138d1
996 Copying blob sha256:9d49001ad6c59e36fff8fa74763be0954414b6ad5333f7855bb70fa0d6e86cb6
997 Copying config sha256:32acd6e631125fe29e91632982e4d0a376e7102c5765b16d0cc5a889d1568ca6
998 Writing manifest to image destination
999 Successfully pushed image-registry.openshift-image-registry.svc:5000/jegan/tektutor-spring-hello@sha256:cb8f42a44a625c8664efcbc4736a18438
1000 Push successful
```

ImageStreams - Red Hat OpenShift - Google Chrome

Not secure https://console-openshift-console.apps.ocp4.tektutor.org.labs/k8s/ns/jegan/image.openshift.io-v1-ImageStream

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## Red Hat OpenShift

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Project: jegan

### ImageStreams

Name Search by name... /

Name	Labels	Created
nginx	app=nginx, app.kubernetes.io/component=nginx, app.kubernetes.io/instance=nginx	6 Jun 2024, 17:21
tektutor-spring-hello	No labels	7 Jun 2024, 11:42

Create ImageStream

tektnur-spring-hello - ImageStream - Details - Red Hat OpenShift - Google Chrome

Not secure https://console-openshift-console.apps.ocp4.tektutor.org.labs/k8s/ns/jegan/imagestreams/tektutor-spring-hello

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## Red Hat OpenShift

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Project: jegan

Annotations 1 annotation

Image repository image-registry.openshift-image-registry.svc:5000/jegan/tektutor-spring-hello

Image count 1

Created at 7 Jun 2024, 11:42

Owner No owner

Tags

Name	From	Identifier	Last updated
tektutor-spring-hello:latest	pushed image	sha256:cb8f42a44a625c8664efcbc4736a1843872d666a0af9d32c17fb0177b906a5ef	7 Jun 2024, 11:44

```
jegan@tektutor.org ~
jegan@tektutor.org buildconfig-pushto-artifactory.yml Dockerfile
jegan@tektutor.org buildconfig.yml hello-deploy-from-openshift-image-registry.yml hello-route.yml imagestream.yml pom.xml
jegan@tektutor.org vim hello-deploy-from-openshift-image-registry.yml
jegan@tektutor.org oc apply -f hello-deploy-from-openshift-image-registry.yml
jegan@tektutor.org deployment.apps/hello created
jegan@tektutor.org oc get deploy,rs,po
NAME          READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/hello  3/3     3           3           6s

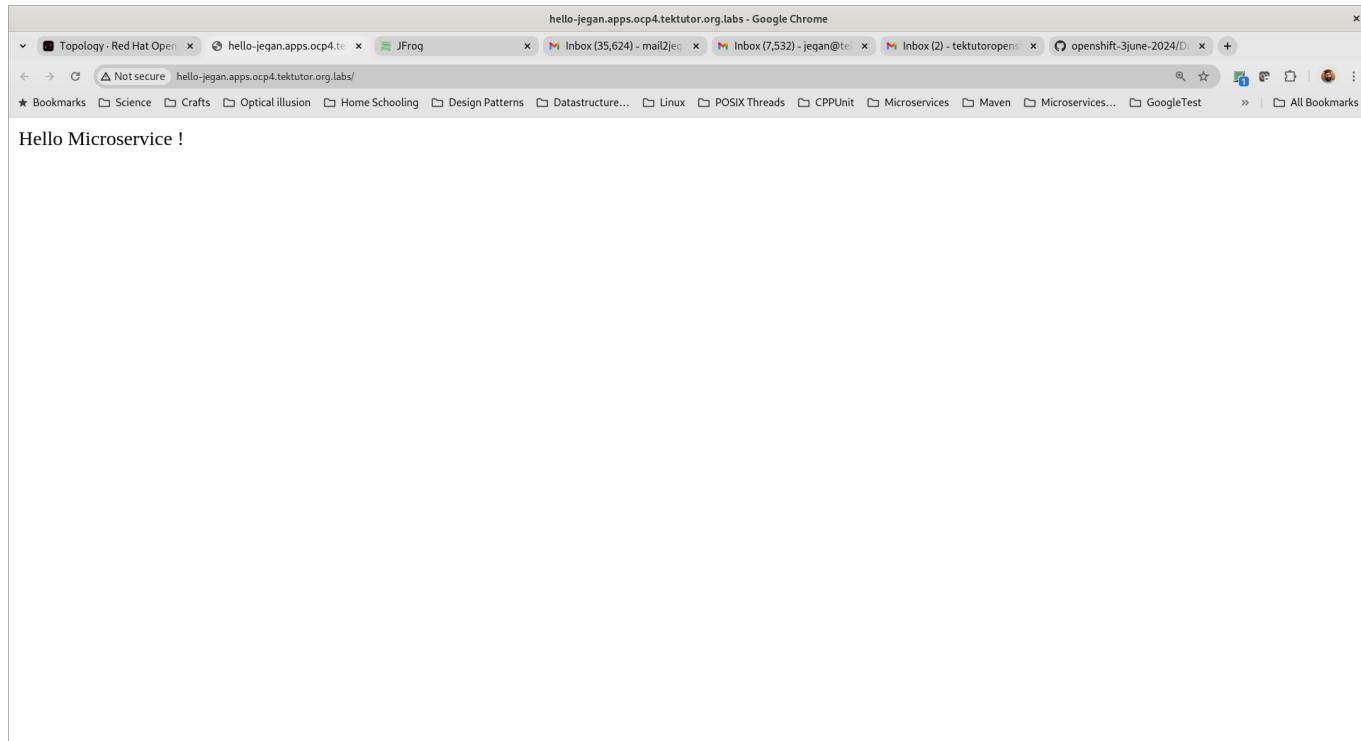
NAME          DESIRED   CURRENT   READY   AGE
replicaset.apps/hello-6b994499c8  3         3         3         6s

NAME          READY   STATUS    RESTARTS   AGE
pod/hello-6b994499c8-bf2l2  1/1     Running   0          6s
pod/hello-6b994499c8-fcpvh  1/1     Running   0          6s
pod/hello-6b994499c8-jpqdq  1/1     Running   0          6s
pod/spring-hello-1-build   0/1     Completed  0          4m44s
jegan@tektutor.org oc get svc
NAME    TYPE        CLUSTER-IP      EXTERNAL-IP      PORT(S)        AGE
nginx  ClusterIP  172.30.231.98 <none>           8080/TCP,8443/TCP 18h
jegan@tektutor.org oc expose deploy/hello --port=8080
service/hello exposed
jegan@tektutor.org oc expose svc/hello
route/hello exposed
jegan@tektutor.org oc get svc,route
NAME    TYPE        CLUSTER-IP      EXTERNAL-IP      PORT(S)        AGE
service/hello  ClusterIP  172.30.120.46 <none>           8080/TCP      10s
service/nginx  ClusterIP  172.30.231.98 <none>           8080/TCP,8443/TCP 18h

NAME          HOST/PORT      PATH  SERVICES  PORT  TERMINATION  WILDCARD
route.route.openshift.io/hello  hello-jegan.apps.ocp4.tektutor.org.labs  hello  8080  None
route.route.openshift.io/nginx  nginx-jegan.apps.ocp4.tektutor.org.labs  nginx  8080-tcp  edge  None
jegan@tektutor.org curl http://hello-jegan.apps.ocp4.tektutor.org.labs
Hello Microservice !
```

Topology - Red Hat OpenShift - Google Chrome

The screenshot shows the Red Hat OpenShift Topology interface. The left sidebar has a 'Topology' section selected. The main area displays a single pod named 'hello' represented by a blue circle with a red icon. Below the pod icon is a button labeled 'D hello'. At the bottom of the interface are several small navigation icons.



## Lab - Create a JFrog Push secret

```
oc create secret docker-registry private-jfrog-image-registry --docker-server=openshiftjegan.jfrog.io --docker-username=your-email-id --docker-password=your-jfrog-token

oc get secrets
```

## Lab - Build and Push Custom Docker Image to JFrog Artifactory using BuildConfig

```
cd ~/openshift-3june-2024
git pull
cd Day5/BuildConfig

oc apply -f buildconfig-pushto-artifactory.yml
oc get bc
oc logs -f bc/hello
```

## Expected output

**Red Hat OpenShift - Google Chrome**

You are logged in as a temporary administrative user. Update the cluster OAuth configuration to allow others to log in.

Project: jegan

Logs

Log stream ended. Search

906 lines

```
L2/Z) UMMMI temp.builder.openshift.io/jegan/hello-1:17360324
--> c9492ba8be1a2a199de0a8ea99354d99be5addcf4d3ddc6bd52ac24186aa335a
c9492ba8be1a2a199de0a8ea99354d99be5addcf4d3ddc6bd52ac24186aa335a
902
903 Pushing image openshiftjegan.jfrog.io/tekutorjegan-docker/hello-spring-microservice:2.0 ...
904 Getting image source signatures
905 Copying blob sha256:a19c1db86b56d92b4d9cc9ee30899ce07641f8ba17831ffd074240384f32cb0
906 Copying blob sha256:c9492ba8be1a2a199de0a8ea99354d99be5addcf4d3ddc6bd52ac24186aa335a
907 Copying blob sha256:96dd1ddca72405a4e0fb1f8f7dddfa8139dcf8e79cb6158672600145f2ea6b
908 Warning: Push failed, retrying in 5s ...
909 Getting image source signatures
910 Copying blob sha256:a19c1db86b56d92b4d9cc9ee30899ce07641f8ba17831ffd074240384f32cb0
911 Copying blob sha256:96dd1ddca72405a4e0fb1f8f7dddfa8139dcf8e79cb6158672600145f2ea6b
912 Copying blob sha256:e9d76a739ee546e413230c4756e86f2ce61e7c4975f40def37648e4fd5a8726
913 Copying config sha256:c9492ba8be1a2a199de0a8ea99354d99be5addcf4d3ddc6bd52ac24186aa335a
914 Writing manifest to image destination
915 Successfully pushed openshiftjegan.jfrog.io/tekutorjegan-docker/hello-spring-microservice@sha256:2fd7a905aab33526f837f89b7b0524525ce7a688a67b0df5c0b4e1d34b08ddb
916 Push successful
```

**JFrog - Google Chrome**

Day 10/14 | Free Trial until Jun 4, 2024

All Projects Application Administration

Search Artifacts

My Favorites Tree View

Get Started Artifactory Packages Builds Artifacts Release Lifecycle Xray Distribution Pipelines Integrations Connect MyJFrog Portal Learning Center

Happy serving 879 artifacts

Search Repositories Filter by: Package Types Repository Types Clear Sort by: Repository Type

tektutorjegan-docker / frog / hello-spring-microservice / 2.0 / manifest.json

Name: hello-spring-microservice

Repository Path: tektutorjegan-docker/hello-spring-microservice/

File URL: https://openshiftjegan.jfrog.io/artifactory/tektutorjegan-docker/hello-spring-microservice/

Created: 31-05-24 09:02:17 +00:00

Package Information

Dependency Declaration

Virtual Repository Associations

Included Repositories

Checksums

BuildConfigs - Red Hat OpenShift - Google Chrome

Not secure https://console-openshift-console.apps.ocp4.tektutor.org.labs/k8s/ns/jegan/build.openshift.io-v1~BuildConfig

You are logged in as a temporary administrative user. Update the cluster OAuth configuration to allow others to log in.

Project: jegan

## BuildConfigs

Create BuildConfig

Name	Last run	Last run status	Last run time	Last run duration
BC hello	B hello-1	Complete	⌚ 31 May 2024, 14:28	4 minutes 27 seconds
BC spring-hello	B spring-hello-1	Complete	⌚ 31 May 2024, 13:07	1 minute 58 seconds

Administrator

- Home
- Operators
- Workloads
  - Serverless
  - Networking
  - Storage
- Builds
  - BuildConfigs
  - Builds
  - ImageStreams
- Pipelines
- Observe
- Compute

BuildConfigs

hello-1 - Build - Details - Red Hat OpenShift - Google Chrome

Not secure https://console-openshift-console.apps.ocp4.tektutor.org.labs/k8s/ns/jegan/builds/hello-1

You are logged in as a temporary administrative user. Update the cluster OAuth configuration to allow others to log in.

Project: jegan

Builds > Build details

### hello-1 Complete

Actions

Details Metrics YAML Environment Logs Events

#### Build details

Name	hello-1	Status	Complete
Namespace	jegan	BuildConfig	BC hello
Labels	buildconfig=hello, name=hello, openshift.io/build-config.name=hello, openshift.io/build.start-policy=Serial	Start time	⌚ 31 May 2024, 14:28
Annotations	3 annotations	Completion time	⌚ 31 May 2024, 14:32
Triggered by	Build configuration change	Duration	4 minutes 27 seconds
Created at	⌚ 31 May 2024, 14:28	Type	Docker
Owner	https://github.com/tektutor/openshift-27may-2024.git	Git repository	

Administrator

- Home
- Operators
- Workloads
  - Serverless
  - Networking
  - Storage
- Builds
  - BuildConfigs
  - Builds
  - ImageStreams
- Pipelines
- Observe
- Compute

```

906 lines
888 [2/2] WUMMII temp.builder.openshift.io/jegan/hello-1:1/3b6524
889 --> c9492ba8bela
890 Successfully tagged temp.builder.openshift.io/jegan/hello-1:17360324
891 c9492ba8bela2a199de0a0e99354d99be5addcf4d3ddc6bd52ac241b6aa335a
892
893 Pushing image openshiftjegan.jfrog.io/tekutorjegan-docker/hello-spring-microservice:2.0 ...
894 Getting image source signatures
895 Copying blob sha256:e9d76a739ee546e413230c4756e866f2ce61e7c4975f40def37648e4fd5a8726
896 Copying blob sha256:c19c1d8b6a56d82b4dccc9e30899ce076a1f8b17831ff074240384f32cb0
897 Copying blob sha256:96dd1cdca72405a4e0fb1f8f7dd6faa8130dcf8e79cb6158872600145f2ea6b
898 Warning: Push failed, retrying in 5s ...
899 Getting image source signatures
900 Copying blob sha256:c19c1d8b6a56d82b4d9cc9ee30899ce076a1f8b17831ff074240384f32cb0
901 Copying blob sha256:96dd1cdca72405a4e0fb1f8f7dd6faa8130dcf8e79cb6158872600145f2ea6b
902 Copying blob sha256:e9d76a739ee546e413230c4756e866f2ce61e7c4975f40def37648e4fd5a8726
903 Copying config sha256:c9492ba8bela2a199de0a0e99354d99be5addcf4d3ddc6bd52ac241b6aa335a
904 Writing manifest to image destination
905 Successfully pushed openshiftjegan.jfrog.io/tekutorjegan-docker/hello-spring-microservice@sha256:2fd7a905aab33526f837f89b7b0524525ce7a688a67b0df5c0b4e1d34b08ddb4
906 Push successful

```

## CI/CD

You need to create a trial JFrog Artifactory (14-days Cloud Trial) @ <https://jfrog.com/start-free/#trialOptions> with your personal gmail account (No credit cards required)

**Choose Your Experience**

**JFrog Platform Tour**

- ✓ No setup required
- ✓ Populated with sample data (read-only)
- ✓ Optional self-guided tours

For viewing JFrog functionality in action  
with minimal upfront investment.

[PLATFORM TOUR >](#)

**Free Trial**

- ✓ Configure your own trial instance
- ✓ Populate with your data
- ✓ The full JFrog Platform Experience

For performing a full review or  
POC of JFrog's capabilities.

[CLOUD TRIAL >](#) [SELF-HOSTED TRIAL >](#)

[← Back](#)

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[Cookies Settings](#) [Accept All Cookies](#)

You could choose AWS ( they use their cloud account hence no charges are applicable to us - I didn't give my mobile number )

Start a Trial With Artifactory and Xray | JFrog - Google Chrome

openshift troubleshoot | Inbox - mail2tektutor@ | OpenShift Operators: | Editing openshift-may | openshift-april-2024/D | Inbox - mail2tektutor@ | Start a Trial With Artifactory | 13 Best Photo Image Ed

jfrog.com/start-free/#saas

## Set up your JFrog Platform Environment

Free 14-Day Trial

Create a Hostname\* <https://openshiftjegan.jfrog.io>  
This will be your team's subdomain.

Hostname: openshiftjegan

Last Name\* Swamianthan

Company\* Personal

Phone Enter your phone number

Hosting Preferences

Select a Cloud Provider for your JFrog Environment (optional)

AWS Google Cloud Microsoft Azure

Cloud Region\* US West 2 (Oregon)

What are you interested in?

DevOps Package and Dependency Management, CI/CD, Container Registry

IoT Software Updates, Remote Access, Fleet Management

End-to-End Security Vulnerability detection, prioritization and remediation

Other

Which of the following best matches your role?

Software Engineer

Back TRY IT NOW

JFrog Landing - Google Chrome

landing.jfrog.com/register/trial-enterprise/waiting?a=IJ4brUH7TjnOjWRuEdAv2kEdMeircOca8Pf8vhSkSSAYrXz5u3lYp9i96K6APgdOpSPJtarKYzOGeDEGQsmxThNS3oTy6428nIDRW2dldEsLc54DL1B7BvqNQ76gjjlJ9ZFdJLbf7AkU...

## Your DevOps & Security Journey is About to Begin

Your JFrog Trial environment is being created

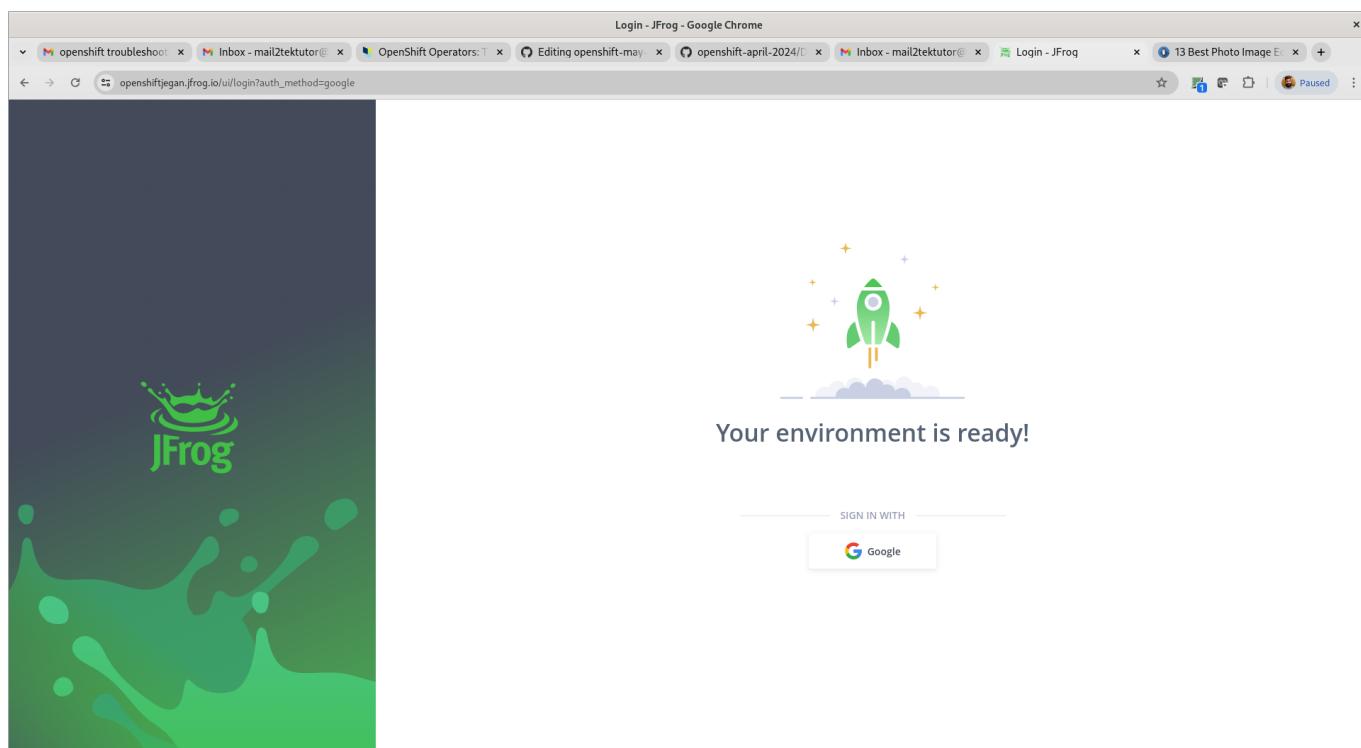
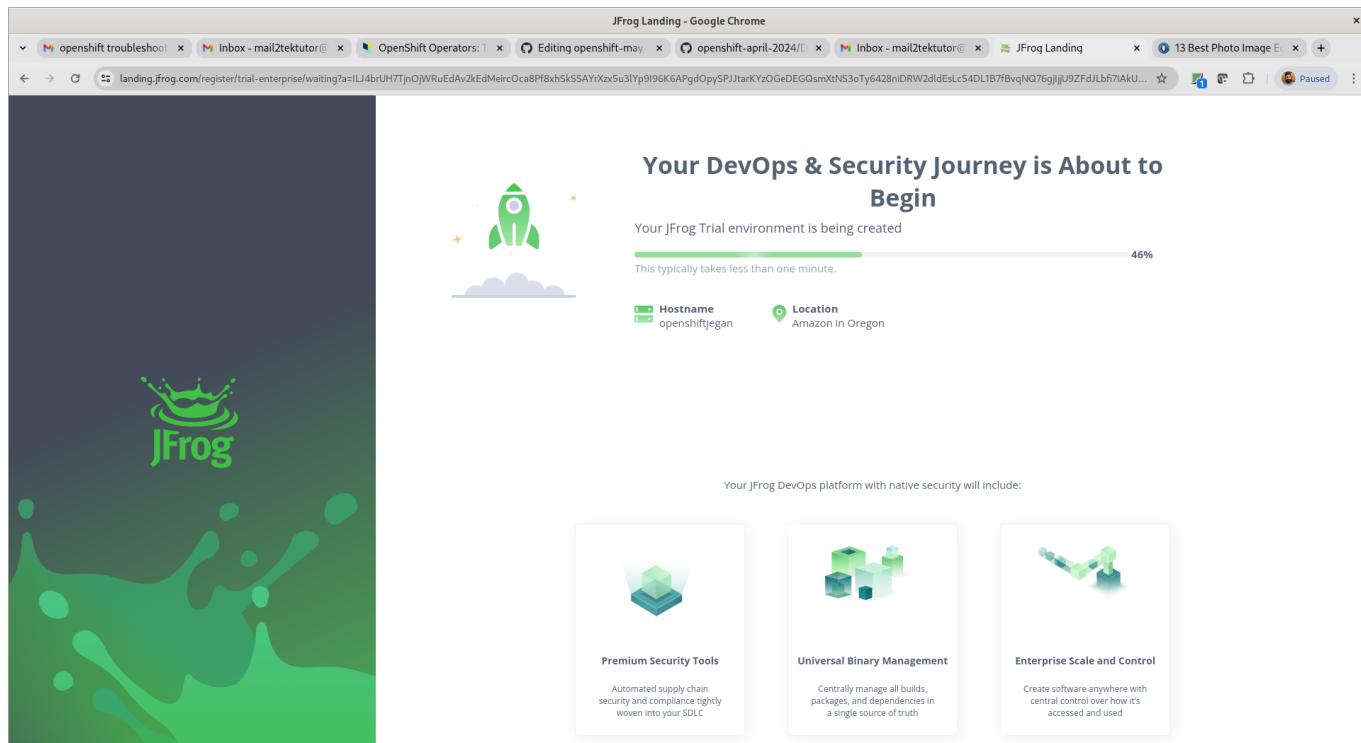
This typically takes less than one minute.

25%

Hostname: openshiftjegan Location: Amazon In Oregon

Your JFrog DevOps platform with native security will include:

- Premium Security Tools: Automated supply chain security and compliance tightly woven into your SDLC
- Universal Binary Management: Centrally manage all builds, packages, and dependencies in a single source of truth
- Enterprise Scale and Control: Create software anywhere with central control over how it's accessed and used



Now you should be able to login to your jfrog cloud with your gmail account that your registered with JFrog trial

The screenshot shows the JFrog Platform 'Get Started' page. The left sidebar includes links for Get Started, Artifactory, Xray, Distribution, Pipelines, Integrations, Connect, and MyJFrog Portal. The main content area features a 'Get Started with JFrog' section with a progress bar at 0%. It lists two main sections: 'Set up your workflow' (0/3 steps) and 'Secure your packages' (0/5 steps). The 'Set up your workflow' section includes:

- 1 Create your first repository: Create a repository to host your favorite package type. (1 min, Go button)
- 2 Connect a developer client: Configure your package manager to deploy packages and resolve dependencies. (Go button)
- 3 Connect your CI tool: Configure your CI tool to publish packages and resolve dependencies. (Go button)

The 'Secure your packages' section includes:

- 1 View scan results: View Xray results for scanned resources. (1 min, Go button)
- 2 Upload your own image: Upload an image from your local machine and scan it with Xray. (3 min, Go button)
- 3 Import your own image: Import an image from your container registry and scan it with Xray. (5 min, Go button)
- 4 Scan your git repositories using Frogbot: Scan pull requests immediately after they are opened but before they are merged. (10 min, Go button)
- 5 Scan project dependencies in your IDE: Use JFrog Xray to scan for security vulnerabilities, license & operational risk in your IDE. (5 min, Go button)

Below these sections is a 'Explore Advanced Capabilities' link.

The screenshot shows the JFrog Platform 'Projects' page. The left sidebar includes links for Projects, Environments, Repositories, User Management, User Authentication, Platform Security, Platform Management, Platform Monitoring, Topology, Artifactory Settings, Xray Settings, and Worker. The main content area shows a 'Projects' section with tabs for All Projects and Unassigned. A green box highlights 'Get Started with your first Project!' and a '+ Create New' button.

Activities Google Chrome May 21 12:20 • JFrog - Google Chrome

Inbox (1) - mail2tektutor... x 24MAN0412\_Container... x Cisco Webex x Inbox (35,420) - mail2[...].x openshift-may-2024/D... x Topology - Red Hat Open... x JFrog x +

openshiftjegan.jfrog.io/ui/admin/repositories/virtual

Day 1/14 | Free Trial until Jun 4, 2024

JFrog Platform All Projects Application Administration

Repositories

Virtual Local Remote Federated

0 Repositories

No results were found Try to change your search

Set Me Up Create a Repository

Pre-Built Setup JFrog Best Practice

A recommended repository structure to host packages your team creates and proxy public and private registries

Virtual Access multiple repositories within a single URL

Local Upload and resolve your own packages

Remote Proxy and cache packages hosted remotely

Federated Mirror packages from different JFrog instances

JFrog Platform JFrog Core Copyright 2024 JFrog Ltd

Activities Google Chrome May 21 12:21 • JFrog - Google Chrome

Inbox (1) - mail2tektutor... x 24MAN0412\_Container... x Cisco Webex x Inbox (35,420) - mail2[...].x openshift-may-2024/D... x Topology - Red Hat Open... x JFrog x +

openshiftjegan.jfrog.io/ui/admin/repositories/virtual

Day 1/14 | Free Trial until Jun 4, 2024

JFrog Platform All Projects Application Administration

Repositories

Virtual Local Remote Federated

0 Repositories

Create Repositories

Select the package type you want - we'll create the default repositories for you!

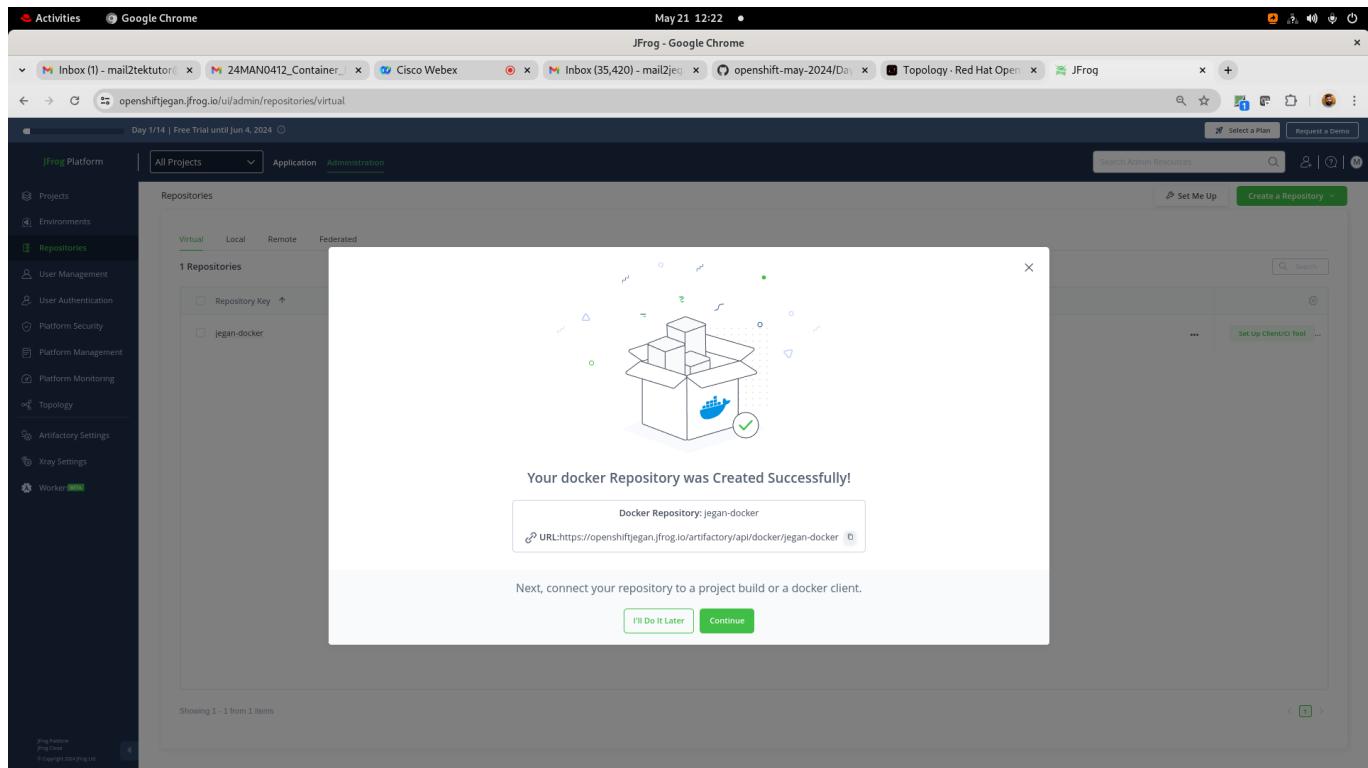
Search by package type

Alpine Bower Cargo Chef CocoaPods Composer Conan Conda CRAN Debian Docker Gems Generic GitLfs Go Gradle Helm HelmOCI HuggingFace Ivy Maven npm NuGet OCI Opkg Pub Puppet PyPi SBT Swift Terraform Vagrant Rpm

JFrog Platform JFrog Core Copyright 2024 JFrog Ltd

The screenshot shows the JFrog Platform interface in Google Chrome. The user is navigating through the 'Repositories' section under the 'Virtual' tab. A modal window titled 'Create Repositories' is open, prompting the user to assign a prefix identifier. The prefix '021' is entered into the input field. Below the input field, there are three options: 'Local Repository' (labeled 'docker-local'), 'Remote Repository' (labeled 'https://registry-1.docker.io/' and 'docker-remote'), and 'Virtual Repository' (labeled 'docker'). A 'Create' button is visible at the bottom right of the modal.

This screenshot shows the same JFrog Platform interface and repository creation process as the first one. However, the 'Repositories prefix' input field now contains the value 'jegan'. The other repository types and their details remain the same: Local Repository ('jegan-docker-local'), Remote Repository ('https://registry-1.docker.io/' and 'jegan-docker-remote'), and Virtual Repository ('jegan-docker'). The 'Create' button is again visible at the bottom right.



```
jegan@tektutor.org ➔ docker login -u mail2tektutor@gmail.com openshiftjegan.jfrog.io
Password:
WARNING! Your password will be stored unencrypted in /home/jegan/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store

Login Succeeded
jegan@tektutor.org ➔
```

The screenshot shows the JFrog Artifactory interface with the "Artifacts" section selected. On the left, a tree view shows repositories like "jegan-docker" containing "jfrog", "Hello-world", and "1.0.0" which further contains "manifest.json". On the right, a detailed view of "manifest.json" is shown under the "General" tab. The file path is "jegan-docker/hello-world/1.0.0/manifest.json". The file URL is "https://openshiftjegan.jfrog.io/artifactory/api/docker/jegan-docker/hello-world/1.0.0/manifest.json". The size is 524 bytes, created on 21-05-24 06:54:25 +00:00, and last modified on 21-05-24 06:54:25 +00:00. The package information section is empty. The dependency declaration section is also empty. The virtual repository associations section is empty. The included repositories section is empty. The checksums section shows SHA-256, SHA-1, and MD5 values for the file.

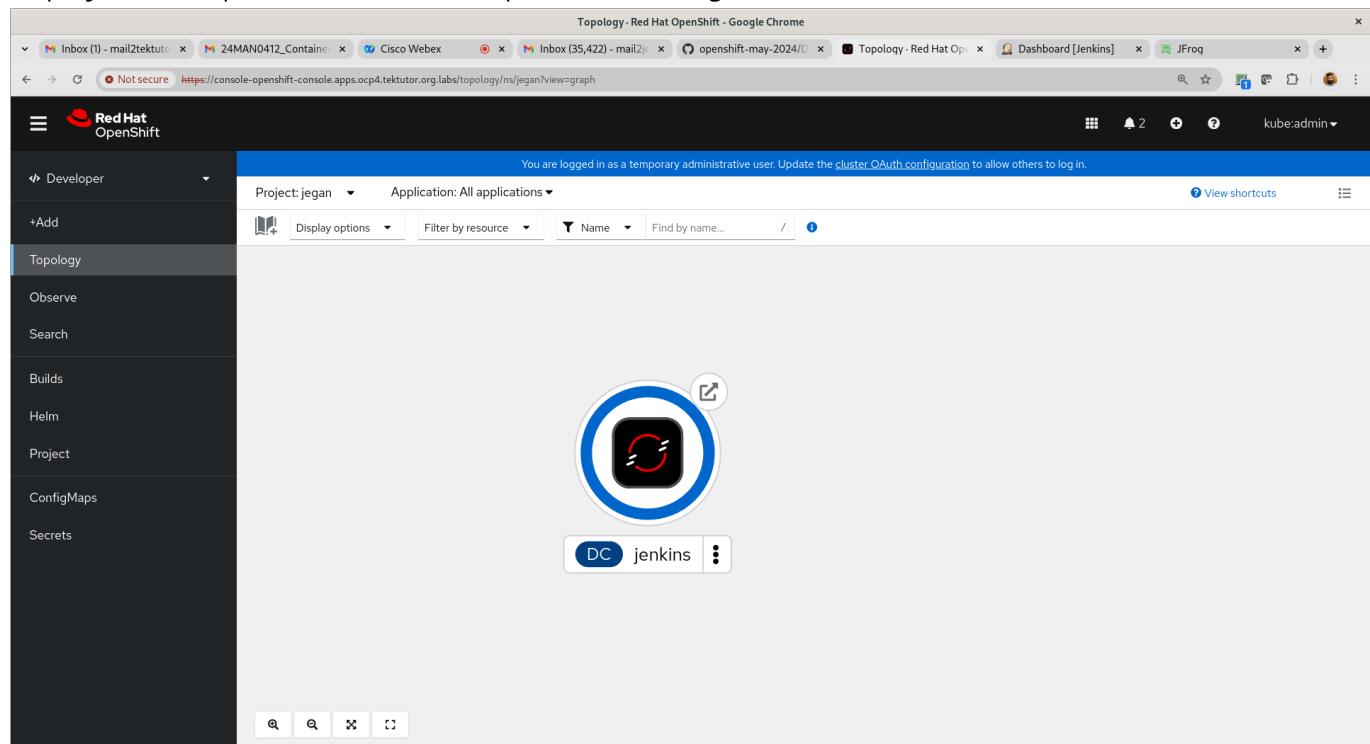
```
jegan@tektutor.org $ docker login -u mail2tektutor@gmail.com
openshiftjegan.jfrog.io
Password:
WARNING! Your password will be stored unencrypted in
```

```
/home/jegan/.docker/config.json.  
Configure a credential helper to remove this warning. See  
https://docs.docker.com/engine/reference/commandline/login/#credentials-store
```

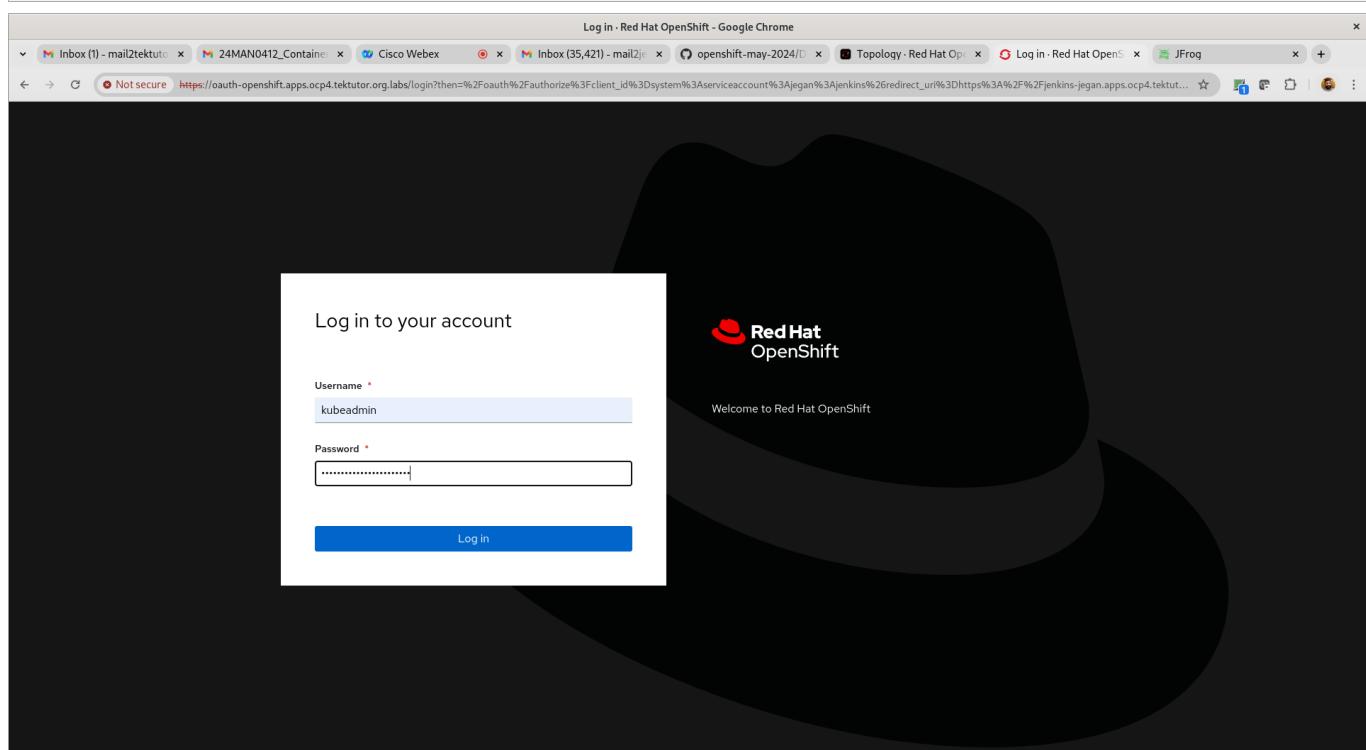
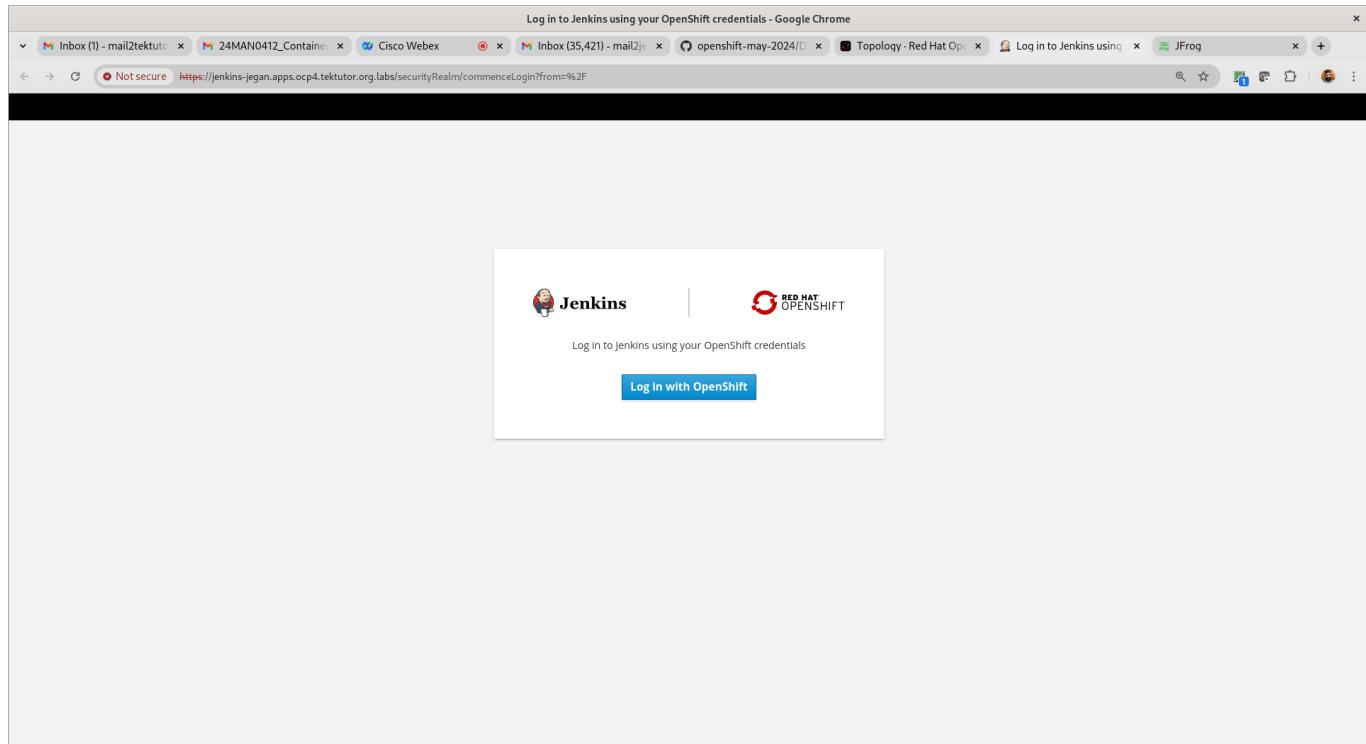
```
Login Succeeded  
jegan@tektutor.org $ docker pull openshiftjegan.jfrog.io/jegan-docker/hello-world:latest  
latest: Pulling from jegan-docker/hello-world  
Digest:  
sha256:266b191e926f65542fa8daaec01a192c4d292bff79426f47300a046e1bc576fd  
Status: Downloaded newer image for openshiftjegan.jfrog.io/jegan-docker/hello-world:latest  
openshiftjegan.jfrog.io/jegan-docker/hello-world:latest
```

```
jegan@tektutor.org $ docker tag openshiftjegan.jfrog.io/jegan-docker/hello-world openshiftjegan.jfrog.io/jegan-docker/hello-world:1.0.0  
jegan@tektutor.org $ docker push openshiftjegan.jfrog.io/jegan-docker/hello-world:1.0.0  
The push refers to repository [openshiftjegan.jfrog.io/jegan-docker/hello-world]  
ac28800ec8bb: Layer already exists  
1.0.0: digest:  
sha256:d37ada95d47ad12224c205a938129df7a3e52345828b4fa27b03a98825d1e2e7  
size: 524
```

## Deploy Jenkins Ephemeral from Develop context and login to Jenkins



The screenshot shows the Red Hat OpenShift Topology interface in a Google Chrome browser. The URL is <https://console.openshift-console.apps.ocp4.tektutor.org.labs/topology/ns/jegan?view=graph>. The user is logged in as 'kube:admin'. The left sidebar has 'Developer' selected, with 'Topology' highlighted. The main area displays a graph node for a Jenkins pod, represented by a blue circle with a white square containing a red circular arrow icon. Below the node is a status bar with 'DC' and 'jenkins'. The bottom of the screen shows standard browser navigation buttons.



Authorize service account Jenkins in project jegan - Google Chrome

Inbox (1) - mail2tekturex 24MAN0412\_Contentx Cisco Webexx Inbox (35,421) - mail2tekturex openshift-may-2024x Topology - Red Hat Op...x Authorize service account Jenkinsx JFrogx

Not secure https://oauth.openshift.apps.ocp4.tektutor.org.labs/oauth/authorize/approve?client\_id=system%3Aserviceaccount%3Ajegan%3Ajenkins&redirect\_uri=https%3A%2F%2Fjenkins-jegan.apps.ocp4.tektutor.org.labs%2FsecurityRealmFinishLogin

Authorize Access

Service account Jenkins in project jegan is requesting permission to access your account (kube:admin)

Requested permissions

user:info  
Read-only access to your user information (including username, identities, and group membership)

user:check-access  
Read-only access to view your privileges (for example, "can I create builds?")

You will be redirected to <https://jenkins-jegan.apps.ocp4.tektutor.org.labs/securityRealmFinishLogin>

Dashboard [Jenkins] - Google Chrome

Inbox (1) - mail2tekturex 24MAN0412\_Contentx Cisco Webexx Inbox (35,421) - mail2tekturex openshift-may-2024x Topology - Red Hat Op...x Dashboard [Jenkins]x JFrogx

Not secure https://jenkins-jegan.apps.ocp4.tektutor.org.labs

Jenkins

Search (CTRL+K) ? 3 4 kube:admin log out

Dashboard >

+ New Item Add description

People 25

Build History

Manage Jenkins

My Views

Open Blue Ocean

Lockable Resources

Welcome to Jenkins!

This page is where your Jenkins jobs will be displayed. To get started, you can set up distributed builds or start building a software project.

Start building your software project

Create a job →

Build Queue ▼  
No builds in the queue.

Build Executor Status ▼

1 Idle  
2 Idle  
3 Idle  
4 Idle  
5 Idle

REST API Jenkins 2.401.1

## Select "pipeline" project

The screenshot shows the Jenkins 'New Item' dialog. In the input field, the text 'hello-pipeline' is typed. Below the input field, there is a note: '» Required field'. A list of project types is displayed:

- Freestyle project**: This is the central feature of Jenkins. Jenkins will build your project, combining any SCM with any build system, and this can be even used for something other than software build.
- Maven project**: Build a maven project. Jenkins takes advantage of your POM files and drastically reduces the configuration.
- Pipeline**: Orchestrates long-running activities that can span multiple build agents. Suitable for building pipelines (formerly known as workflows) and/or organizing complex activities that do not easily fit in free-style job type.
- Multi-configuration project**: Suitable for projects that need a large number of different configurations, such as testing on multiple environments, platform-specific builds, etc.
- Folder**: Creates a container that stores nested items in it. Useful for grouping things together. Unlike view, which is just a filter, a folder creates a separate namespace, so you can have multiple things of the same name as long as they are in different folders.
- Multibranch Pipeline**: Creates a set of Pipeline projects according to detected branches in one SCM repository.
- Organization Folder**: Creates a set of multibranch project subfolders by scanning for repositories.

At the bottom of the dialog is an 'OK' button.

The screenshot shows the Jenkins configuration page for the 'hello-pipeline' job. The 'General' tab is selected. The 'Enabled' switch is turned on. The 'Description' field contains the text 'Jira site'. The 'Jira site' dropdown menu is open. Below the description, there is a list of checkboxes for various build options:

- Discard old builds ?
- Do not allow concurrent builds
- Do not allow the pipeline to resume if the controller restarts
- GitHub project
- Pipeline speed/durability override ?
- Preserve stashes from completed builds ?
- This project is parameterised ?
- Throttle builds ?

At the bottom of the configuration page are 'Save' and 'Apply' buttons.

hello-pipeline Config [Jenkins] - Google Chrome

Inbox (1) - mail2tektuto x 24MAN0412\_Content x Cisco Webex x Inbox (35,422) - mail2... x tektutor/openshift-ma x Topology - Red Hat Op... x hello-pipeline Config [x] JFrog x

Not secure https://jenkins-jegan.apps.ocp4.tektutor.org.labs/job/hello-pipeline/configure

Jenkins

Search (CTRL+K)

Dashboard > hello-pipeline > Configuration

**Configure**

**General**

Description  
CI/CD for sample spring-boot application

[Plain text] [Preview](#)

Jira site

Discard old builds ?  
 Do not allow concurrent builds  
 Do not allow the pipeline to resume if the controller restarts  
 GitHub project  
 Pipeline speed/durability override ?  
 Preserve stashes from completed builds ?  
 This project is parameterised ?  
 Throttle builds ?

**Build Triggers**

[Save](#) [Apply](#)

hello-pipeline Config [Jenkins] - Google Chrome

Inbox (1) - mail2tektuto x 24MAN0412\_Content x Cisco Webex x Inbox (35,422) - mail2... x tektutor/openshift-ma x Topology - Red Hat Op... x hello-pipeline Config [x] JFrog x

Not secure https://jenkins-jegan.apps.ocp4.tektutor.org.labs/job/hello-pipeline/configure

Dashboard > hello-pipeline > Configuration

**Configure**

**Build Triggers**

Build after other projects are built ?  
 Build periodically ?  
 GitHub hook trigger for GITScm polling ?  
 Poll SCM ?  
Schedule ?  
H/02 \* \* \* \*

Would last have run at Tuesday, May 21, 2024 at 7:25:55 AM Coordinated Universal Time; would next run at Tuesday, May 21, 2024 at 7:25:55 AM Coordinated Universal Time.

Ignore post-commit hooks ?  
 Quiet period ?  
 Trigger builds remotely (e.g., from scripts) ?

**Advanced Project Options**

Advanced ▾

**Pipeline**

[Save](#) [Apply](#)

hello-pipeline Config [Jenkins] - Google Chrome

Inbox (1) - mail2tektuto x 24MAN0412\_Content x Cisco Webex x Inbox (35,422) - mail2... x tektutor/openshift-may-2024 x Topology - Red Hat OpenShift x hello-pipeline Config [x] JFrog x

Not secure https://jenkins-tejan.apps.ocp4.tektutor.org.labs/job/hello-pipeline/configure

Dashboard > hello-pipeline > Configuration

## Configure

### Pipeline

General

Advanced Project Options

Pipeline

Definition

Pipeline script from SCM

SCM

Git

Repositories

Repository URL

https://github.com/tektutor/openshift-may-2024.git

Credentials

- none -

Add

Advanced

Name

Refspec

Save Apply

hello-pipeline Config [Jenkins] - Google Chrome

Inbox (1) - mail2tektuto x 24MAN0412\_Content x Cisco Webex x Inbox (35,422) - mail2... x tektutor/openshift-may-2024 x Topology - Red Hat OpenShift x hello-pipeline Config [x] JFrog x

Not secure https://jenkins-tejan.apps.ocp4.tektutor.org.labs/job/hello-pipeline/configure

Dashboard > hello-pipeline > Configuration

## Configure

### Pipeline

General

Advanced Project Options

Pipeline

Branches to build

Add Repository

Branch Specifier (blank for 'any')

\*main

Add Branch

Repository browser

(Auto)

Additional Behaviours

Add

Script Path

Day5/BuildConfig/jenkinsfile

Lightweight checkout

Pipeline Syntax

Save Apply

hello-pipeline [Jenkins] - Google Chrome  
Inbox (1) - mail2tekuto... 24MAN0412\_Container... Cisco Webex Inbox (35,422) - mail2... tektutor/openshift-ma... Topology - Red Hat Op... hello-pipeline [Jenkins] JFrog

## Pipeline hello-pipeline

CI/CD for sample spring-boot application

Status Changes Build Now Configure Delete Pipeline Full Stage View Open Blue Ocean Rename Pipeline Syntax Polling Log

Stage View

No data available. This Pipeline has not yet run.

Permalinks Atom feed for all Atom feed for failures

Build History trend

No builds

Atom feed for all Atom feed for failures

REST API Jenkins 2.401.1

hello-pipeline [Jenkins] - Google Chrome  
Inbox (1) - mail2tekuto... 24MAN0412\_Container... Cisco Webex Inbox (35,422) - mail2... openshift-may-2024... Topology - Red Hat Op... hello-pipeline [Jenkins] JFrog

## Pipeline hello-pipeline

CI/CD for sample spring-boot application

Status Changes Build Now Configure Delete Pipeline Full Stage View Open Blue Ocean Rename Pipeline Syntax Polling Log

Stage View

Average stage times: (Average full run time: ~13s)

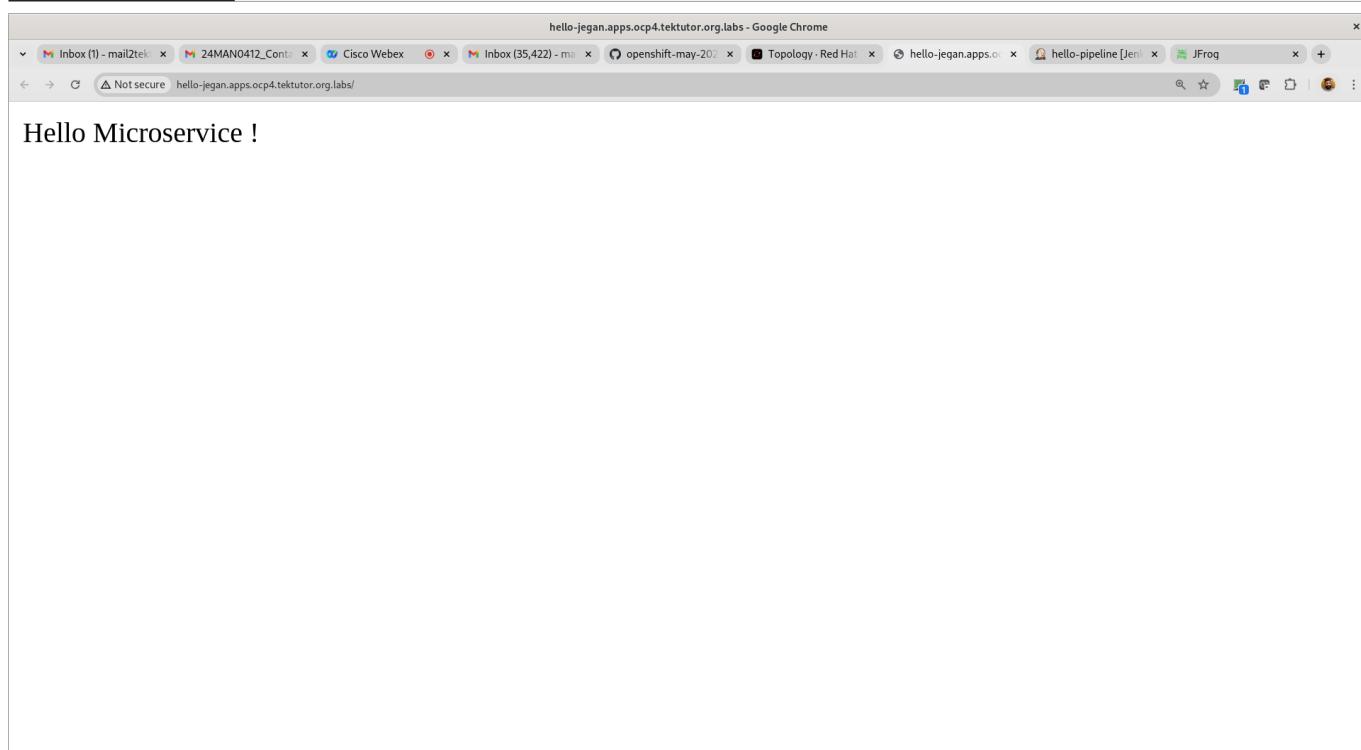
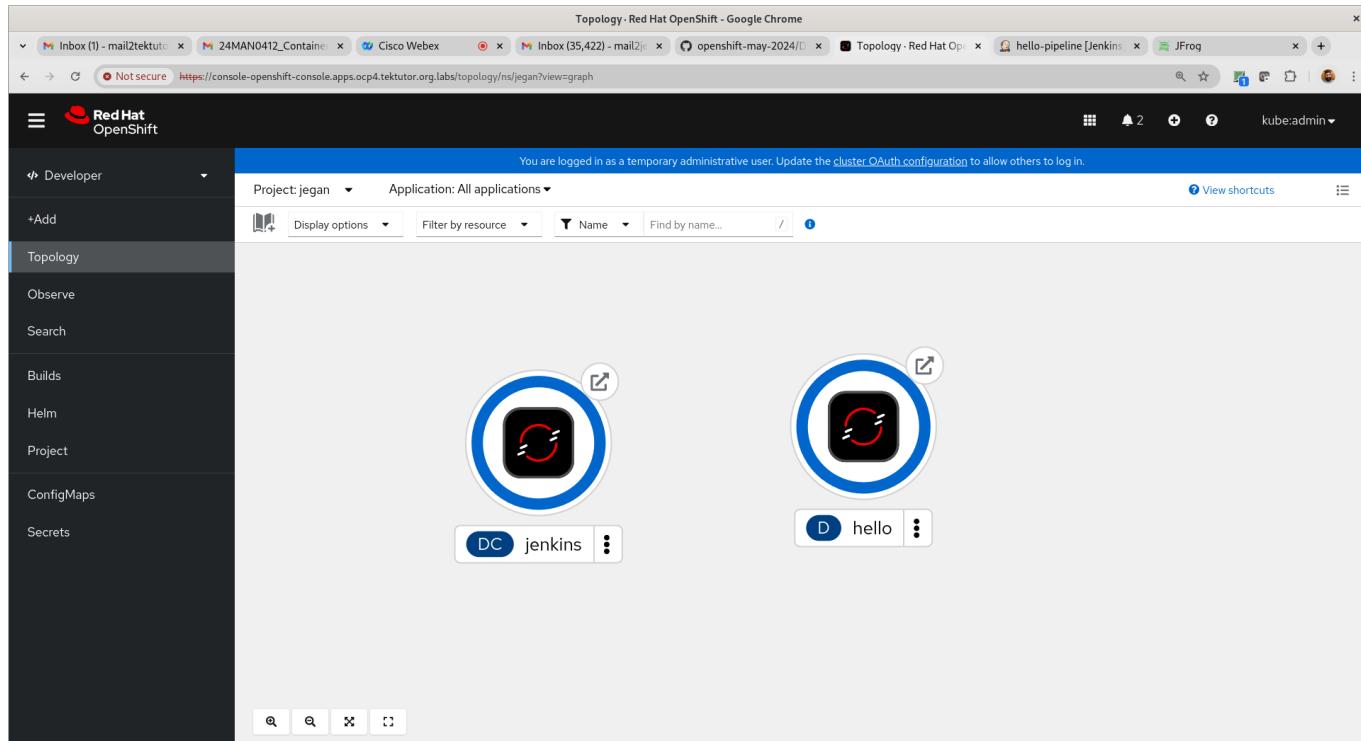
Stage 1 - Build	Stage 2 - Deploy hello microservice into OpenShift
3s	3s
2s	2s
5s	4s

Build History trend

#2 21 May 2024, 07:33 #1 21 May 2024, 07:31

Atom feed for all Atom feed for failures

Last build (#2), 57 sec ago  
Last stable build (#2), 57 sec ago  
Last successful build (#2), 57 sec ago  
Last completed build (#2), 57 sec ago



The screenshot shows the JFrog Artifactory web interface. On the left, there's a sidebar with various navigation options: Get Started, Artifactory, Packages, Builds, Artifacts (selected), Release Lifecycle, Xray, Distribution, Pipelines, Integrations, Connect, MyJFrog Portal, and Learning Center. The main content area shows a tree view of repositories. Under 'jegan-docker', there are several repositories, including 'jfrog', 'hello-spring-microservice' (which is expanded to show its contents like 'manifest.json' and several SHA-256 checksums), 'uploads', 'HelloWorld', 'library', and 'artifactory-build-info'. To the right of the tree view, a detailed view of the 'hello-spring-microservice' repository is shown. It includes tabs for General, Effective Permissions, Properties, and Followers. The General tab displays the repository's name ('hello-spring-microservice'), repository path ('jegan-docker/hello-spring-microservice'), file URL ('https://openshiftjegen.jfrog.io/artifactory/jegan-docker/hello-spring-microservice/'), and creation date ('21-05-24 07:32:34 +00:00'). Other tabs include Package Information, Dependency Declaration, Virtual Repository Associations, Included Repositories, and Checksums.

## What does Serverless mean?

- serverless does not mean the absence of servers
- is an architecture model for running applications in an environment that is abstracted away from the developers
- developers can focus more on developing their applications than where their code runs
- in other deployment models, resources wait idle to serve requests and run regardless of whether there is work to do
- an ideal serverless workload executes a single task
- a function that retrieves data from a database can be an excellent serverless workload
- the database server is not a good serverless workload because it needs to run continuously
- serverless model is the idea of the cold start
- when using serverless, there is a period between the request and creating the pod environment. This period is the cold start.
- Examples
  - OpenShift Serverless workloads follow this workflow:
    - A request comes in
    - A pod is spun up to service the request
    - The pod services the request
    - The pod is destroyed
  - Another example of a serverless workload can be an image processing function

- An event could be a photo upload. The uploaded photo triggers an event to run an application to process the image.
- For example, the application may overlay text, create a banner, or make a thumbnail.
- Once the image is stored permanently, the application has served its purpose and is no longer needed.

## Serverless Features

- Stateless Function
  - a function to query a database and return the data
  - a function to query weather report and return the data
- Event Driven
  - serverless model relies on a trigger to execute the code
  - could be a request to an API or an event on a queue
- Auto Scales to Zero
  - Being able to scale to zero means your code only runs when it needs to respond to an event.
  - Once the request is served, resources are released.

## Benefits of Serverless

- cost savings and more efficient utilization of CPU, RAM, and storage resources (better hardware utilization in general)
- Code is executed as needed, there is no idle time. We only pay for the execution time.
- As there is no servers to manage, no need to worry about Infrastructure management activities like
  - security updates
  - monitoring
  - hardware maintenance
  - hardware upgradation, etc.,
- Scaling is easier on demand
- high availability (HA)

## Knative and Red Hat Serverless

- Red Hat Serverless is based on Knative project
- Knative provides a serverless application layer on top of OpenShift/Kubernetes
- Knative consists of 3 building blocks
  1. Build
  2. Eventing
  3. Serving

## Lab - Deploying a knative service

```
kn service create hello \
--image ghcr.io/knative/helloworld-go:latest \
```

```
--port 8080
--env TARGET=World
```

## Expected output

The screenshot shows a terminal window with four tabs, each labeled 'jegan@tektutor.org'. The tabs are arranged horizontally. The first tab has the command 'jegan@tektutor.org > ~/openshift-may-2024 >'. The second tab has 'jegan@tektutor.org > ~/openshift-may-2024 >'. The third tab has 'jegan@tektutor.org > ~/openshift-may-2024 >'. The fourth tab has 'jegan@tektutor.org > ~/openshift-may-2024 >'. The terminal output is as follows:

```
jegan@tektutor.org > ~/openshift-may-2024 > \ main | set -o vi
jegan@tektutor.org > ~/openshift-may-2024 > \ main | kn service create hello \
--image gcr.io/knative/helloworld-go:latest \
--port 8080 \
--env TARGET=World
Warning: Kubernetes default value is insecure, Knative may default this to secure in a future release: spec.template.spec.containers[0].securityContext.allowPrivilegeEscalation, spec.template.spec.containers[0].securityContext.capabilities, spec.template.spec.containers[0].securityContext.runAsNonRoot, spec.template.spec.containers[0].securityContext.seccompProfile
Creating service 'hello' in namespace 'jegan':
0.053s The Route is still working to reflect the latest desired specification.
0.063s Configuration "hello" is waiting for a Revision to become ready.
0.075s ...
3.322s ...
3.361s Ingress has not yet been reconciled.
3.413s Waiting for load balancer to be ready
3.614s Ready to serve.

Service 'hello' created to latest revision 'hello-00001' is available at URL:
https://hello-jegan.apps.ocp4.tektutor.org.labs
jegan@tektutor.org > ~/openshift-may-2024 > \ main |
jegan@tektutor.org > ~/openshift-may-2024 > \ main | kn revisions list
NAME      SERVICE  TRAFFIC  TAGS  GENERATION  AGE   CONDITIONS  READY  REASON
hello-00001  hello    100%     1       9s      4 OK / 4  True
jegan@tektutor.org > ~/openshift-may-2024 > \ main |
```

The status bar at the bottom of the terminal window shows '[0] 0:zsh' and the date and time 'tektutor.org" 15:11 21-May-24'.

## Accessing the knative application

```
curl -k https://hello-jegan.apps.ocp4.tektutor.org.labs
```

## Expected output

The screenshot shows a terminal window with four tabs, each labeled 'jegan@tektutor.org'. The tabs are arranged horizontally. The first tab has the command 'jegan@tektutor.org > ~/openshift-may-2024 >'. The second tab has 'jegan@tektutor.org > ~/openshift-may-2024 >'. The third tab has 'jegan@tektutor.org > ~/openshift-may-2024 >'. The fourth tab has 'jegan@tektutor.org > ~/openshift-may-2024 >'. The terminal output is as follows:

```
jegan@tektutor.org > ~/openshift-may-2024 > \ main | set -o vi
jegan@tektutor.org > ~/openshift-may-2024 > \ main | kn service create hello \
--image gcr.io/knative/helloworld-go:latest \
--port 8080 \
--env TARGET=World
Warning: Kubernetes default value is insecure, Knative may default this to secure in a future release: spec.template.spec.containers[0].securityContext.allowPrivilegeEscalation, spec.template.spec.containers[0].securityContext.capabilities, spec.template.spec.containers[0].securityContext.runAsNonRoot, spec.template.spec.containers[0].securityContext.seccompProfile
Creating service 'hello' in namespace 'jegan':
0.053s The Route is still working to reflect the latest desired specification.
0.063s Configuration "hello" is waiting for a Revision to become ready.
0.075s ...
3.322s ...
3.361s Ingress has not yet been reconciled.
3.413s Waiting for load balancer to be ready
3.614s Ready to serve.

Service 'hello' created to latest revision 'hello-00001' is available at URL:
https://hello-jegan.apps.ocp4.tektutor.org.labs
jegan@tektutor.org > ~/openshift-may-2024 > \ main |
jegan@tektutor.org > ~/openshift-may-2024 > \ main | kn revisions list
NAME      SERVICE  TRAFFIC  TAGS  GENERATION  AGE   CONDITIONS  READY  REASON
hello-00001  hello    100%     1       9s      4 OK / 4  True
jegan@tektutor.org > ~/openshift-may-2024 > \ main | kn revisions list
NAME      SERVICE  TRAFFIC  TAGS  GENERATION  AGE   CONDITIONS  READY  REASON
hello-00001  hello    100%     1      81s      3 OK / 4  True
jegan@tektutor.org > ~/openshift-may-2024 > \ main | curl -k https://hello-jegan.apps.ocp4.tektutor.org.labs
Hello World!
jegan@tektutor.org > ~/openshift-may-2024 > \ main |
```

The status bar at the bottom of the terminal window shows '[0] 0:curl\*' and the date and time 'tektutor.org" 15:12 21-May-24'.

## Update the service

```
kn service update hello --env TARGET=Knative
kn revisions list
```

## Expected output

The screenshot shows a terminal window with four tabs, all labeled 'jegan@tektutor.org'. The terminal content is as follows:

```
Service 'hello' created to latest revision 'hello-00001' is available at URL:
https://hello-jegan.apps.ocp4.tektutor.org.labs
jegan@tektutor.org > ~/openshift-may-2024 > \ main
jegan@tektutor.org > ~/openshift-may-2024 > \ main > kn revisions list
NAME      SERVICE   TRAFFIC   TAGS    GENERATION   AGE     CONDITIONS   READY   REASON
hello-00001  hello   100%       1        9s      4 OK / 4   True
jegan@tektutor.org > ~/openshift-may-2024 > \ main > kn revisions list
NAME      SERVICE   TRAFFIC   TAGS    GENERATION   AGE     CONDITIONS   READY   REASON
hello-00001  hello   100%       1        81s     3 OK / 4   True
jegan@tektutor.org > ~/openshift-may-2024 > \ main > curl -k https://hello-jegan.apps.ocp4.tektutor.org.labs
Hello World!
jegan@tektutor.org > ~/openshift-may-2024 > \ main > kn service update hello --env TARGET=Knative
Warning: Kubernetes default value is insecure, Knative may default this to secure in a future release: spec.template.spec.containers[0].securityContext.allowPrivilegeEscalation, spec.template.spec.containers[0].securityContext.capabilities, spec.template.spec.containers[0].securityContext.runAsNonRoot, spec.template.spec.containers[0].securityContext.seccompProfile
Updating Service 'hello' in namespace 'jegan':
0.031s The Configuration is still working to reflect the latest desired specification.
2.037s Traffic is not yet migrated to the latest revision.
2.074s Ingress has not yet been reconciled.
2.132s Waiting for load balancer to be ready
2.304s Ready to serve.

Service 'hello' updated to latest revision 'hello-00002' is available at URL:
https://hello-jegan.apps.ocp4.tektutor.org.labs
jegan@tektutor.org > ~/openshift-may-2024 > \ main > kn revisions list
NAME      SERVICE   TRAFFIC   TAGS    GENERATION   AGE     CONDITIONS   READY   REASON
hello-00002  hello   100%       2        12s      4 OK / 4   True
hello-00001  hello   100%       1        2m30s    4 OK / 4   True
jegan@tektutor.org > ~/openshift-may-2024 > \ main >
[0] 0:zsh*                                     "tektutor.org" 15:13 21-May-24
```

## Splitting the traffic between two revisions

```
kn service update hello --traffic hello-00001=50 --traffic @latest=50
kn revisions list
```

## Expected output

```
jegan@tektutor.org x jegan@tektutor.org x jegan@tektutor.org x jegan@tektutor.org x
jegan@tektutor.org 0.031s The Configuration is still working to reflect the latest desired specification.
jegan@tektutor.org 2.037s Traffic is not yet migrated to the latest revision.
jegan@tektutor.org 2.074s Ingress has not yet been reconciled.
jegan@tektutor.org 2.132s Waiting for load balancer to be ready
jegan@tektutor.org 2.304s Ready to serve.

Service 'hello' updated to latest revision 'hello-00002' is available at URL:
https://hello-jegan.apps.ocp4.tektutor.org.labs
jegan@tektutor.org ➤ ~/openshift-may-2024 ▶ main ▶ kn revisions list

NAME      SERVICE   TRAFFIC   TAGS    GENERATION   AGE       CONDITIONS   READY   REASON
hello-00002  hello     100%        2      12s          4 OK / 4    True
hello-00001  hello           1      2m30s        4 OK / 4    True
jegan@tektutor.org ➤ ~/openshift-may-2024 ▶ main ▶ kn service update hello --traffic hello-00001=50 --traffic @latest=50

Warning: Kubernetes default value is insecure, Knative may default this to secure in a future release: spec.template.spec.containers[0].securityContext.allowPrivilegeEscalation, spec.template.spec.containers[0].securityContext.capabilities, spec.template.spec.containers[0].securityContext.runAsNonRoot, spec.template.spec.containers[0].securityContext.seccompProfile
Updating Service 'hello' in namespace 'jegan':

0.031s The Route is still working to reflect the latest desired specification.
0.069s Ingress has not yet been reconciled.
0.096s Waiting for load balancer to be ready
0.287s Ready to serve.

Service 'hello' with latest revision 'hello-00002' (unchanged) is available at URL:
https://hello-jegan.apps.ocp4.tektutor.org.labs
jegan@tektutor.org ➤ ~/openshift-may-2024 ▶ main ▶ kn revisions list

NAME      SERVICE   TRAFFIC   TAGS    GENERATION   AGE       CONDITIONS   READY   REASON
hello-00002  hello     50%        2      80s          3 OK / 4    True
hello-00001  hello     50%        1      3m38s        3 OK / 4    True
jegan@tektutor.org ➤ ~/openshift-may-2024 ▶ main ▶ [0] 0:kn*
```

```
jegan@tektutor.org ~ -/openshift-may-2024 ]$ main > kn revisions list
NAME      SERVICE  TRAFFIC  TAGS   GENERATION  AGE     CONDITIONS  READY  REASON
hello-00002  hello    50%        2    80s       3 OK / 4  True
hello-00001  hello    50%        1   3m38s    3 OK / 4  True
jegan@tektutor.org ~ -/openshift-may-2024 ]$ main > curl -k https://hello-jegan.apps.ocp4.tektutor.org.labs
Hello World!
jegan@tektutor.org ~ -/openshift-may-2024 ]$ main > curl -k https://hello-jegan.apps.ocp4.tektutor.org.labs
Hello World!
jegan@tektutor.org ~ -/openshift-may-2024 ]$ main > curl -k https://hello-jegan.apps.ocp4.tektutor.org.labs
Hello World!
jegan@tektutor.org ~ -/openshift-may-2024 ]$ main > curl -k https://hello-jegan.apps.ocp4.tektutor.org.labs
Hello World!
jegan@tektutor.org ~ -/openshift-may-2024 ]$ main > curl -k https://hello-jegan.apps.ocp4.tektutor.org.labs
Hello Knative!
jegan@tektutor.org ~ -/openshift-may-2024 ]$ main > curl -k https://hello-jegan.apps.ocp4.tektutor.org.labs
Hello Knative!
jegan@tektutor.org ~ -/openshift-may-2024 ]$ main > curl -k https://hello-jegan.apps.ocp4.tektutor.org.labs
Hello Knative!
jegan@tektutor.org ~ -/openshift-may-2024 ]$ main > curl -k https://hello-jegan.apps.ocp4.tektutor.org.labs
Hello World!
jegan@tektutor.org ~ -/openshift-may-2024 ]$ main > curl -k https://hello-jegan.apps.ocp4.tektutor.org.labs
Hello World!
jegan@tektutor.org ~ -/openshift-may-2024 ]$ main > curl -k https://hello-jegan.apps.ocp4.tektutor.org.labs
[0] 0:zsh*
```

## Deleting the knative service

```
kn service list  
kn service delete hello  
kn service list
```

## Expected output

```
jegan@tektutor.org > ~/openshift-may-2024 > ! main ▶ curl -k https://hello-jegan.apps.ocp4.tektutor.org.labs
Hello World!
jegan@tektutor.org > ~/openshift-may-2024 > ! main ▶ curl -k https://hello-jegan.apps.ocp4.tektutor.org.labs
Hello World!
jegan@tektutor.org > ~/openshift-may-2024 > ! main ▶ curl -k https://hello-jegan.apps.ocp4.tektutor.org.labs
Hello World!
jegan@tektutor.org > ~/openshift-may-2024 > ! main ▶ curl -k https://hello-jegan.apps.ocp4.tektutor.org.labs
Hello Knative!
jegan@tektutor.org > ~/openshift-may-2024 > ! main ▶ curl -k https://hello-jegan.apps.ocp4.tektutor.org.labs
Hello Knative!
jegan@tektutor.org > ~/openshift-may-2024 > ! main ▶ curl -k https://hello-jegan.apps.ocp4.tektutor.org.labs
Hello World!
jegan@tektutor.org > ~/openshift-may-2024 > ! main ▶ curl -k https://hello-jegan.apps.ocp4.tektutor.org.labs
Hello World!
jegan@tektutor.org > ~/openshift-may-2024 > ! main ▶ kn service delete hello
Service 'hello' successfully deleted in namespace 'jegan'.
jegan@tektutor.org > ~/openshift-may-2024 > ! main ▶ kn revisions list
No revisions found.
jegan@tektutor.org > ~/openshift-may-2024 > ! main ▶ ■
[0] 0:zsh* "tektutor.org" 15:16 21-May-24
```

## Lab - Knative eventing

Let's deploy a sink service

```
oc project jegan
kn service create eventinghello --concurrency-target=1 --
image=quay.io/rhdevelopers/eventinghello:0.0.2
```

## Expected output

```
jegan@tektutor.org > ~/openshift-may-2024 > ! main ▶ oc get all
Warning: apps.openshift.io/v1 DeploymentConfig is deprecated in v4.14+, unavailable in v4.10000+
No resources found in jegan namespace.
jegan@tektutor.org > ~/openshift-may-2024 > ! main ▶ kn service create eventinghello --concurrency-target=1 --image=quay.io/rhdevelopers/eventinghello:0.0.2
Warning: Kubernetes default value is insecure, Knative may default this to secure in a future release: spec.template.spec.containers[0].securityContext.allowPrivilegeEscalation, spec.template.spec.containers[0].securityContext.capabilities, spec.template.spec.containers[0].securityContext.runAsNonRoot, spec.template.spec.containers[0].securityContext.seccompProfile
Creating service 'eventinghello' in namespace 'jegan':
0.054s The Route is still working to reflect the latest desired specification.
0.080s ...
0.106s Configuration "eventinghello" is waiting for a Revision to become ready.
25.381s ...
25.427s Ingress has not yet been reconciled.
25.476s Waiting for load balancer to be ready
25.675s Ready to serve.

Service 'eventinghello' created to latest revision 'eventinghello-00001' is available at URL:
https://eventinghello-jegan.apps.ocp4.tektutor.org.labs
jegan@tektutor.org > ~/openshift-may-2024 > ! main ▶ ■
[0] 0:zsh* "tektutor.org" 15:53 21-May-24
```

## Let's create an event source application

```
kn source ping create eventinhello-ping-source --schedule="*/2 * * * *" --
data '{"message": "Thanks for your message"}' --sink ksvc:eventinghello
```

### Expected output

```
jegan@tektutor.org ~ -/openshift-may-2024 > \ main > oc project jegan
jegan@tektutor.org ~ -/openshift-may-2024 > \ main >
jegan@tektutor.org ~ -/openshift-may-2024 > \ main > # Deploying the event receiving application
jegan@tektutor.org ~ -/openshift-may-2024 > \ main > kn service create eventinghello --concurrency-target=1 --image=quay.io/rhdevops/eventinghello:0.0.2

Warning: Kubernetes default value is insecure, Knative may default this to secure in a future release: spec.template.spec.containers[0].securityContext.allowPrivilegeEscalation, spec.template.spec.containers[0].securityContext.capabilities, spec.template.spec.containers[0].securityContext.runAsNonRoot, spec.template.spec.containers[0].securityContext.seccompProfile
Creating service 'eventinghello' in namespace 'jegan':

0.052s The Route is still working to reflect the latest desired specification.
0.080s Configuration "eventinghello" is waiting for a Revision to become ready.
0.092s ...
3.977s ...
4.020s Ingress has not yet been reconciled.
4.097s Waiting for load balancer to be ready
4.289s Ready to serve.

Service 'eventinghello' created to latest revision 'eventinghello-00001' is available at URL:
https://eventinghello-jegan.apps.ocp4.tektutor.org.labs
jegan@tektutor.org ~ -/openshift-may-2024 > \ main > kn service list
NAME          URL           LATEST      AGE        CONDITIONS   READY   REASON
eventinghello https://eventinghello-jegan.apps.ocp4.tektutor.org.labs  eventinghello-00001  13s       3 OK / 3    True

jegan@tektutor.org ~ -/openshift-may-2024 > \ main >
```

[0] 0:kn\*

"tektutor.org" 16:03 21-May-24

Name	URL	Conditions	Ready	Reason	Revision	Created
eventinghello	https://eventinghello-jegan.apps.ocp4.tektutor.org.labs	3   0	True	-	1	21 May 2024, 16:03

Event Sources - Red Hat OpenShift - Google Chrome

Inbox (1) - mail2tekutor... 24MANO412\_Container... Cisco Webex Inbox (35,423) - mail2jeg... openshift-may-2024/D... Event Sources - Red Hat ... Not secure https://console-openshift-console.apps.ocp4.tektutor.org.labs/eventing/ns/jegan kube:admin

## Eventing

Event Sources Brokers Triggers Channels Subscriptions

Name Ready Conditions Type Created

Name	Ready	Conditions	Type	Created
eventinhello-ping-source	True	3 OK / 3	PingSource	21 May 2024, 16:03

Filter Name Search by name... /

Overview Projects Search API Explorer Events Operators Workloads Serverless Networking Storage Builds Observe

OperatorHub Installed Operators Workloads > Eventing > Eventing

Serving Eventing

Create

You are logged in as a temporary administrative user. Update the cluster OAuth configuration to allow others to log in.

Project: jegan

Pods - Red Hat OpenShift - Google Chrome

Inbox (1) - mail2tekutor... 24MANO412\_Container... Cisco Webex Inbox (35,423) - mail2jeg... openshift-may-2024/D... Pods - Red Hat OpenShift ... Not secure https://console-openshift-console.apps.ocp4.tektutor.org.labs/k8s/ns/jegan/core-v1~Pod kube:admin

## Pods

Filter Name Status Ready Restarts Owner Memory CPU Created

Name	Status	Ready	Restarts	Owner	Memory	CPU	Created
eventinhello-00001-deployment-6f455db578-zg5lz	Running	2/2	0	eventinhello-00001-deployment-6f455db578	1479 MiB	0.002 cores	21 May 2024, 16:03

Filter Name Search by name... /

Overview Projects Search API Explorer Events Operators Workloads > Pods > Pods

Deployments DeploymentConfigs StatefulSets Secrets ConfigMaps CronJobs Jobs DaemonSets ReplicaSets

Create Pod

You are logged in as a temporary administrative user. Update the cluster OAuth configuration to allow others to log in.

Project: jegan

The screenshot shows the Red Hat OpenShift web interface. The left sidebar has 'Pods' selected under 'Workloads'. The main area displays a table of pods in the 'jegan' project. One pod is listed:

Name	Status	Ready	Restarts	Owner	Memory	CPU	Created
eventinghello-00001-deployment-6f455db578-zg5lz	Terminating	2/2	0	RS eventinghello-00001-deployment-6f455db578	1479 MiB	0.002 cores	21 May 2024, 16:03

## Lab - Developing a simple knative function in nodejs and deploying into Openshift cluster

This will generate a basic nodejs application in your current directory

```
kn func create -l node
```

If you wish to build your application

```
kn func build
```

If you wish to run the application locally and test it

```
kn func run
```

Deploy the nodejs application into openshift after building it

```
kn func deploy -n jegan
```

Test the knative function

```
curl -k https://functions-jegan.apps.ocp4.tektutor.org.labs
```

## Info - What is Ingress?

- Ingress is a forwarding/routing rules
- There is controlled called Ingress Controller, which manages the Ingress resource
- Ingress can be created by us under any project namespace, but the controller access to monitor and ingress resources created under any namespace
- Ingress Controllers Examples
  - HAProxy Ingress Controller
  - Nginx Ingress Controller
- Ingress Controllers as soon as it found a new Ingress resources, it picks all the rules in the Ingress and configures a load balancer to route the traffic to respective services as defined in the ingress resource

## Lab - Scheduling

Let's say our application involves loads of disk read/write, hence our application prefers nodes that has SSD disk.

- Scheduler will search for nodes that has SSD disks, if the Scheduler is able to find nodes that has SSD disks then the Pods will be deployed onto those nodes that has SSD disks
- In case the scheduler is not able to find nodes has SSD disk, then it would still deploy the Pods on nodes that doesn't have SSD disks in case your affinity type is "Preferred"

```
cd ~/openshift-3june-2024
git pull
cd Day5/scheduling
oc apply -f nginx-deploy-with-preffered-node-affinity.yml
oc get po
oc get po -o wide
```

## Expected output

The screenshot shows four terminal windows, each with the user 'jegan@tektutor.org'. The windows are arranged horizontally and show the following sequence of commands and outputs:

- Terminal 1:** Runs 'oc get nodes -l disk=ssd' and outputs: "No resources found".
- Terminal 2:** Runs 'ls' and lists three files: 'nginx-deploy-with-preferred-node-affinity.yml', 'preferred-affinity.yml', and 'nginx-deploy-with-required-node-affinity.yml'.
- Terminal 3:** Runs 'clear'.
- Terminal 4:** Runs 'oc apply -f nginx-deploy-with-preferred-node-affinity.yml' and outputs: "deployment.apps/nginx created".

After the deployment command, the user runs 'oc get po' and 'oc get po -w' to monitor the pods. The pod status table shows:

NAME	READY	STATUS	RESTARTS	AGE
nginx-6bbf585674-62pd9	0/1	ContainerCreating	0	6s
nginx-6bbf585674-68bf8	0/1	ContainerCreating	0	6s
nginx-6bbf585674-b2trx	0/1	ContainerCreating	0	6s
nginx-6bbf585674-b2trx	1/1	Running	0	6s
nginx-6bbf585674-68bf8	1/1	Running	0	7s

Finally, the user runs 'oc get po -o wide' and 'oc get po -o wide --width' to see detailed node information. The output includes columns for IP, NODE, NOMINATED NODE, and READINESS.

Let's delete the preferred Disk affinity scheduling

```
cd ~/openshift-3june-2024
git pull
cd Day5/scheduling
oc delete -f nginx-deploy-with-preferred-node-affinity.yml
```

Let's deploy the required Disk affinity scheduling

```
cd ~/openshift-3june-2024
git pull
cd Day5/scheduling
oc apply -f nginx-deploy-with-required-node-affinity.yml
```

## Expected output

```
jegan@tektutor.org ~ -/openshift-may-2024/Day5/scheduling ↵ ↴ main ▶ oc label node/worker-1.ocp4.tektutor.org.labs disk=ssd
node/worker-1.ocp4.tektutor.org.labs labeled
jegan@tektutor.org ~ -/openshift-may-2024/Day5/scheduling ↵ ↴ main ▶ oc get nodes -l disk=ssd
NAME STATUS ROLES AGE VERSION
worker-1.ocp4.tektutor.org.labs Ready worker 27h v1.28.9+2f7b992
jegan@tektutor.org ~ -/openshift-may-2024/Day5/scheduling ↵ ↴ main ▶ oc get po -o wide
NAME READY STATUS RESTARTS AGE IP NODE NOMINATED NODE READINESS GATES
nginx-695dbb6f6f-5fltq 1/1 Running 0 2m31s 10.131.0.77 worker-1.ocp4.tektutor.org.labs <none> <none>
nginx-695dbb6f6f-pgsq6 1/1 Running 0 2m31s 10.131.0.78 worker-1.ocp4.tektutor.org.labs <none> <none>
nginx-695dbb6f6f-qbqsq 1/1 Running 0 2m31s 10.131.0.76 worker-1.ocp4.tektutor.org.labs <none> <none>
jegan@tektutor.org ~ -/openshift-may-2024/Day5/scheduling ↵ ↴ main ▶ oc edit node/worker-1.ocp4.tektutor.org.labs
node/worker-1.ocp4.tektutor.org.labs edited
jegan@tektutor.org ~ -/openshift-may-2024/Day5/scheduling ↵ ↴ main ▶ oc get nodes -l disk=ssd
No resources found
jegan@tektutor.org ~ -/openshift-may-2024/Day5/scheduling ↵ ↴ main ▶ oc get po -o wide
NAME READY STATUS RESTARTS AGE IP NODE NOMINATED NODE READINESS GATES
NOMINATED NODE READINESS GATES
eventinghello-00001-deployment-6f455db578-nbl6k 2/2 Running 0 58s 10.131.0.80 worker-1.ocp4.tektutor.org.labs <none> <none>
eventinghello-00001-deployment-6f455db578-t6r67 2/2 Running 0 58s 10.128.2.106 worker-2.ocp4.tektutor.org.labs <none> <none>
nginx-695dbb6f6f-5fltq 1/1 Running 0 3m35s 10.131.0.77 worker-1.ocp4.tektutor.org.labs <none> <none>
nginx-695dbb6f6f-pgsq6 1/1 Running 0 3m35s 10.131.0.78 worker-1.ocp4.tektutor.org.labs <none> <none>
nginx-695dbb6f6f-qbqsq 1/1 Running 0 3m35s 10.131.0.76 worker-1.ocp4.tektutor.org.labs <none> <none>
jegan@tektutor.org ~ -/openshift-may-2024/Day5/scheduling ↵ ↴ main ▶ ls
nginx-deploy-with-preferred-node-affinity.yml preferred-affinity.yml
nginx-deploy-with-required-node-affinity.yml required-affinity.yml
jegan@tektutor.org ~ -/openshift-may-2024/Day5/scheduling ↵ ↴ main ▶ vim nginx-deploy-with-required-node-affinity.yml
jegan@tektutor.org ~ -/openshift-may-2024/Day5/scheduling ↵ ↴ main █
[0] 0:vim* "tektutor.org" 16:35 21-May-24
```

Kindly complete the post-test from RPS Lab Machine

<https://app.mymapit.in/code4/tiny/03b0bw>

Feedback - kindly provide your feedback here

<https://survey.zohopublic.com/zs/dnBTiX>