Create your Spring Boot application

Table of Contents

Go to http://start.spring.io and create your app. That's it. You have other options too:

1. With Spring Tool Suite (STS)
2. with Spring Initializr CLI
3. With JBoss Developer Studio (see below)
4. With IntelliJ, Eclipse, Netbeans (via JBoss Forge – see below)
5. With the Fabric8 console for CI/CD

We can also do with these, but will be covered in a different section:

- With JBoss Forge CLI
- With maven archetypes/fabric8 quickstarts

Spring Initializr or existing Spring projects

STS, start.spring.io, and the spring-boot CLI all use Spring Initializr under the covers.

To kubernetes enable your Spring projectyou will need to enable the fabric8 maven plugin.

The simplest way to do this is by using the fabric8:setup goal from the maven plugin; this will add the necessary maven plugin configuration to your `pom.xml` file.

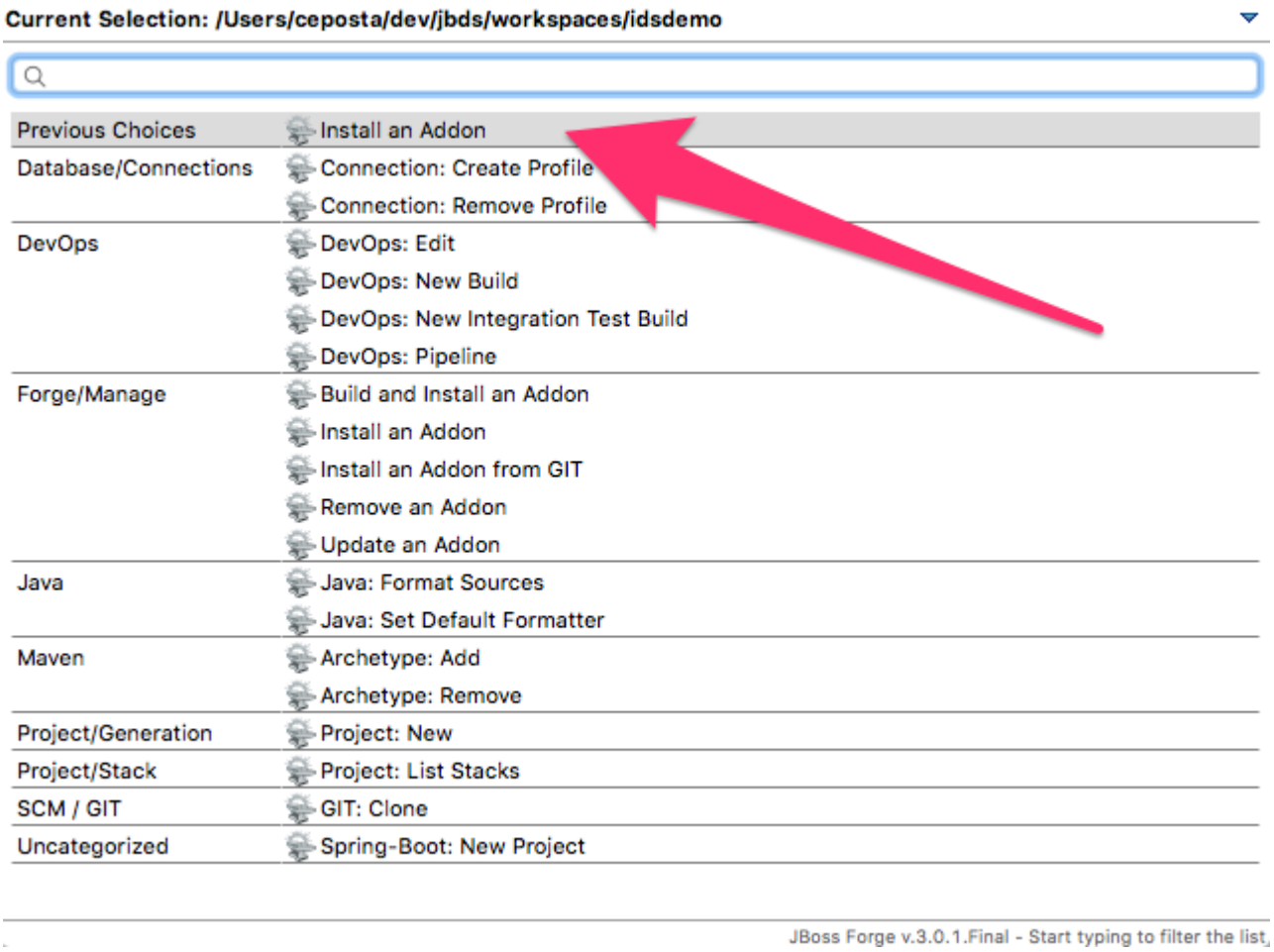
```
mvn io.fabric8:fabric8-maven-plugin:${fabric8.maven.plugin.version}:setup
```

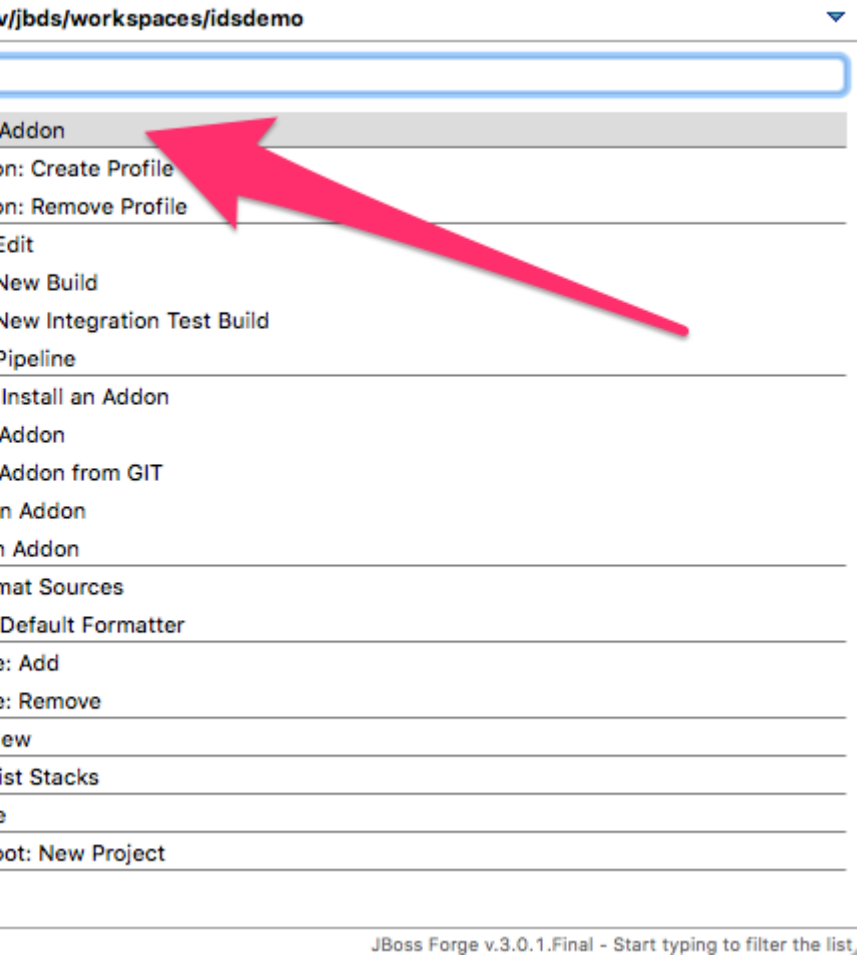
Or you can manually add the following section to your `pom.xml` by hand:

```
<build>
  ...
     <plugins>
       <plugin>
       <groupId>io.fabric8</groupId>
       <artifactId>fabric8-maven-plugin</artifactId>
       <version>${fabric8.maven.plugin.version}</version>
       <executions>
         <execution>
           <goals>
             <goal>resource</goal>
           </goals>
         </execution>
       </executions>
       </plugin>
  ...
```

JBoss Developer Studio

JBoss Developer Studio has JBoss Forge tooling installed by default. Press `CTRL+4` or `CMD+4` if on Mac to get the forge window. If you haven't already, install the Fabric8 `devops` plugin which will enable the Spring Boot project wizards. You can install the addon from within JBDS by hitting `CTRL/CMD+4` and type `addon` and find the option for installing. Use the coordinate below:

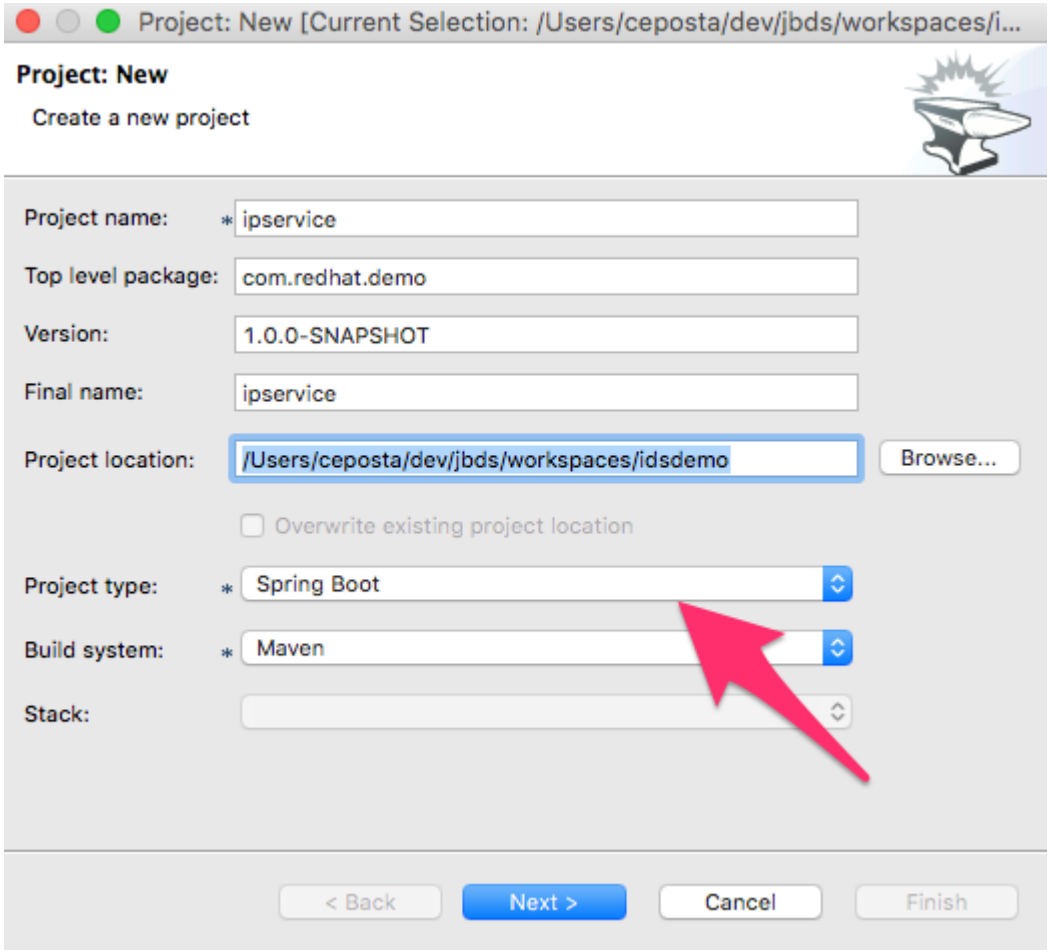




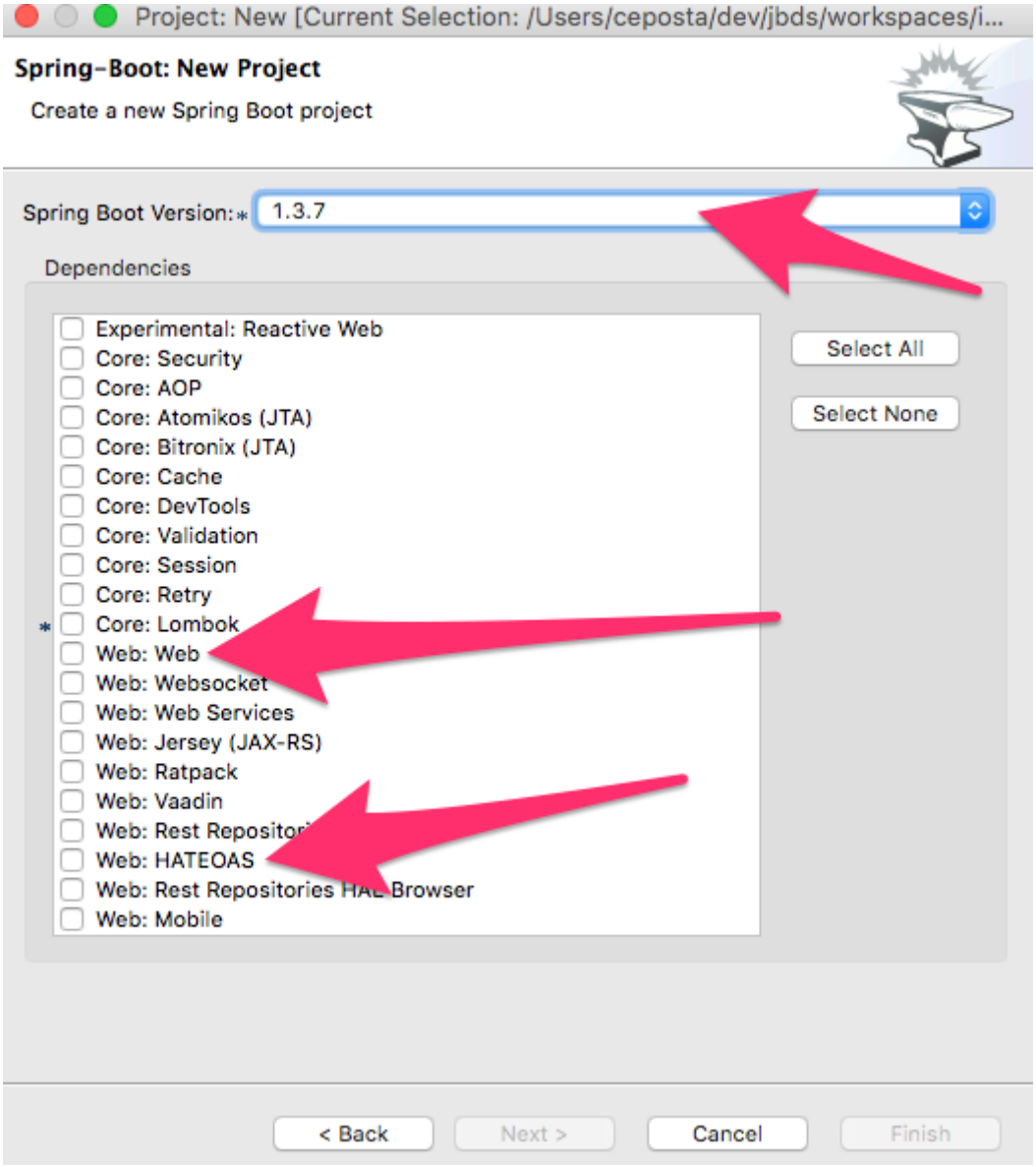

```
addon-install --coordinate io.fabric8.forge:devops,2.3.18
```

Quick Note: You can also install this from the CLI.

Now when you `CTRL/CMD+4` you can type `project` and select the `Project New` option. When you begin creating the new project, fill in the Project Name, Package Name, etc. and make sure to change the Project Type to 'spring boot':



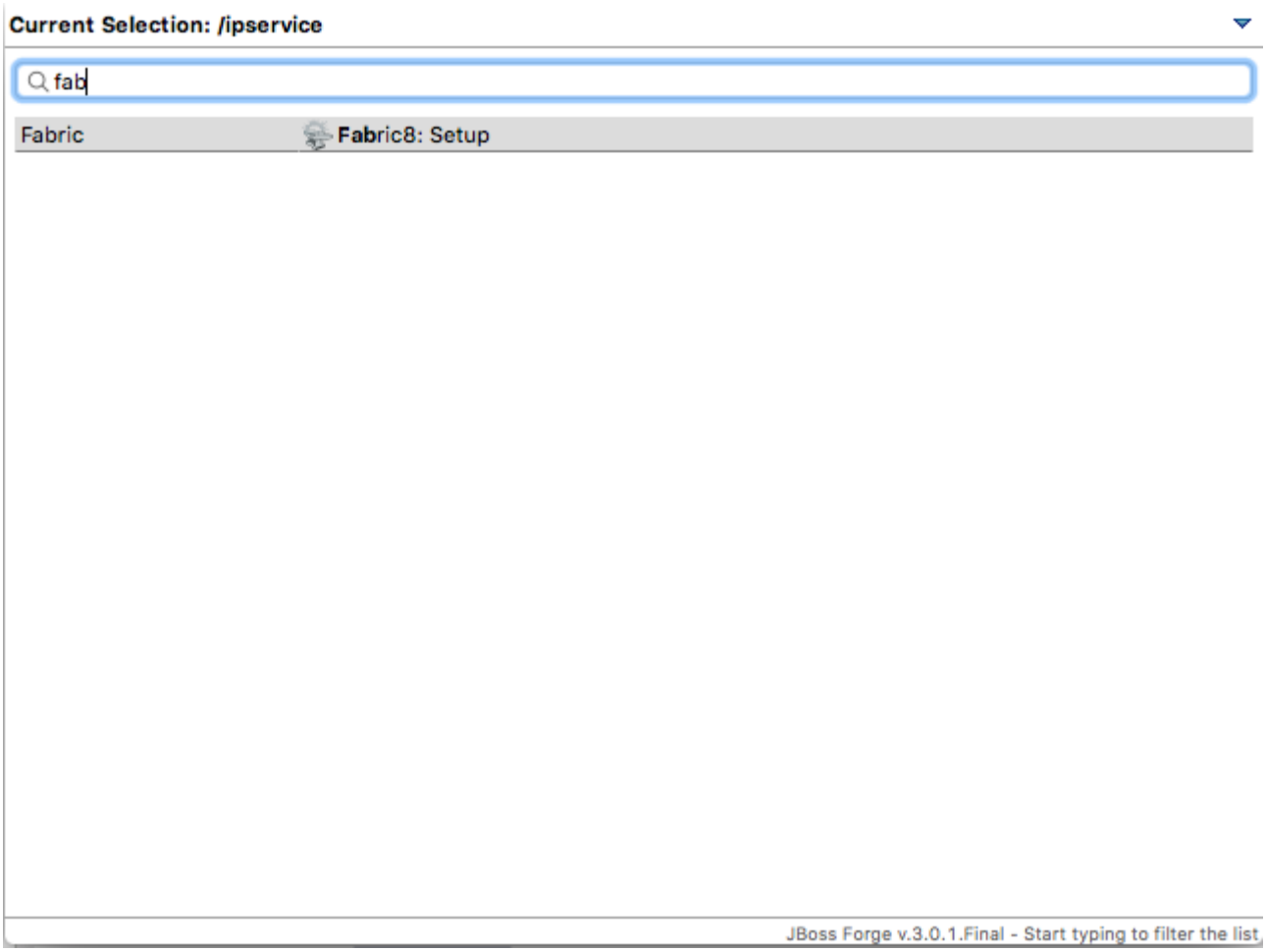
When you click "Next", you can choose the dependencies you like for your project (just as you can from any Spring Initializr dialog including start.spring.io).



Clicking "Finish" will create the project for you. At this point you have a skeleton Spring Boot project into which you can add your own amazing business logic.

What about when you're ready to start using the Fabric8 tooling and build Docker images for your Kubernetes installation?

Select the project in your project/package explorer and then hit `CTLR/CMD+4` and type `fabric8` into the dialog box filter. You should see an option for *Fabric8 Setup*.



When the next dialog box comes up you can add metadata about which Docker image to use or

which Main class to bootstrap, but in our case the fabric8 tooling is going to pick sensible defaults since it will auto-detect we have a Spring Boot application. Just click "Finish"

Now if we take a look at the pom.xml, we'll see that our `fabric8-maven-plugin` has been added:

```
<build>
    <plugins>
        <plugin>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-maven-plugin</artifactId>
        </plugin>
        <plugin>
            <groupId>io.fabric8</groupId>
            <artifactId>fabric8-maven-plugin</artifactId>
            <version>3.1.23</version>
            <executions>
                <execution>
                    <goals>
                        <goal>resource</goal>
                        <goal>build</goal>
                    </goals>
                </execution>
            </executions>
        </plugin>
    </plugins>
</build>
```

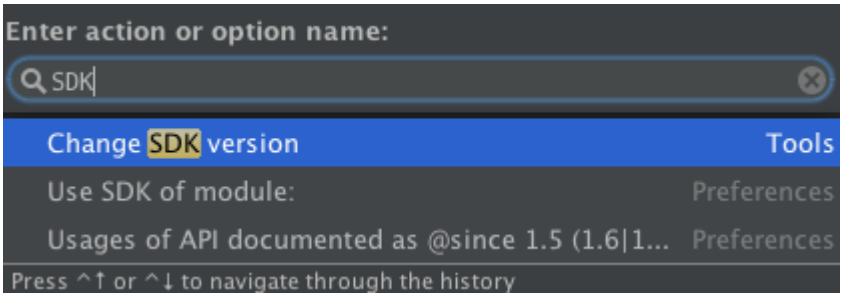
```
framework.boot</groupId>
boot-maven-plugin</artifactId>


</groupId>
-maven-plugin</artifactId>
rsion>


esource</goal>
uild</goal>
```

You're now in business! Skip to the section titled "Spring Boot on Kubernetes" if you're not interested in set up for IntelliJ. Or, watch a video of doing this whole process here:

<iframe src="https://player.vimeo.com/video/180053437" width="640" height="360" frameborder="0" webkitallowfullscreen mozallowfullscreen allowfullscreen></iframe> Spring Boot, Spring Cloud with Kubernetes and Fabric8 from Christian Posta on Vimeo.

IntelliJ

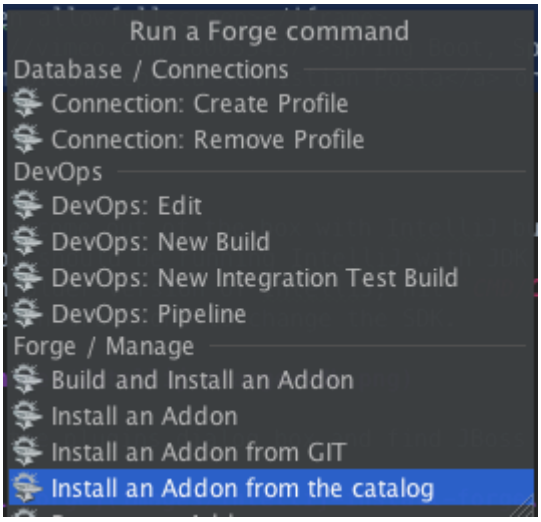
JBoss Forge doesn't come out of the box with IntelliJ but through IntelliJ's amazing plugin system, we can easily added it! Just note, you should be running IntelliJ with JDK 1.8+. Newer versions of IntelliJ bundle and use JDK 1.8 out of the box. If you've an older version of IntelliJ, hit `CMD/CTRL+SHIFT+A` to get the `All Actions` dialog box and start typing `SDK`. Follow the instructions to change the SDK.



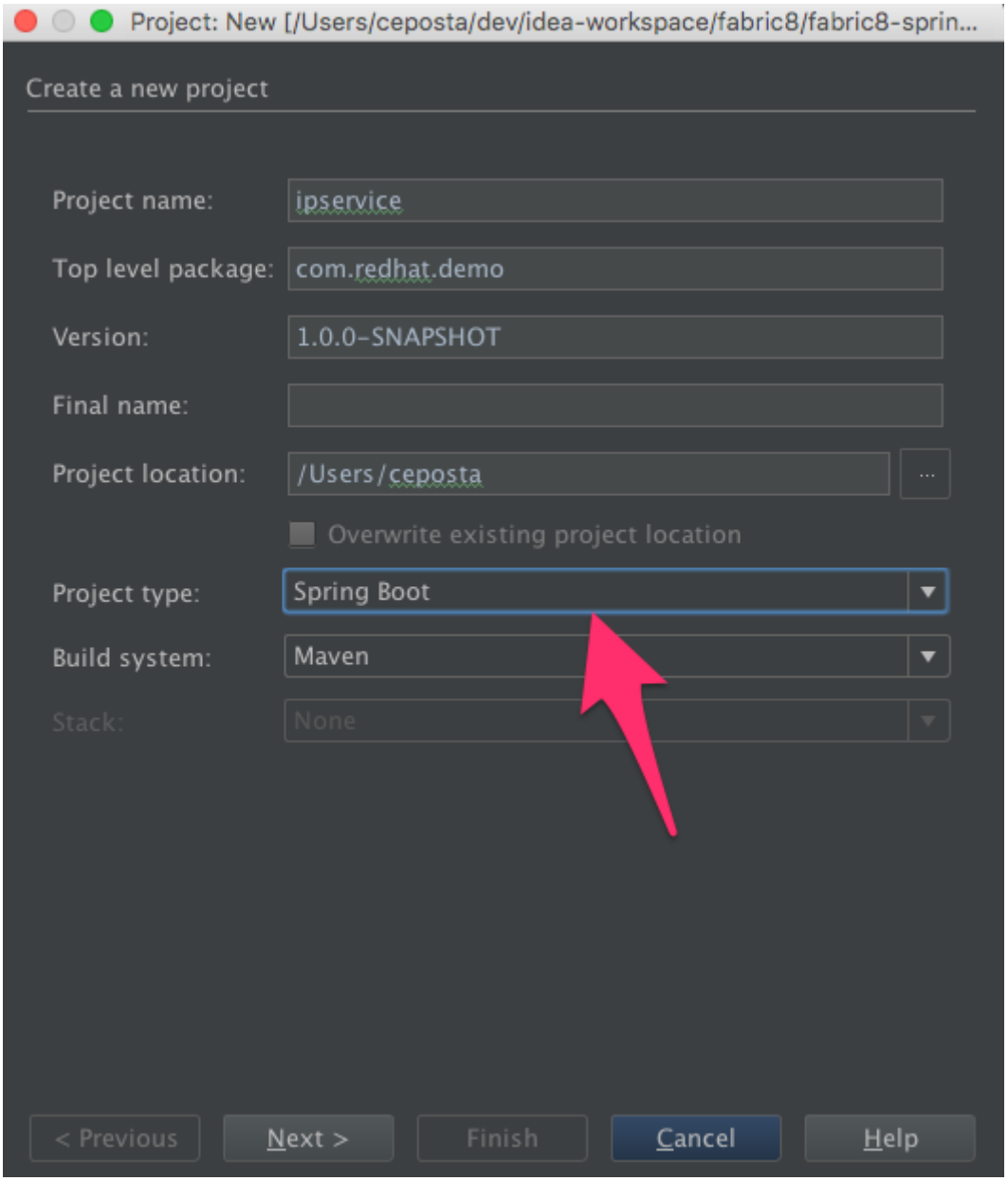
Now you can go to the plugins dialog box and find JBoss Forge:

[IntelliJ install Forge]

Now you can `CTRL+ALT+4` or `CMD+OPTION+4` on Mac to get the Forge dialog box:

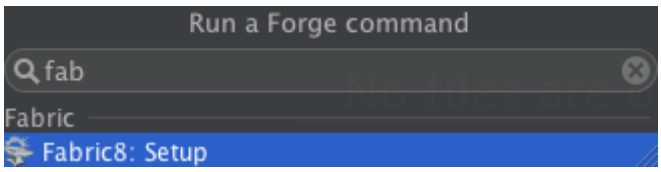


Just like with the JBDS example, we'll find the "Project New" option, fill in the project information, and make sure to select Project Type of Spring Boot:



Click next, select the Spring Boot dependencies you'd like to include in your project and click Finish.

To add the Fabric8 tooling, select the root of your project and go back to the Forge dialog (`CMD/CTRL+ALT/OPTION+4`) and begin typing fabric8



Again, you can add more details to the setup, but just clicking "Finish" is sufficient because fabric8 can auto-detect we're in a Spring Boot project and use appropriate defaults. Now if you open the `pom.xml` you'll see the `fabric8-maven-plugin` added:

```
<build>
  <plugins>
    <plugin>
      <groupId>org.springframework.boot</groupId>
      <artifactId>spring-boot-maven-plugin</artifactId>
    </plugin>
    <plugin>
      <groupId>io.fabric8</groupId>
      <artifactId>fabric8-maven-plugin</artifactId>
      <version>3.1.23</version>
      <executions>
        <execution>
          <goals>
            <goal>resource</goal>
            <goal>build</goal>
          </goals>
        </execution>
      </executions>
    </plugin>
  </plugins>
</build>
```

Spring Boot on Kubernetes

Once we have our Spring Boot microservice to our liking we want to be able to package it up and deliver it to our cluster running in the Cloud. Docker provides a great abstraction (the container!) for doing this. To be able to do this while running on Mac OS X or Windows, we'll need a little help. We'll need a Docker daemon and Kubernetes to do this. Here are a few options for getting started:

- minikube
- minishift
- oc cluster up
- Red Hat Container Development Kit

See the fabric8 docs (http://fabric8.io/guide/index.html) for more details.

Once we have a Docker/Kubernetes environment up and have access to a Docker daemon we can build our docker images. For OpenShift users that wish to use Source to Image, see the next section. First let's verify we have docker connected properly:

```
$ docker images
```

If that command returns a list of docker images, you're ready to go.

Also make sure you're logged into Kubernetes properly:

```
$ kubectl get nodes
```

If that command returns a list of nodes (just 1 if running locally) then you're good!

Navigate to your spring boot application that we created earlier (and also to which we added the

fabric8-maven-plugin). Try running:

```
$ mvn clean install
```

If you run a `docker images` now you should see our new Docker image built and ready to go!!

```
$ docker images
REPOSITORY                                  TAG                 IMAGE ID
CREATED             SIZE
demo/ipservice                              latest              b491738bf223
35 seconds ago      161.5 MB
example/foo                                 1.0.1               f86db95465cf
About an hour ago   161.5 MB
172.30.128.90:80/example/foo                1.0.1               f86db95465cf
About an hour ago   161.5 MB
foo/foo                                     latest              aa5fa39e3609
21 hours ago        161.5 MB
```

That's pretty amazing. Didn't have to touch a Dockerfile or anything.

What about deploying to Kubernetes? To do that, we usually have to build a Kuberentes resource `yml` file. Take a look at the `./target/classes/META-INF/fabric8` folder:

```
$ ls -l ./target/classes/META-INF/fabric8/
total 32
drwxr-xr-x  4 ceposta  staff   136 Sep  2 14:07 kubernetes
-rw-r--r--  1 ceposta  staff  3226 Sep  2 14:07 kubernetes.json
-rw-r--r--  1 ceposta  staff  2344 Sep  2 14:07 kubernetes.yml
drwxr-xr-x  4 ceposta  staff   136 Sep  2 14:07 openshift
-rw-r--r--  1 ceposta  staff  3343 Sep  2 14:07 openshift.json
-rw-r--r--  1 ceposta  staff  2415 Sep  2 14:07 openshift.yml
```

Woah! The maven plugin generated manifest json/yml files for us! Let's take a quick look:

```
$ cat ./target/classes/META-INF/fabric8/kubernetes.yml
---
apiVersion: "v1"
kind: "List"
items:
- apiVersion: "v1"
  kind: "Service"
  metadata:
    annotations:
      prometheus.io/port: "9779"
      prometheus.io/scrape: "true"
      fabric8.io/iconUrl: "img/icons/spring-boot.svg"
    labels:
```

```
      provider: "fabric8"
      project: "ipservice"
      version: "1.0.0-SNAPSHOT"
      group: "com.redhat.demo"
    name: "ipservice"
  spec:
    ports:
    - port: 8080
      protocol: "TCP"
      targetPort: 8080
    selector:
      project: "ipservice"
      provider: "fabric8"
      group: "com.redhat.demo"
    type: "LoadBalancer"
- apiVersion: "extensions/v1beta1"
  kind: "Deployment"
  metadata:
    annotations:
      fabric8.io/iconUrl: "img/icons/spring-boot.svg"
      fabric8.io/metrics-path: "dashboard/file/kubernetes-pods.json/?var-
project=ipservice&var-version=1.0.0-SNAPSHOT"
    labels:
      provider: "fabric8"
      project: "ipservice"
      version: "1.0.0-SNAPSHOT"
      group: "com.redhat.demo"
    name: "ipservice"
  spec:
    replicas: 1
    selector:
      matchLabels:
        project: "ipservice"
        provider: "fabric8"
        group: "com.redhat.demo"
    template:
      metadata:
        annotations:
          fabric8.io/iconUrl: "img/icons/spring-boot.svg"
          fabric8.io/metrics-path: "dashboard/file/kubernetes-pods.json/?var-
project=ipservice&var-version=1.0.0-SNAPSHOT"
        labels:
          provider: "fabric8"
          project: "ipservice"
          version: "1.0.0-SNAPSHOT"
          group: "com.redhat.demo"
      spec:
        containers:
        - env:
          - name: "KUBERNETES_NAMESPACE"
            valueFrom:
```

```
            fieldRef:
              fieldPath: "metadata.namespace"
        image: "demo/ipservice:latest"
        imagePullPolicy: "IfNotPresent"
        livenessProbe:
          httpGet:
            path: "/health"
            port: 8080
          initialDelaySeconds: 180
        name: "spring-boot"
        ports:
        - containerPort: 8080
          protocol: "TCP"
        - containerPort: 9779
          protocol: "TCP"
        - containerPort: 8778
          protocol: "TCP"
        readinessProbe:
          httpGet:
            path: "/health"
            port: 8080
          initialDelaySeconds: 10
        securityContext:
          privileged: false
```

Wow! It built out a Kubernetes Service and Kubernetes Deployment resource file/manifest for us! We didn't have to touch a single line of yaml/json!

Let's deploy our application then:

```
$ mvn fabric8:deploy
Java HotSpot(TM) 64-Bit Server VM warning: ignoring option MaxPermSize=1512m; support
was removed in 8.0
[INFO] Scanning for projects...
[INFO]
[INFO] ------------------------------------------------------------------------
[INFO] Building demo 1.0.0-SNAPSHOT
[INFO] ------------------------------------------------------------------------
[INFO]
[INFO] --- fabric8-maven-plugin:3.1.23:deploy (default-cli) @ ipservice ---
[INFO] F8> Using OpenShift at https://192.168.64.7:8443/ in namespace ipservice with
manifest /Users/ceposta/dev/jbds/workspaces/idsdemo/ipservice/target/classes/META-
INF/fabric8/openshift.yml
[INFO] OpenShift platform detected
[INFO] Using project: ipservice
[INFO] Creating a Service from openshift.yml namespace ipservice name ipservice
[INFO] Created Service: target/fabric8/applyJson/ipservice/service-ipservice.json
[INFO] Creating a DeploymentConfig from openshift.yml namespace ipservice name
ipservice
[INFO] Created DeploymentConfig: target/fabric8/applyJson/ipservice/deploymentconfig-
ipservice.json
[INFO] Creating Route ipservice:ipservice host:
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time: 3.447 s
[INFO] Finished at: 2016-09-02T14:14:44-07:00
[INFO] Final Memory: 34M/335M
[INFO] ------------------------------------------------------------------------
```

Now if we take a look at the deployments/replicasets/pods, we should see our application has been deployed!

```
$ kubectl get pod
NAME                READY     STATUS    RESTARTS   AGE
ipservice-1-v3hjc   1/1       Running   0          1m
```

OpenShif s2i binary builds

What if we wanted to use OpenShift to build the Docker image? What if we weren't able to install a Docker daemon locally and wanted to use OpenShift to do the docker builds? Easy! Just change the mode from (default: `kubernetes`) to `openshift`:

```
$ mvn clean install -Dfabric8.mode=openshift
```

Doing this will create an OpenShift BuildConfig and kick off a binary s2i build!

Then if we want to do a deploy:

```
mvn fabric8:deploy -Dfabric8.mode=openshift
```

Then the maven plugin will create the appropriate OpenShift DeploymentConfig and use the associated OpenShift ImageStreams that were created from the BuildConfig.

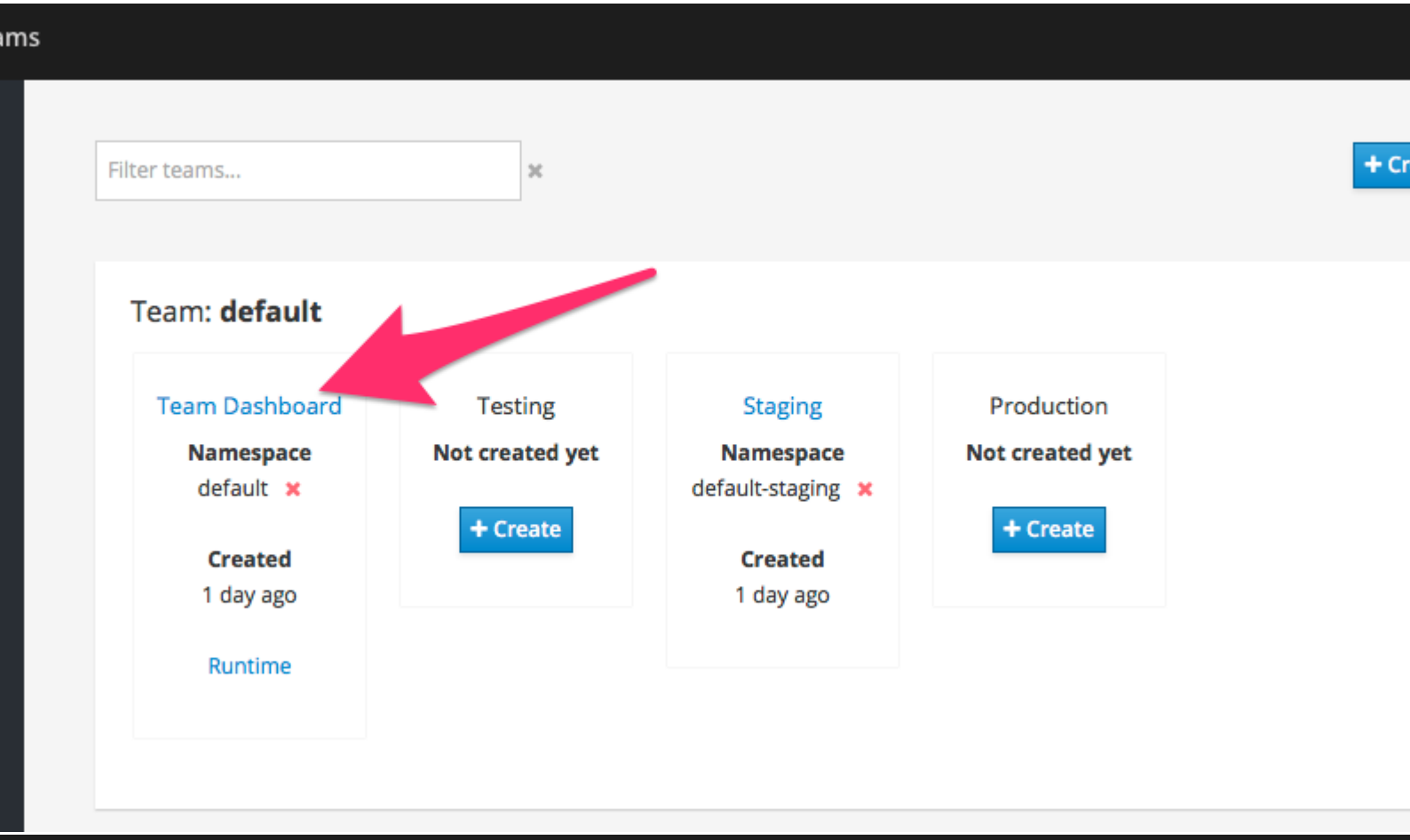
This approach is great when you don't have access to a Docker daemon to kick off docker builds. Just let the OpenShift Container Platform do it for you.

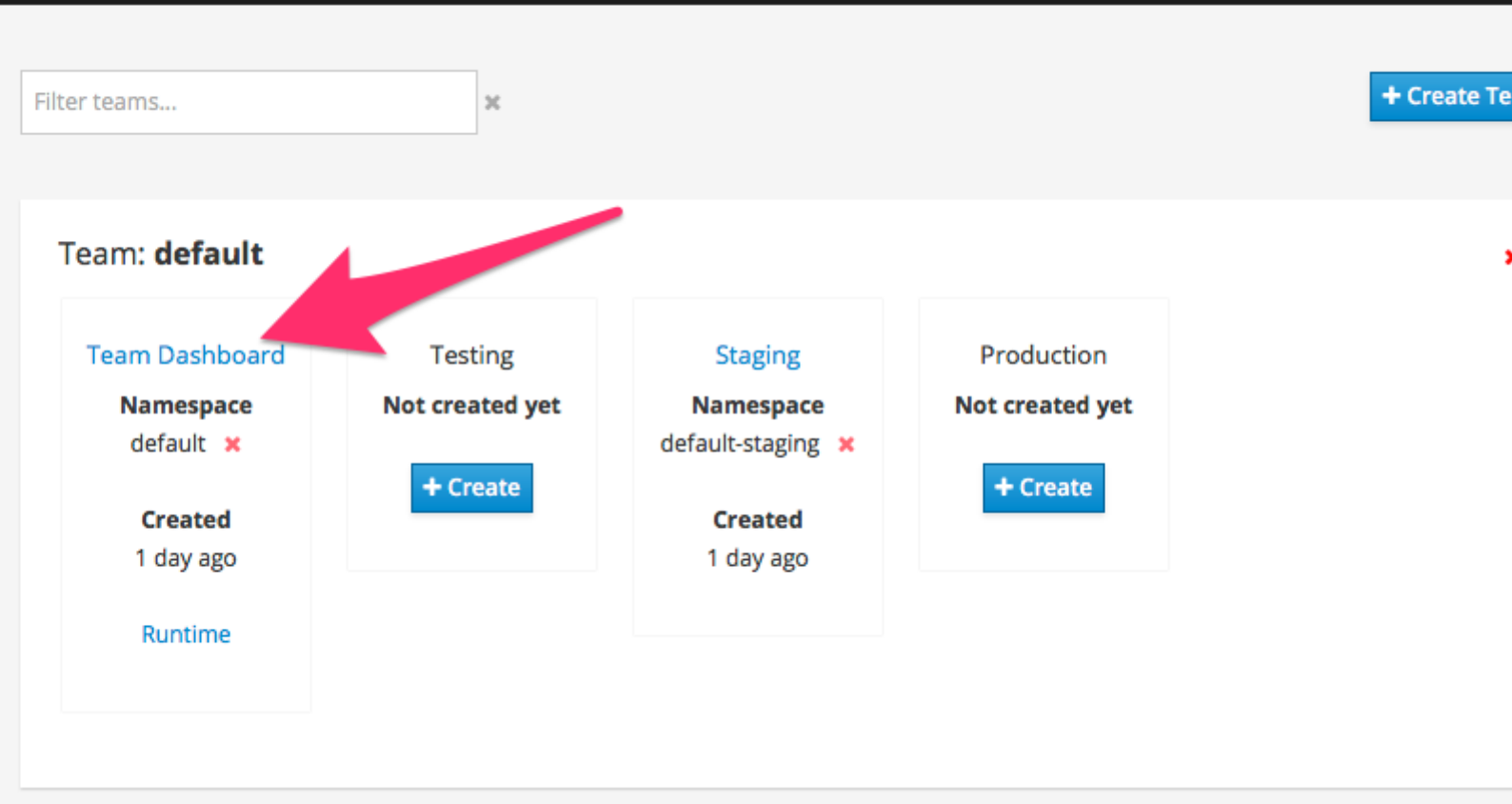
Continuous Delivery

We want to continuously deliver Spring Boot microservices!

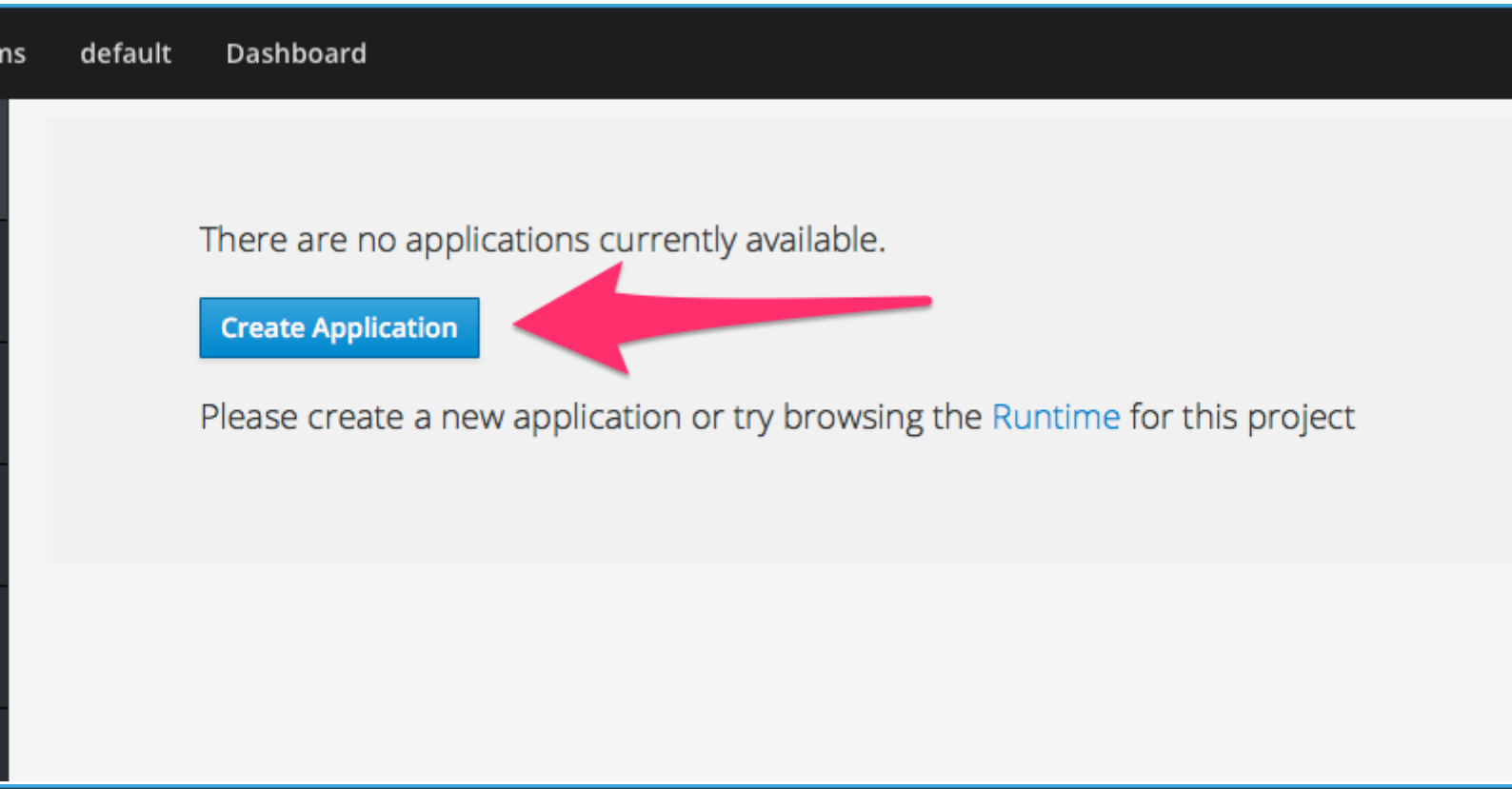
Creating a project as we did above is okay to get started. A lot of times we create projects and then for each one have to go through the steps of setting up a git repository, setting up builds in some kind of CI system, and then fabricating a deployment pipeline that suits us. Then we have to connect all those pieces together. If we want to use containers and run them in Kubernetes then we have to go try find all of the plugins and configure them (and understand the nuance of each). What if we could just do all of this with a couple clicks?

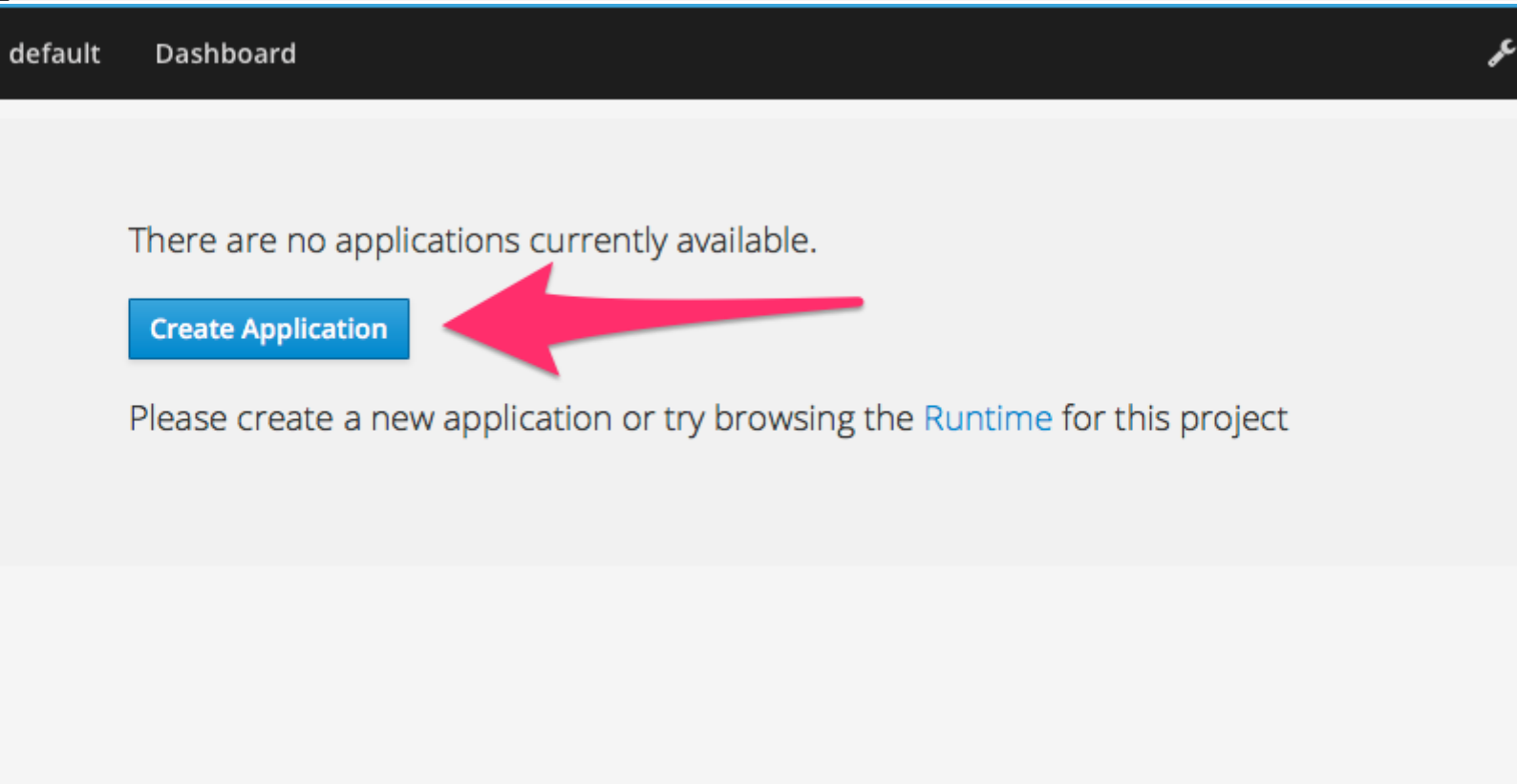
The Fabric8 console allows us to do this. It is a webconsole for Kubernetes that has lots of goodies not the least of which is built-in CI/CD with Jenkins Pipelines. To get started creating a Spring Boot microservice and attach it to a CI/CD system, log in to the console and choose a team (default team works fine for illustration)



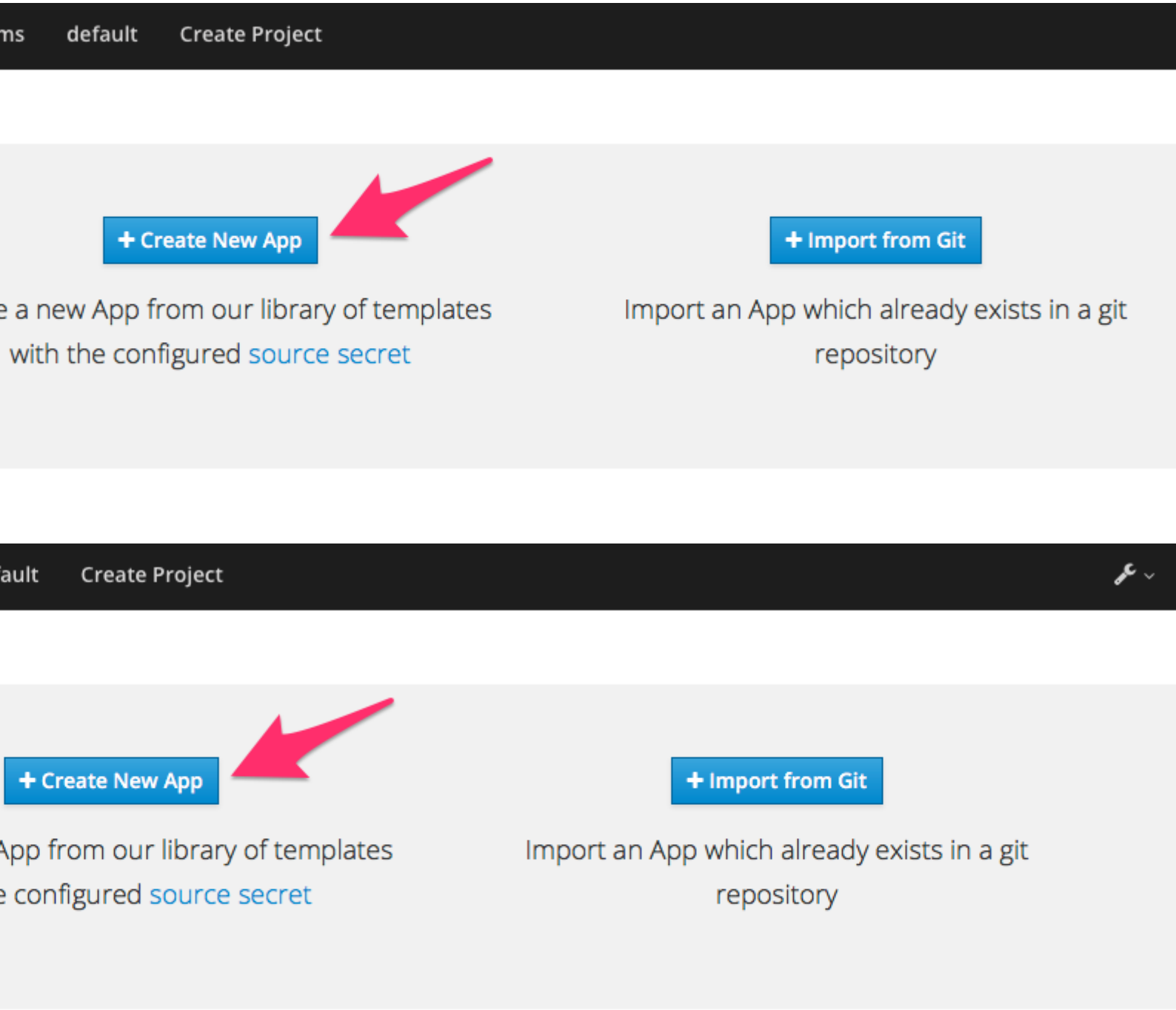


Next we want to create an application, so click Create Application:





If we had created our app using any of the above (Spring Initializr/STS, JBDS, or IntelliJ) we can check our code into git and import the project. But here, we're going to create a new app:



In this next dialog, we have myriad of options to choose for how we want to create our microservice. Let's choose the Spring Boot option (but Go, Integration, and WildFly Swarm are also great options!):

default Create Project

ect

Django

From Archetype

Funktion

Generic

Integration

Java Enterprise Archive (EAR)

Java Library (JAR)

Java Web Application (WAR)

NodeJS

PHP

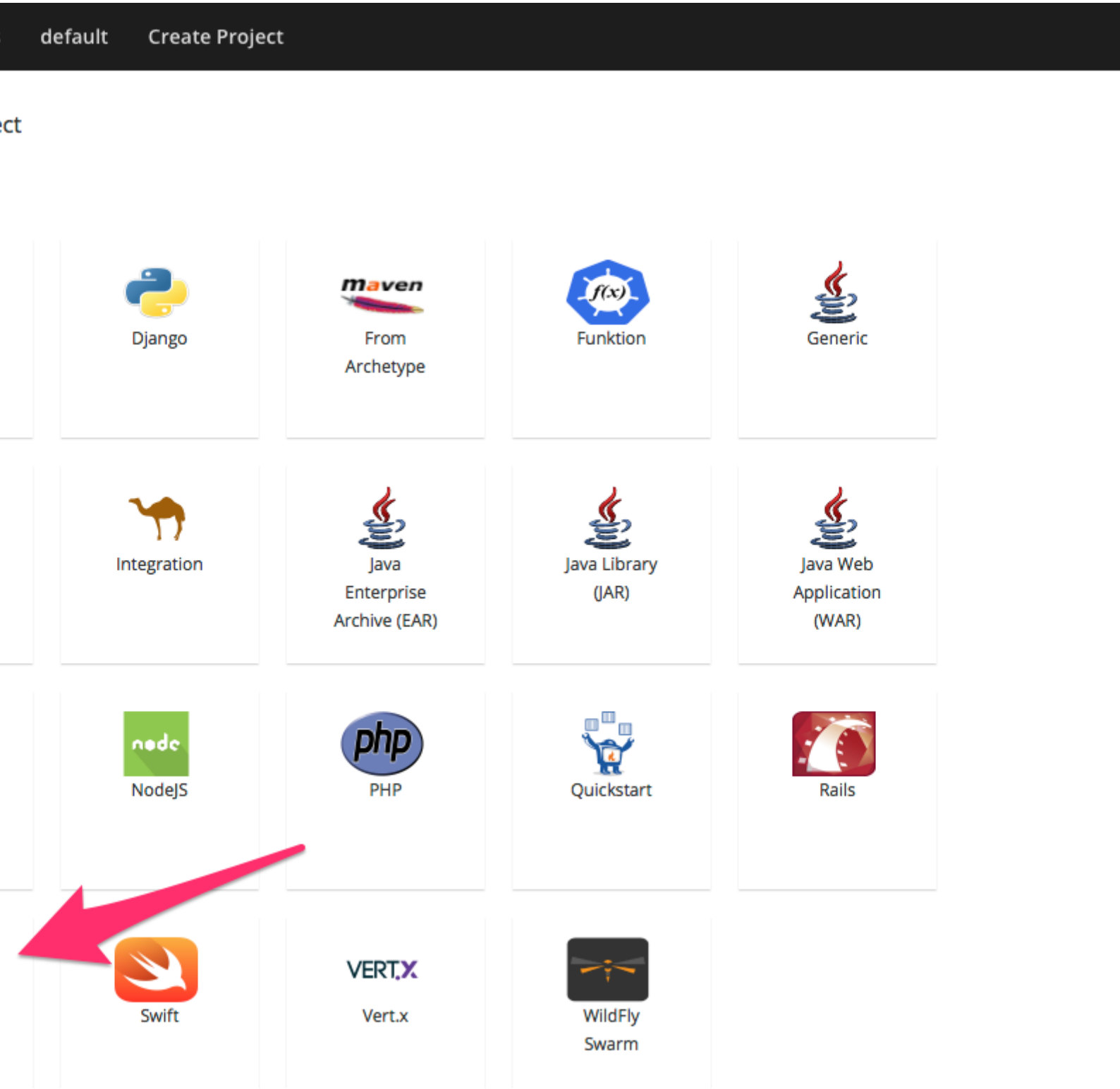
Quickstart

Rails

Swift

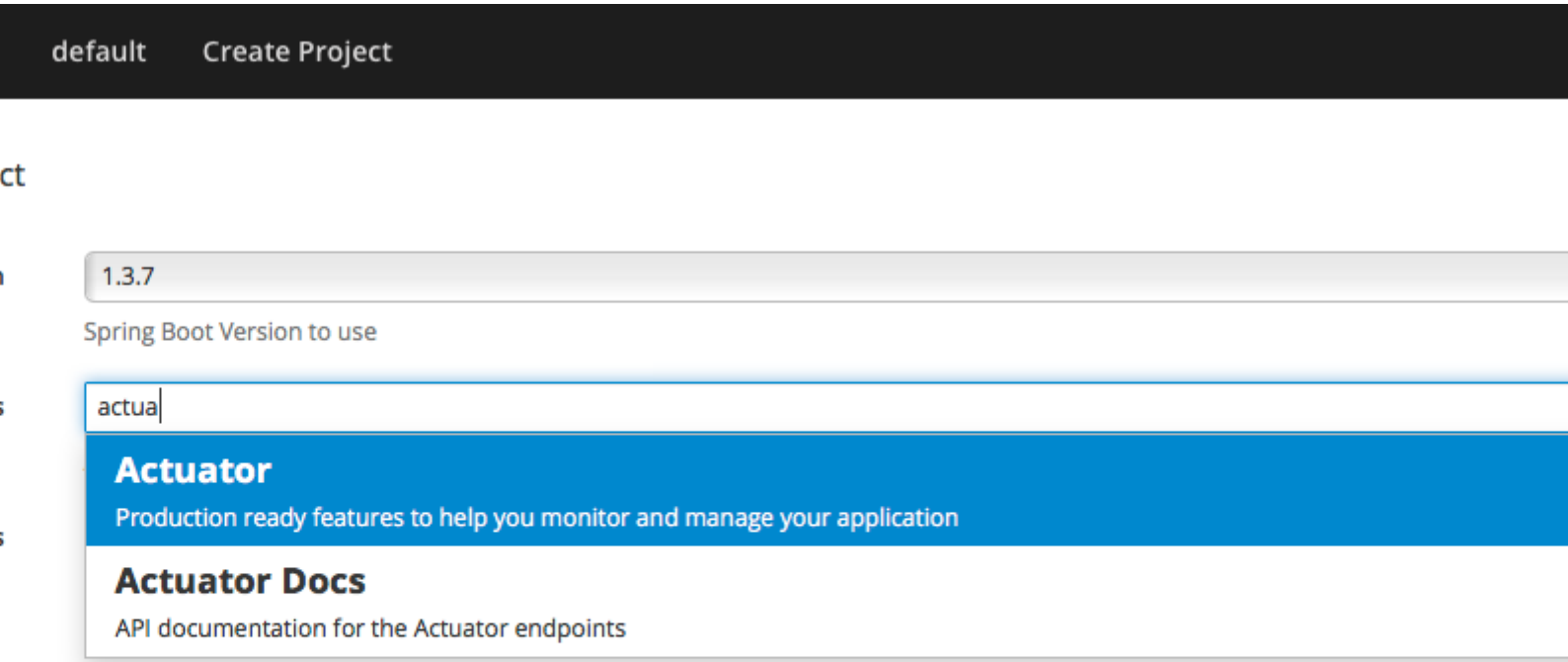
Vert.x

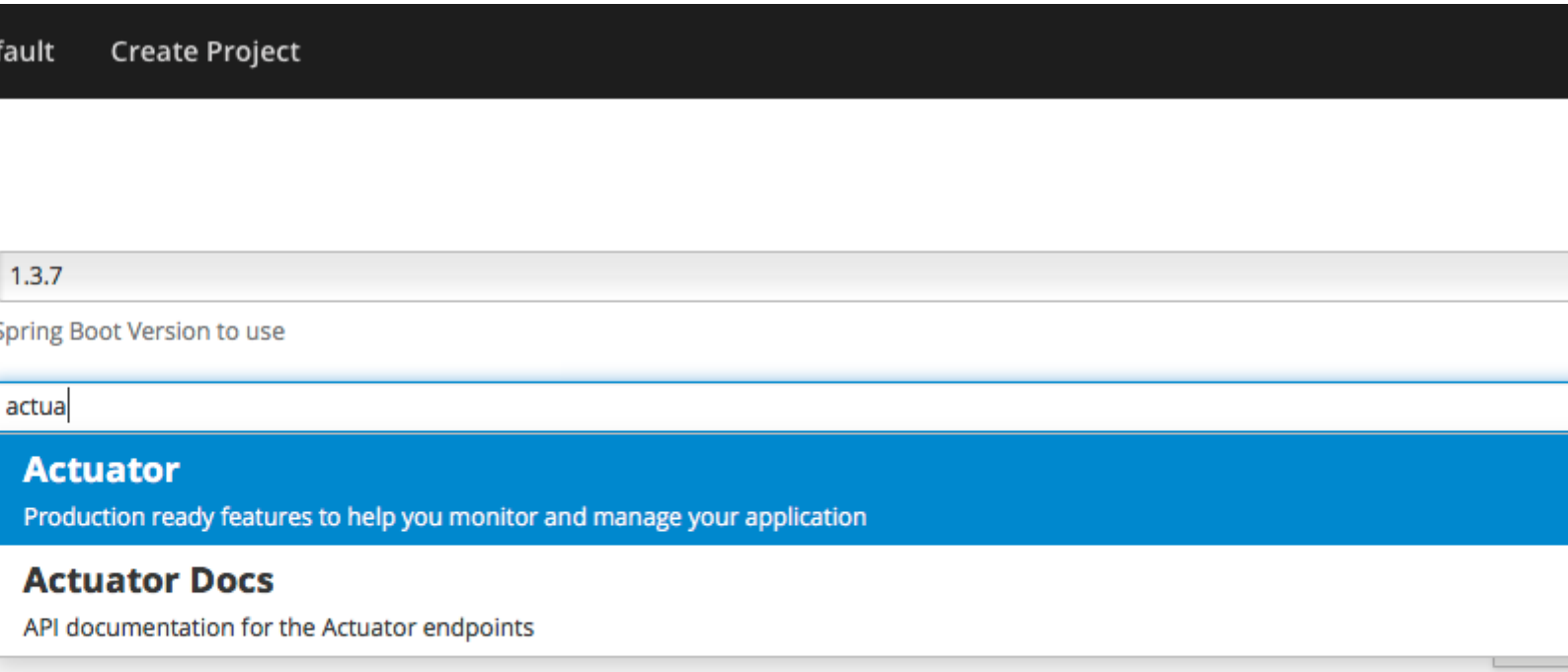
WildFly Swarm

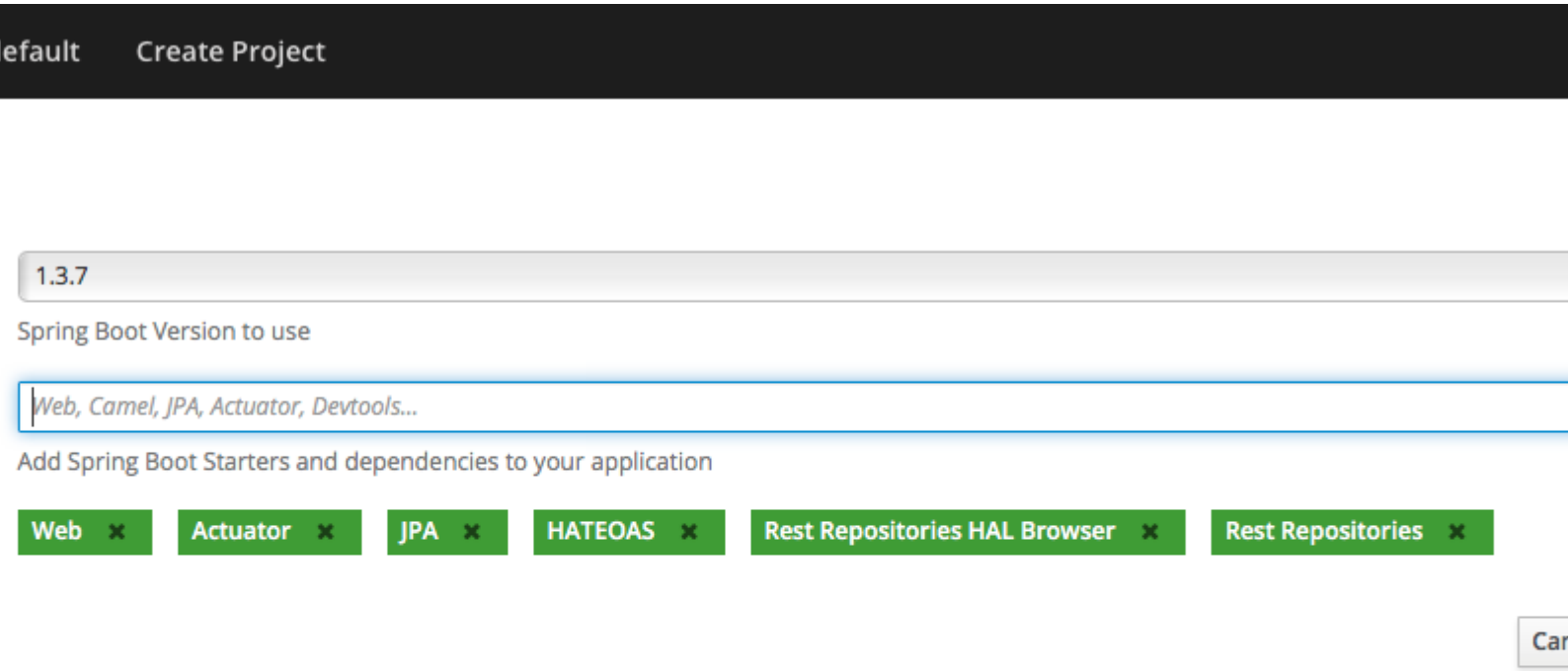


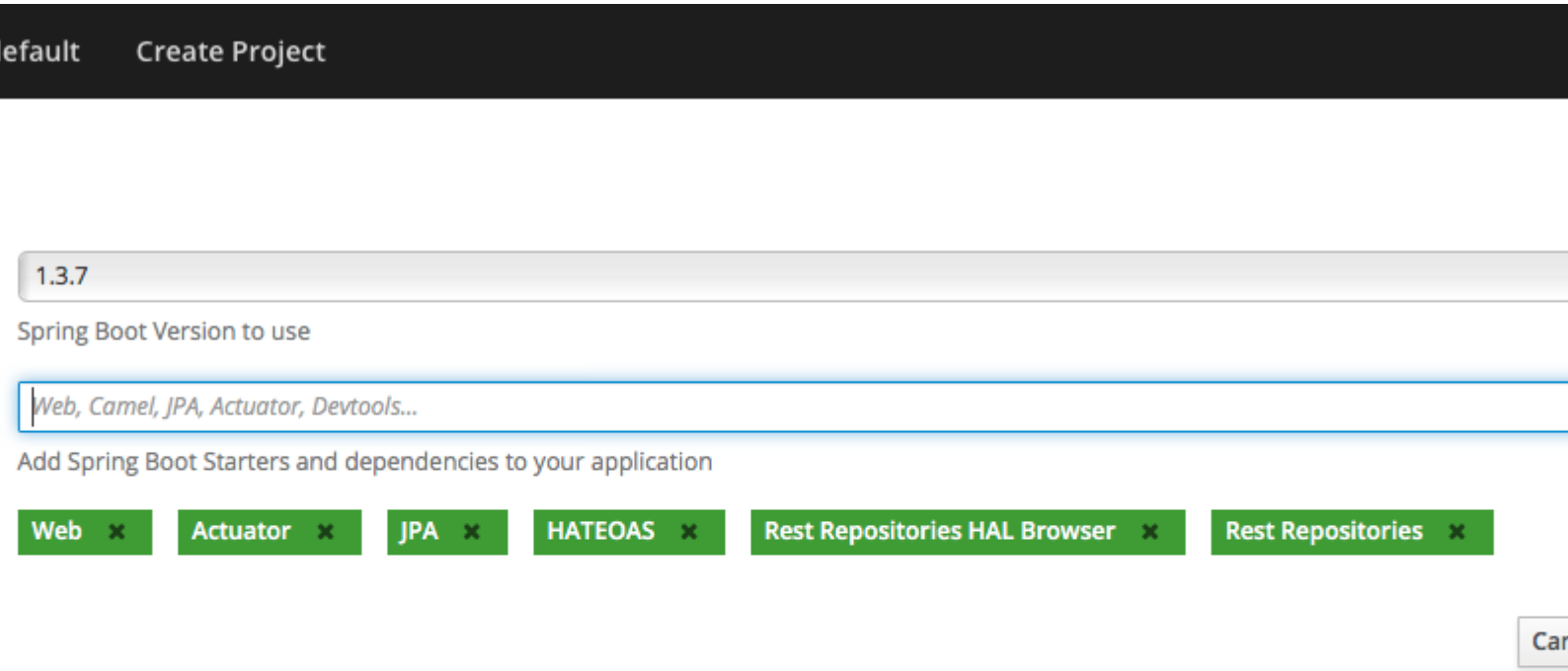
Give it a name/package name and click "Next"

Now you can see a dialog that looks similar to the http://start.spring.io page that lets you choose which version of Spring Boot you want to use and which dependencies to add:


default
Create Project
ct
1.3.7
Spring Boot Version to use
actua
Actuator
Production ready features to help you monitor and manage your application
Actuator Docs
API documentation for the Actuator endpoints

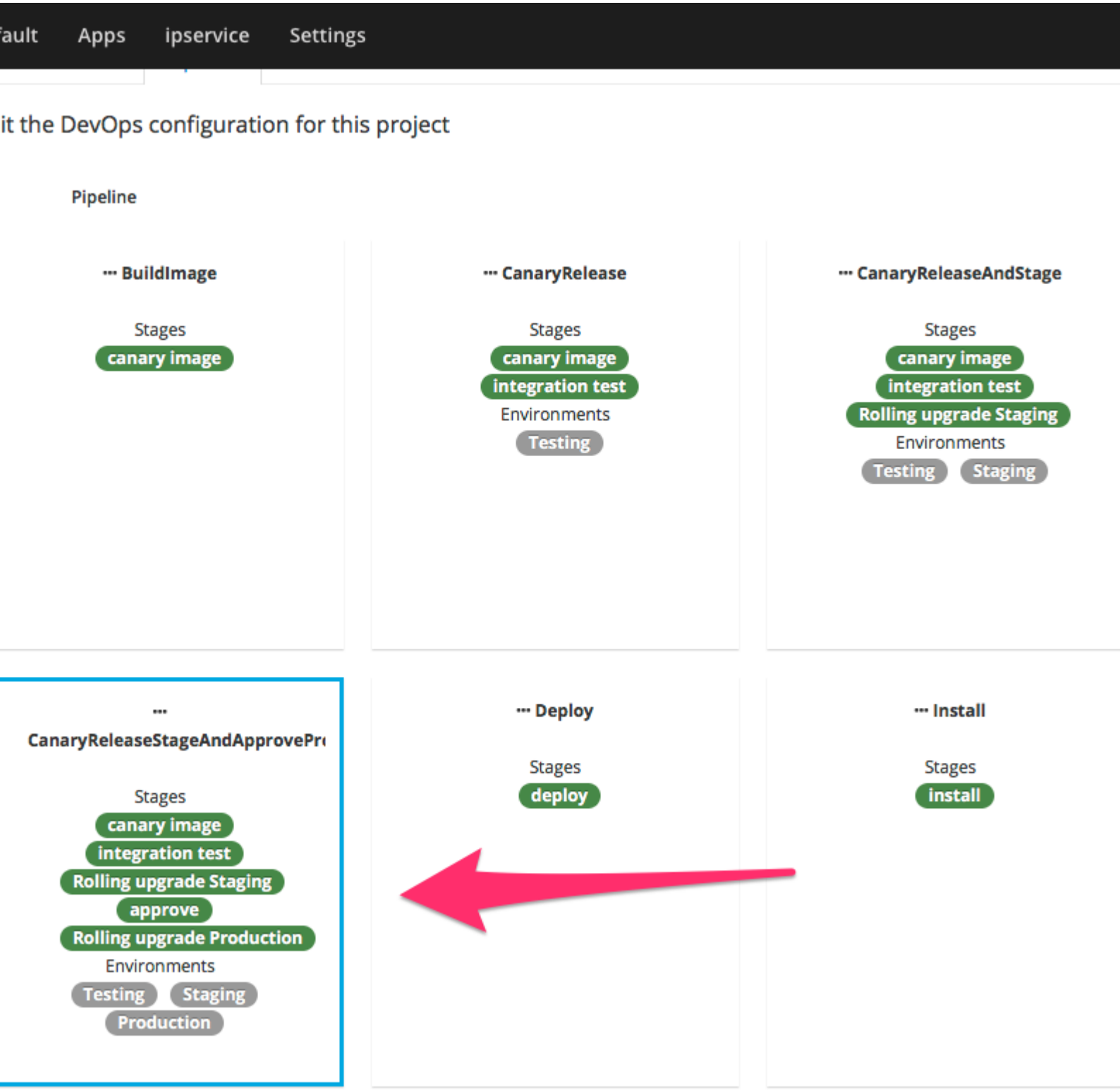

fault
Create Project
1.3.7
Spring Boot Version to use
actua
Actuator
Production ready features to help you monitor and manage your application
Actuator Docs
API documentation for the Actuator endpoints

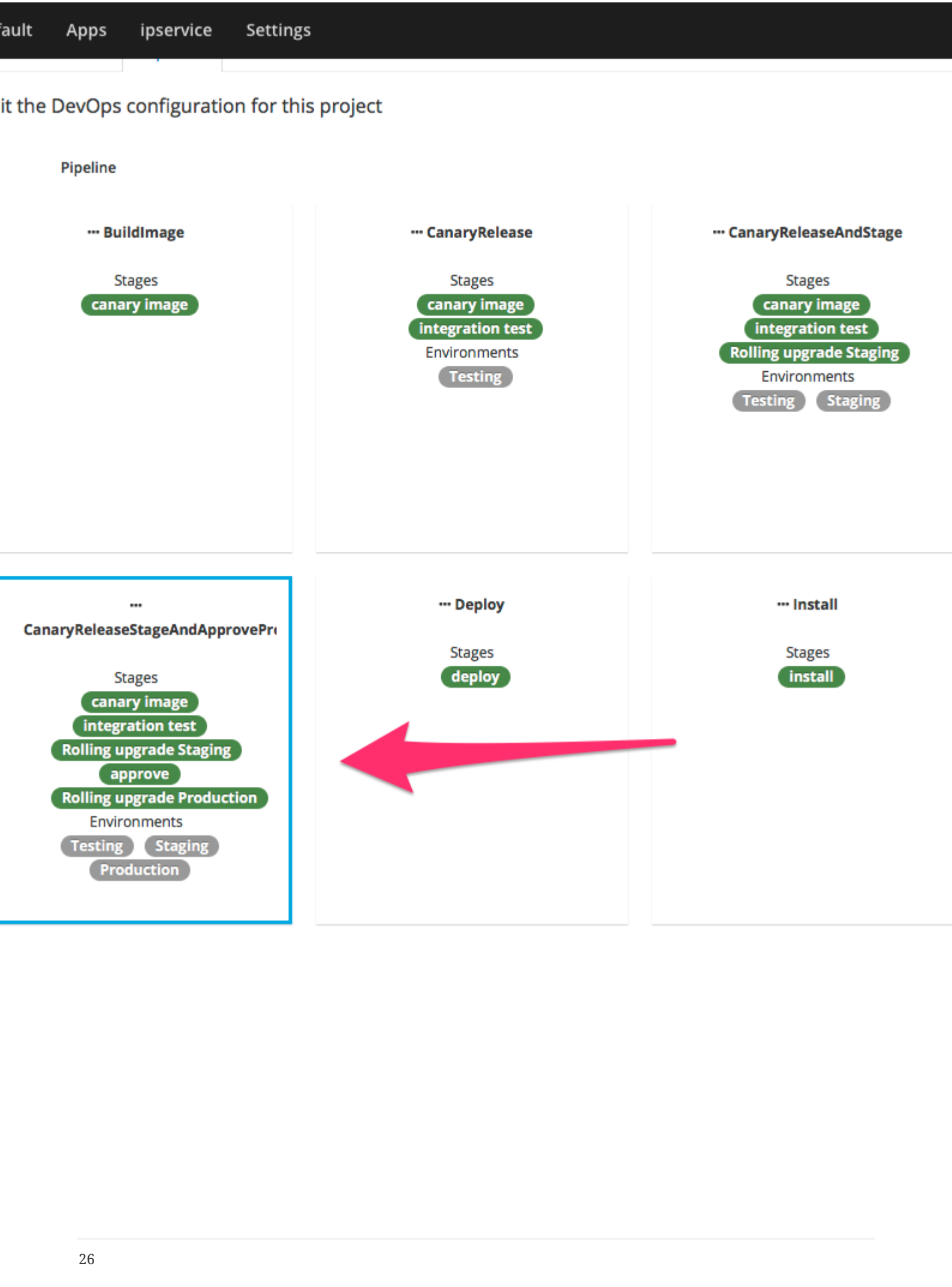

efault
Create Project
1.3.7
Spring Boot Version to use
Web, Camel, JPA, Actuator, Devtools...
Add Spring Boot Starters and dependencies to your application
Web
Actuator
JPA
HATEOAS
Rest Repositories HAL Browser
Rest Repositories
Car

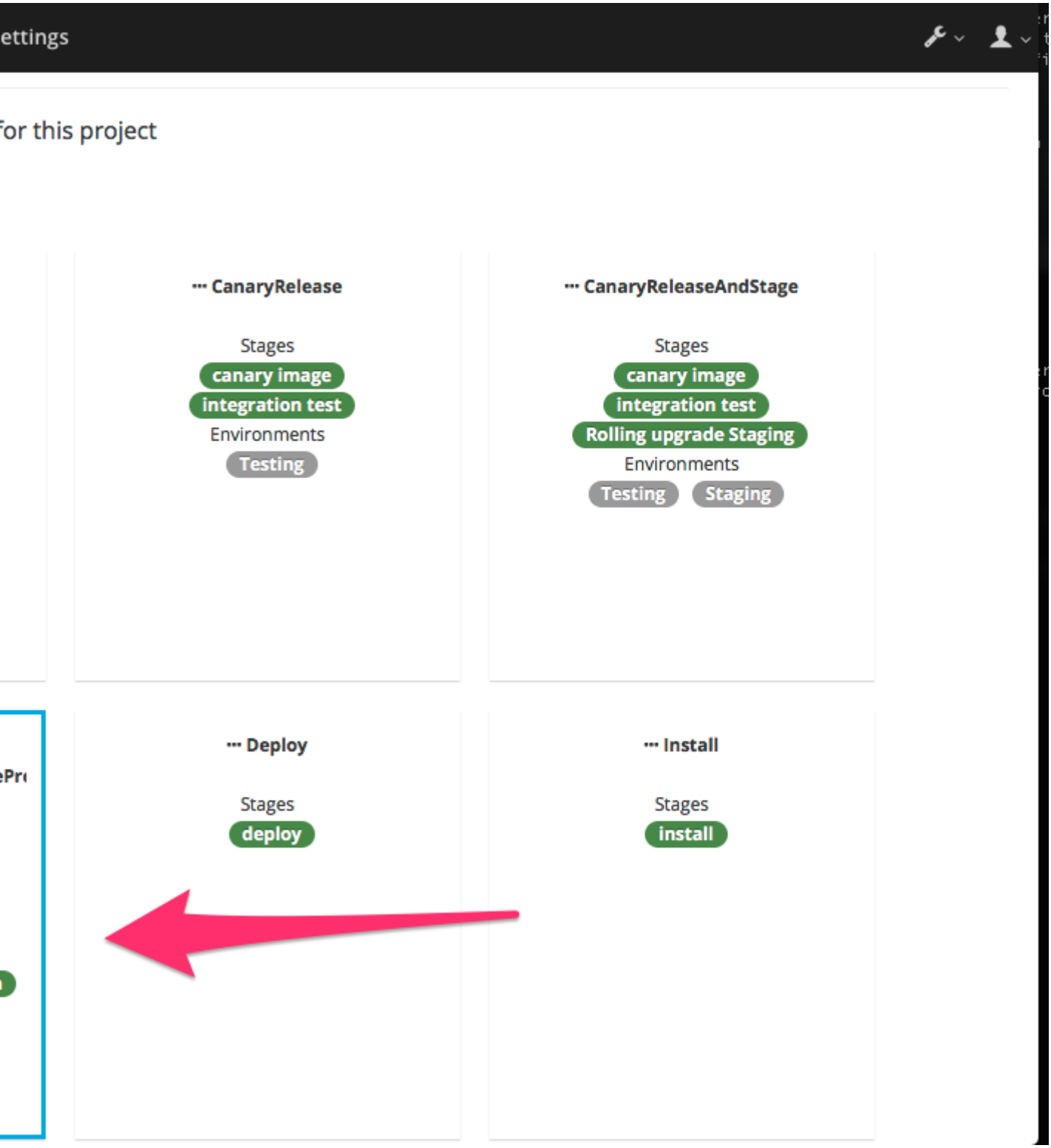


Once you've selected the dependencies you like, click "Next"

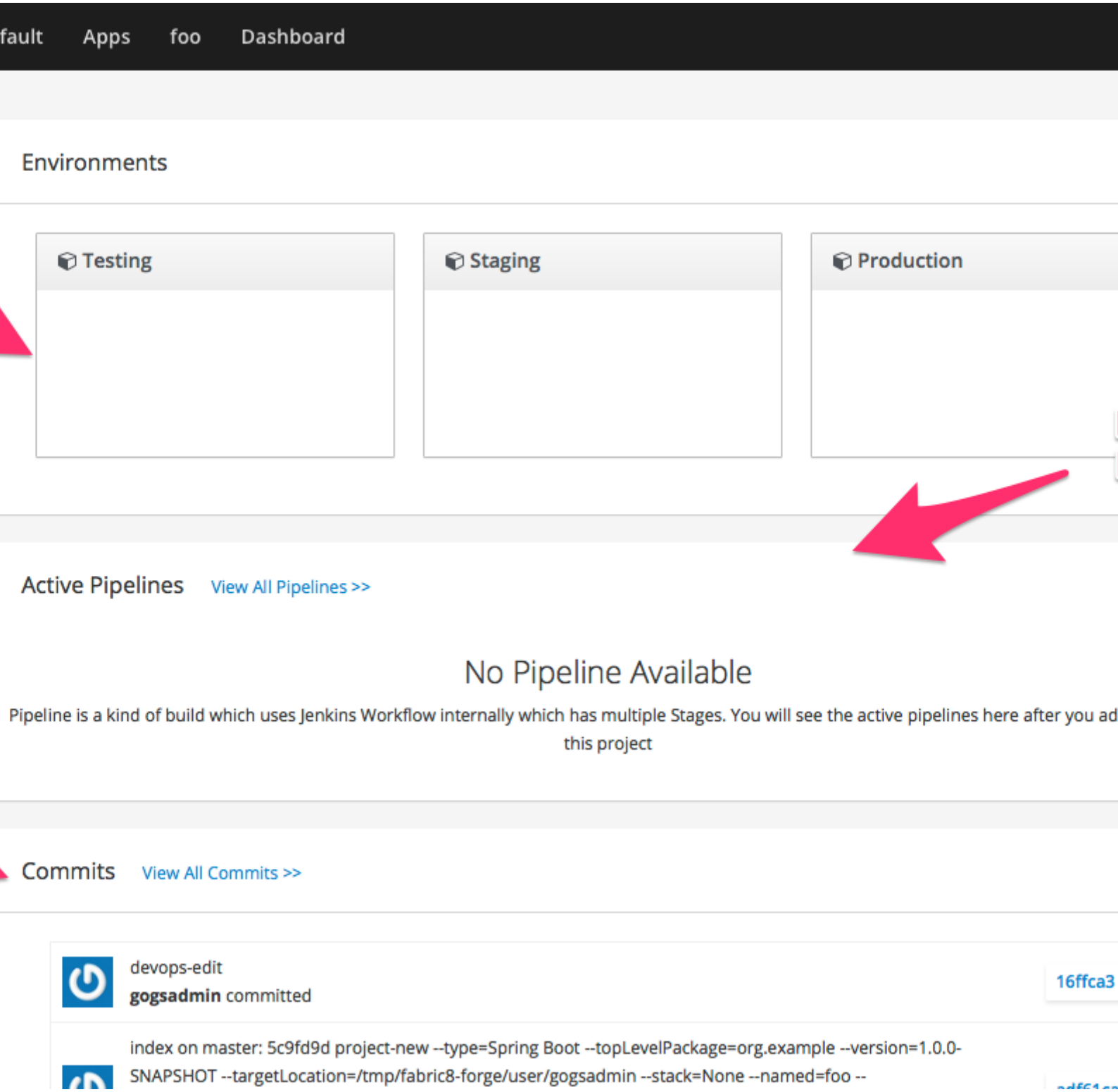
Now you're taken to a dialog that asks us to select a CI/CD pipeline to associate with your project (eg, CanaryReleaseStageAndApprove for a pipeline with rolling upgrades between environments and approval steps). Choose a pipeline.

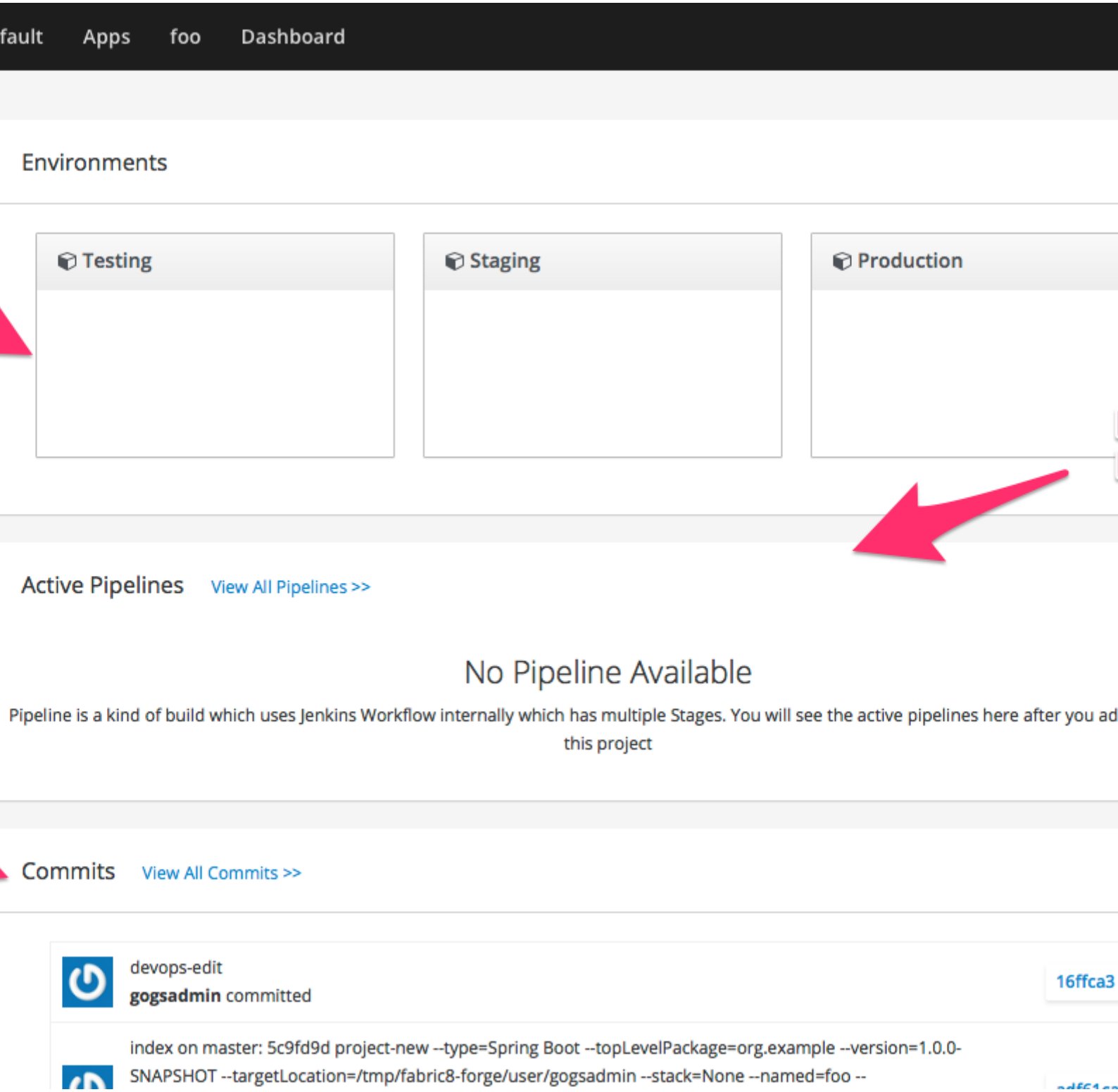

fault
Apps
ipservice
Settings
it the DevOps configuration for this project
Pipeline
··· BuildImage
Stages
canary image
··· CanaryRelease
Stages
canary image
integration test
Environments
Testing
··· CanaryReleaseAndStage
Stages
canary image
integration test
Rolling upgrade Staging
Environments
Testing
Staging
···
CanaryReleaseStageAndApprovePr
Stages
canary image
integration test
Rolling upgrade Staging
approve
Rolling upgrade Production
Environments
Testing
Staging
Production
··· Deploy
Stages
deploy
··· Install
Stages
install


fault
Apps
ipservice
Settings
it the DevOps configuration for this project
Pipeline
··· BuildImage
Stages
canary image
··· CanaryRelease
Stages
canary image
integration test
Environments
Testing
··· CanaryReleaseAndStage
Stages
canary image
integration test
Rolling upgrade Staging
Environments
Testing
Staging
···
CanaryReleaseStageAndApprovePr
Stages
canary image
integration test
Rolling upgrade Staging
approve
Rolling upgrade Production
Environments
Testing
Staging
Production
··· Deploy
Stages
deploy
··· Install
Stages
install



After selecting a pipeline, click "Next" and wait a moment for your project to be completed and everything to be set up. You'll initially be taken to a dashboard that appears mostly empty. Give it a few minutes to come alive.


fault
Apps
foo
Dashboard
Environments
Testing
Staging
Production
Active Pipelines
View All Pipelines >>
No Pipeline Available
Pipeline is a kind of build which uses Jenkins Workflow internally which has multiple Stages. You will see the active pipelines here after you ad
this project
Commits
View All Commits >>
devops-edit
gogsadmin committed
16ffca3
index on master: 5c9fd9d project-new --type=Spring Boot --topLevelPackage=org.example --version=1.0.0-
SNAPSHOT --targetLocation=/tmp/fabric8-forge/user/gogsadmin --stack=None --named=foo --


fault
Apps
foo
Dashboard
Environments
Testing
Staging
Production
Active Pipelines
View All Pipelines >>
No Pipeline Available
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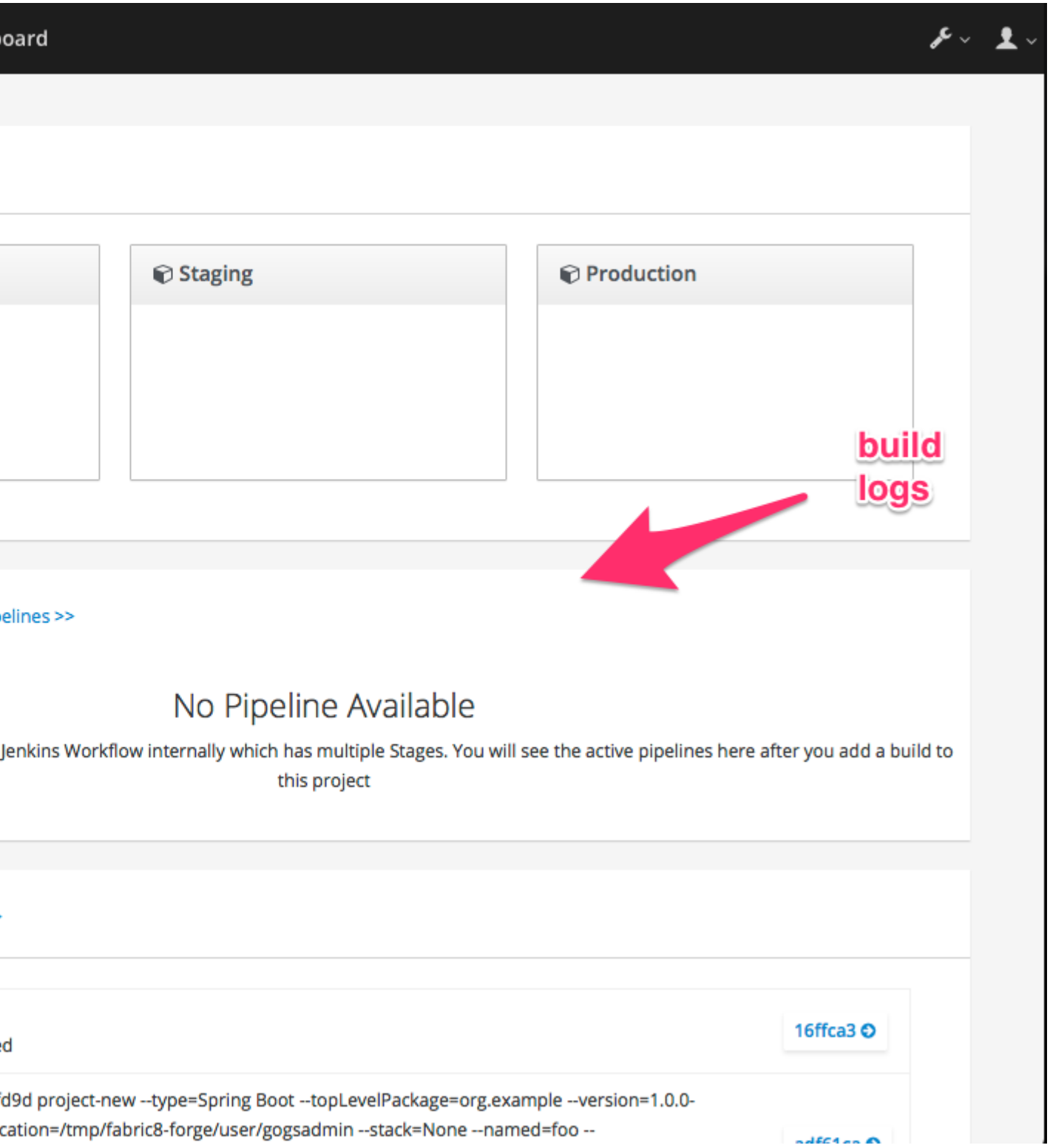
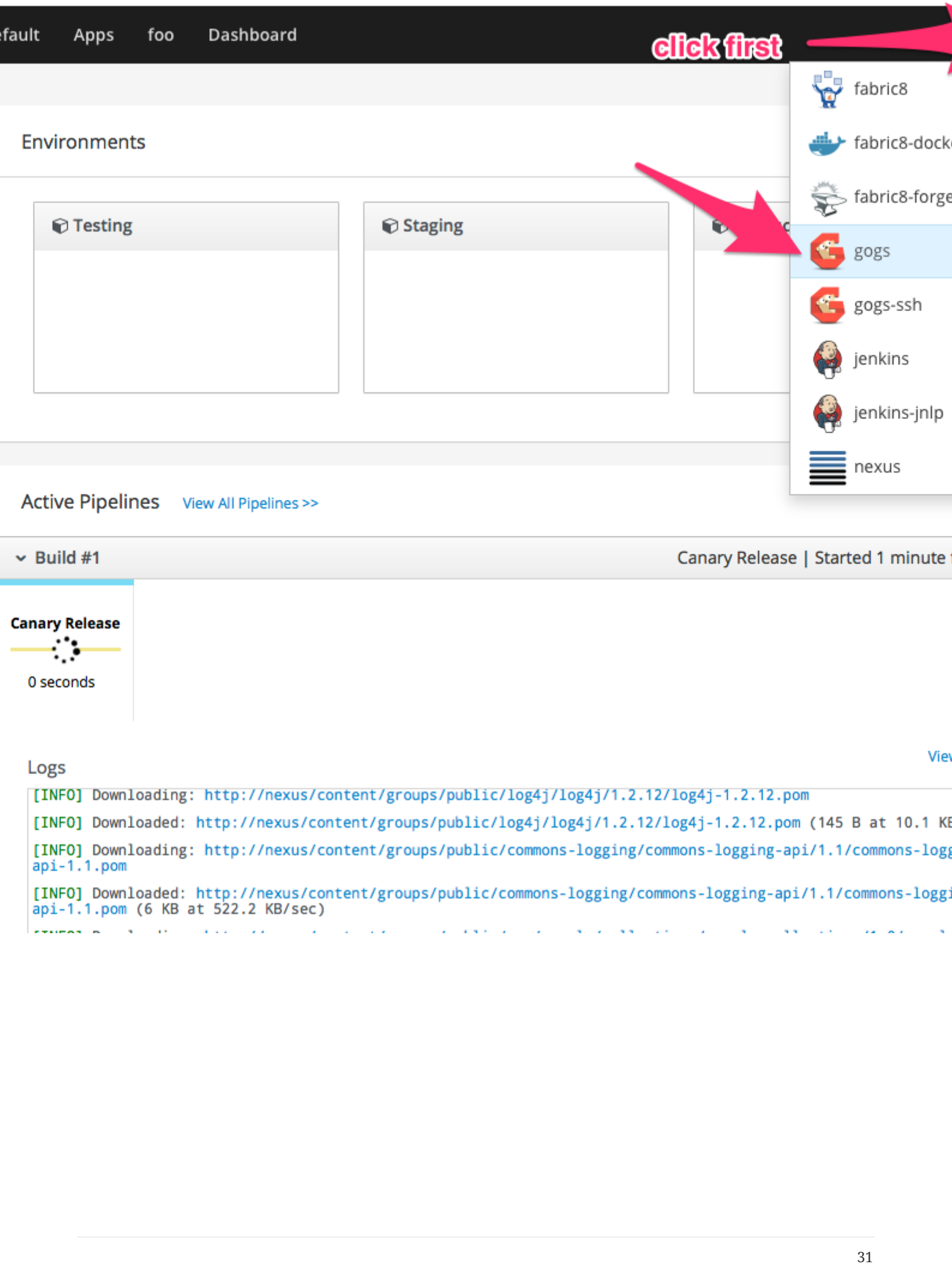
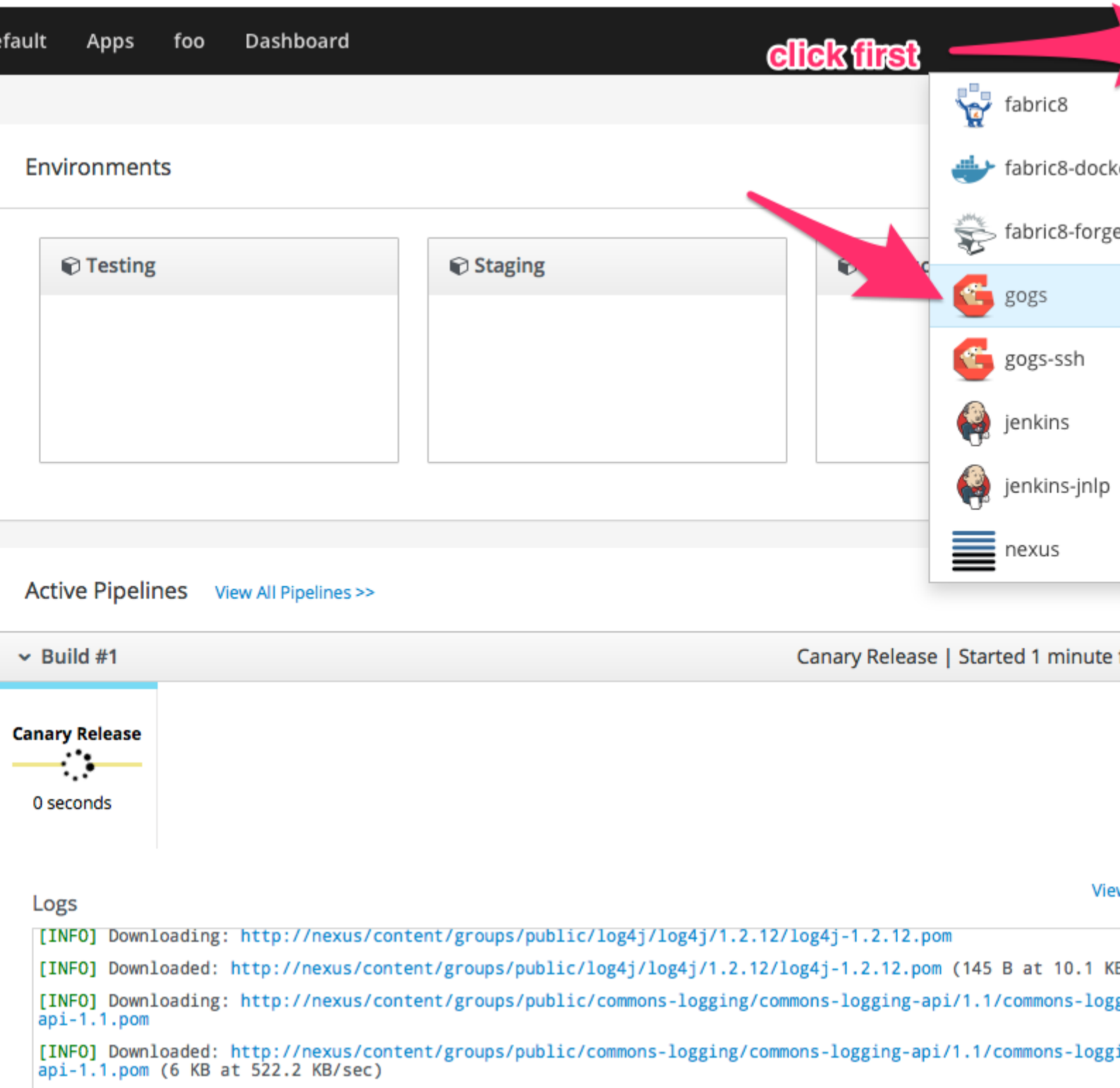
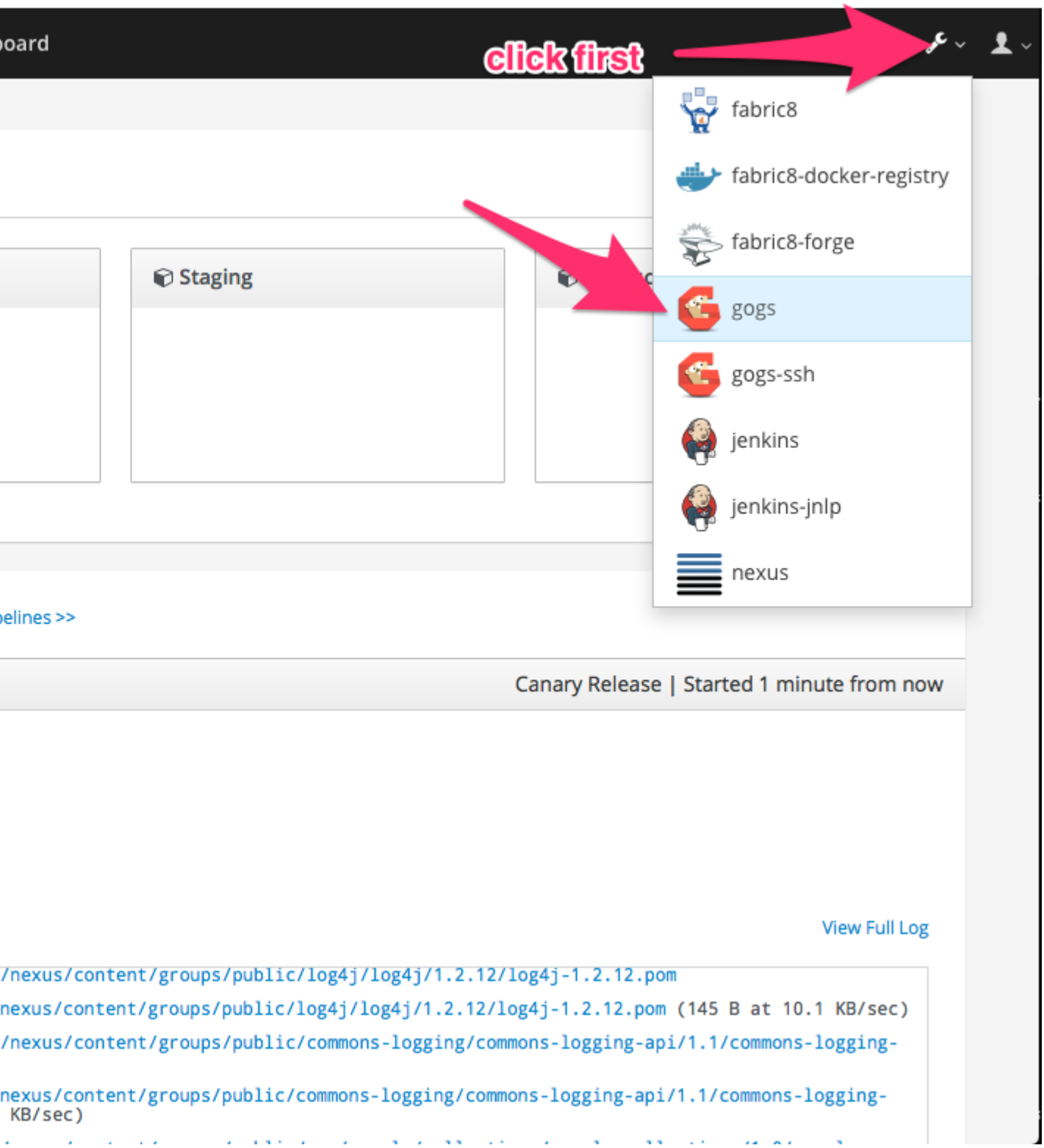
Commits
View All Commits >>
devops-edit
gogsadmin committed
16ffca3
index on master: 5c9fd9d project-new --type=Spring Boot --topLevelPackage=org.example --version=1.0.0-
SNAPSHOT --targetLocation=/tmp/fabric8-forge/user/gogsadmin --stack=None --named=foo --



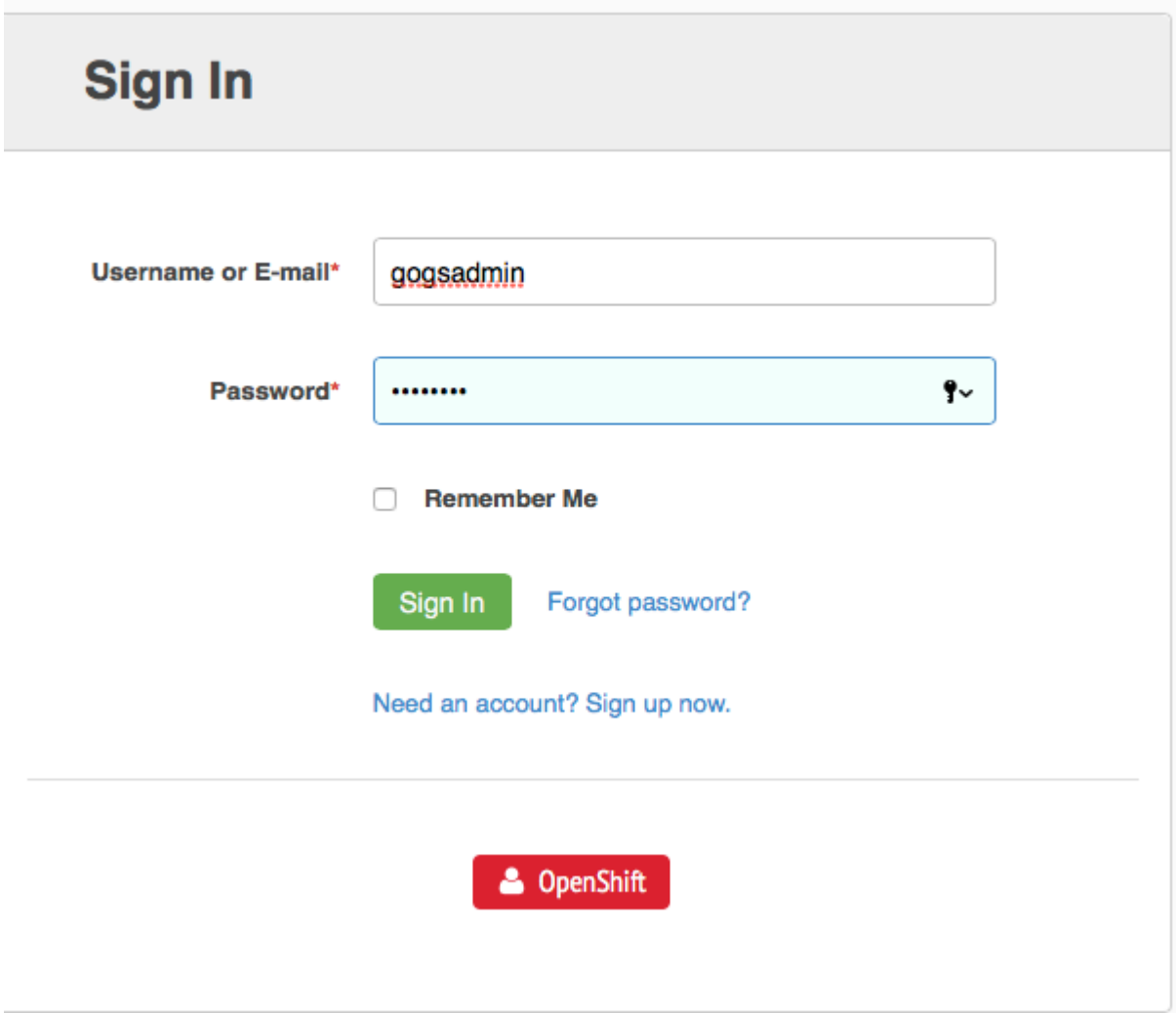
In the mean time, you can navigate to the internal git repository that comes out of the box with a fabric8 installation:

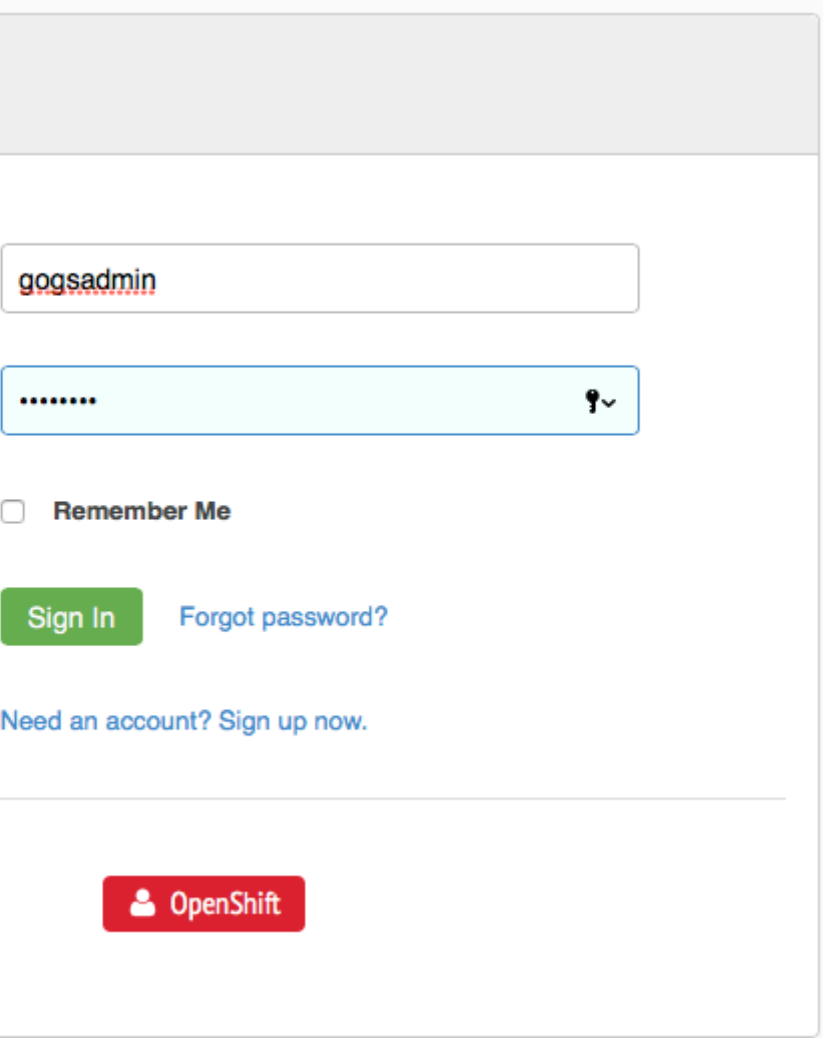

efault
Apps
foo
Dashboard
click first
fabric8
fabric8-dock
fabric8-forge
gogs
gogs-ssh
jenkins
jenkins-jnlp
nexus
Environments
Testing
Staging
Active Pipelines
View All Pipelines >>
Build #1
Canary Release | Started 1 minute
Canary Release
0 seconds
Logs
[INFO] Downloading: http://nexus/content/groups/public/log4j/log4j/1.2.12/log4j-1.2.12.pom
[INFO] Downloaded: http://nexus/content/groups/public/log4j/log4j/1.2.12/log4j-1.2.12.pom (145 B at 10.1 KB
[INFO] Downloading: http://nexus/content/groups/public/commons-logging/commons-logging-api/1.1/commons-logg
api-1.1.pom
[INFO] Downloaded: http://nexus/content/groups/public/commons-logging/commons-logging-api/1.1/commons-loggi
api-1.1.pom (6 KB at 522.2 KB/sec)


efault
Apps
foo
Dashboard
click first
fabric8
fabric8-dock
fabric8-forge
gogs
gogs-ssh
jenkins
jenkins-jnlp
nexus
Environments
Testing
Staging
Active Pipelines
View All Pipelines >>
Build #1
Canary Release | Started 1 minute
Canary Release
0 seconds
Logs
[INFO] Downloading: http://nexus/content/groups/public/log4j/log4j/1.2.12/log4j-1.2.12.pom
[INFO] Downloaded: http://nexus/content/groups/public/log4j/log4j/1.2.12/log4j-1.2.12.pom (145 B at 10.1 KB
[INFO] Downloading: http://nexus/content/groups/public/commons-logging/commons-logging-api/1.1/commons-logg
api-1.1.pom
[INFO] Downloaded: http://nexus/content/groups/public/commons-logging/commons-logging-api/1.1/commons-loggi
api-1.1.pom (6 KB at 522.2 KB/sec)

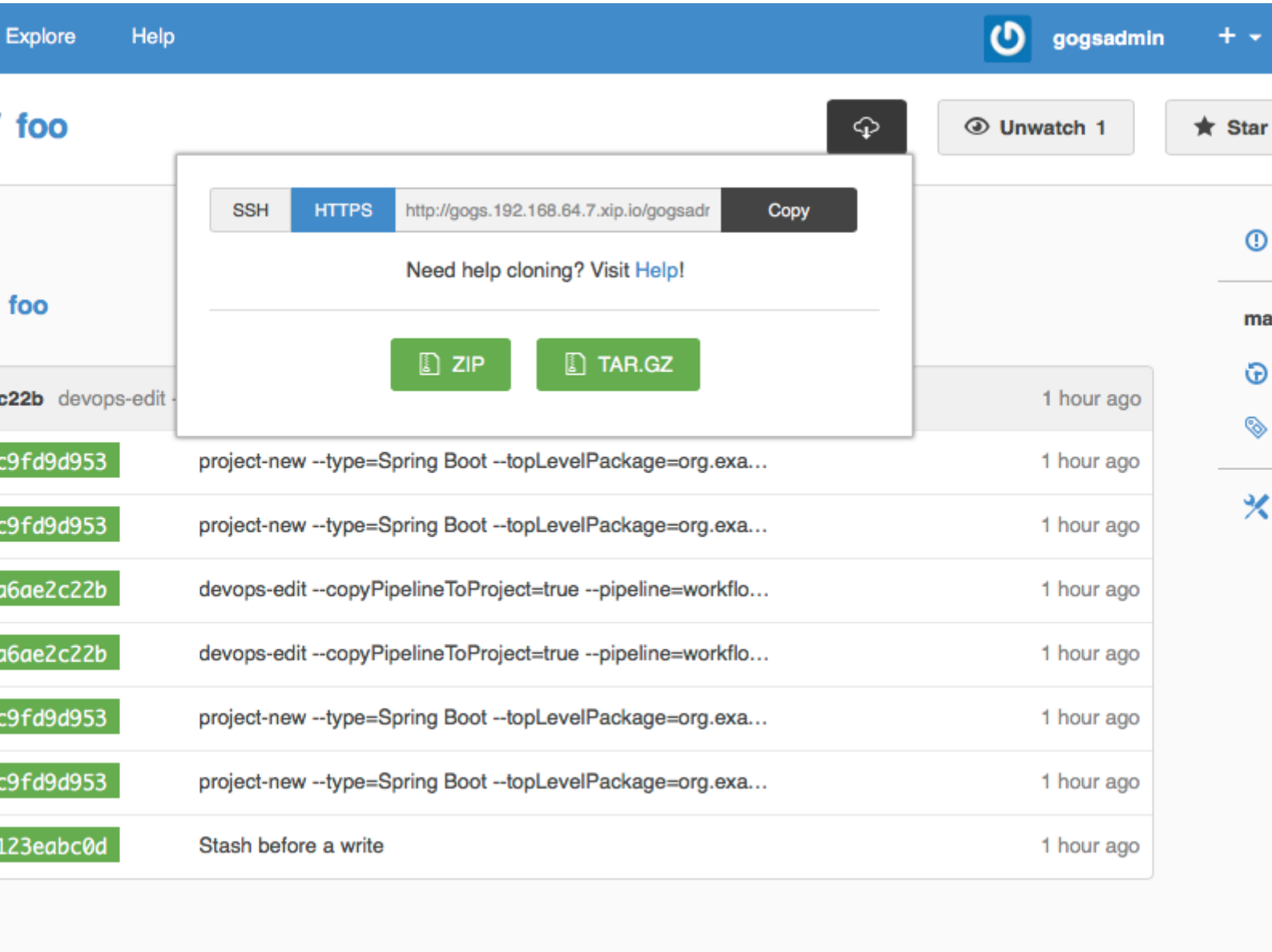


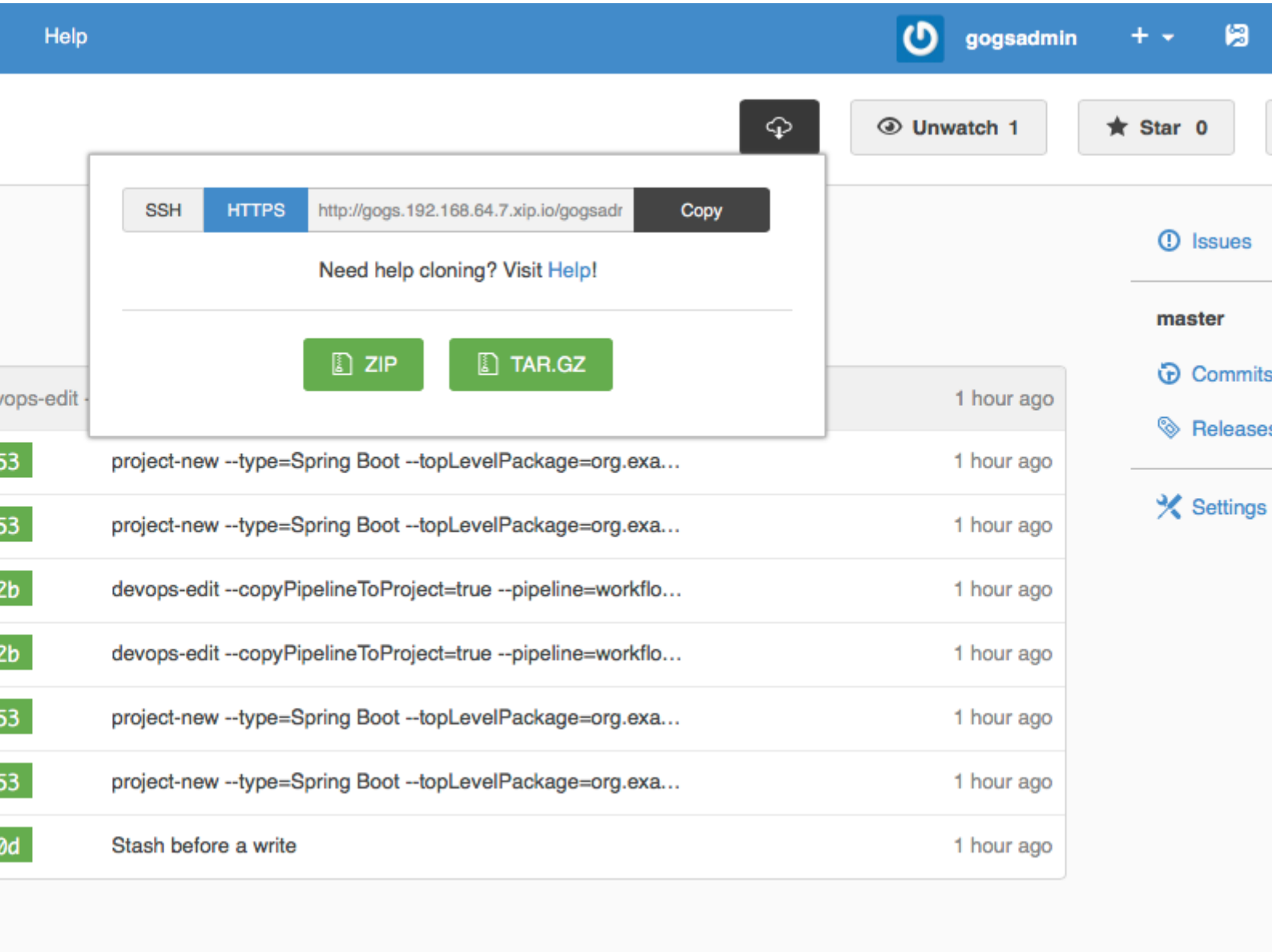
Sign in to Gogs to see the repo (note default password for the default installation of fabric8 is `gogsadmin/RedHat$1`):


Sign In
Username or E-mail*
gogsadmin
Password*
Remember Me
Sign In
Forgot password?
Need an account? Sign up now.
OpenShift

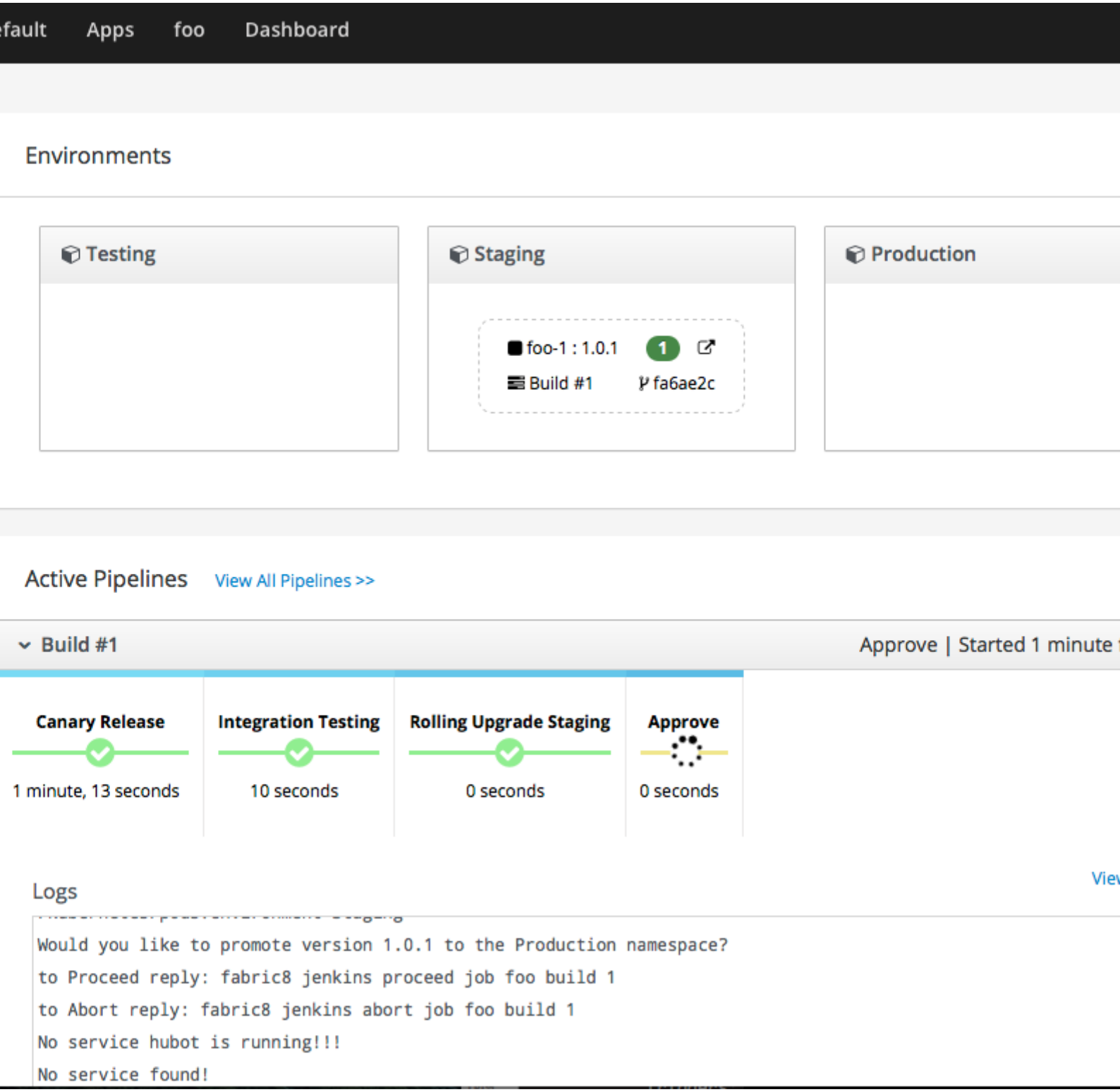


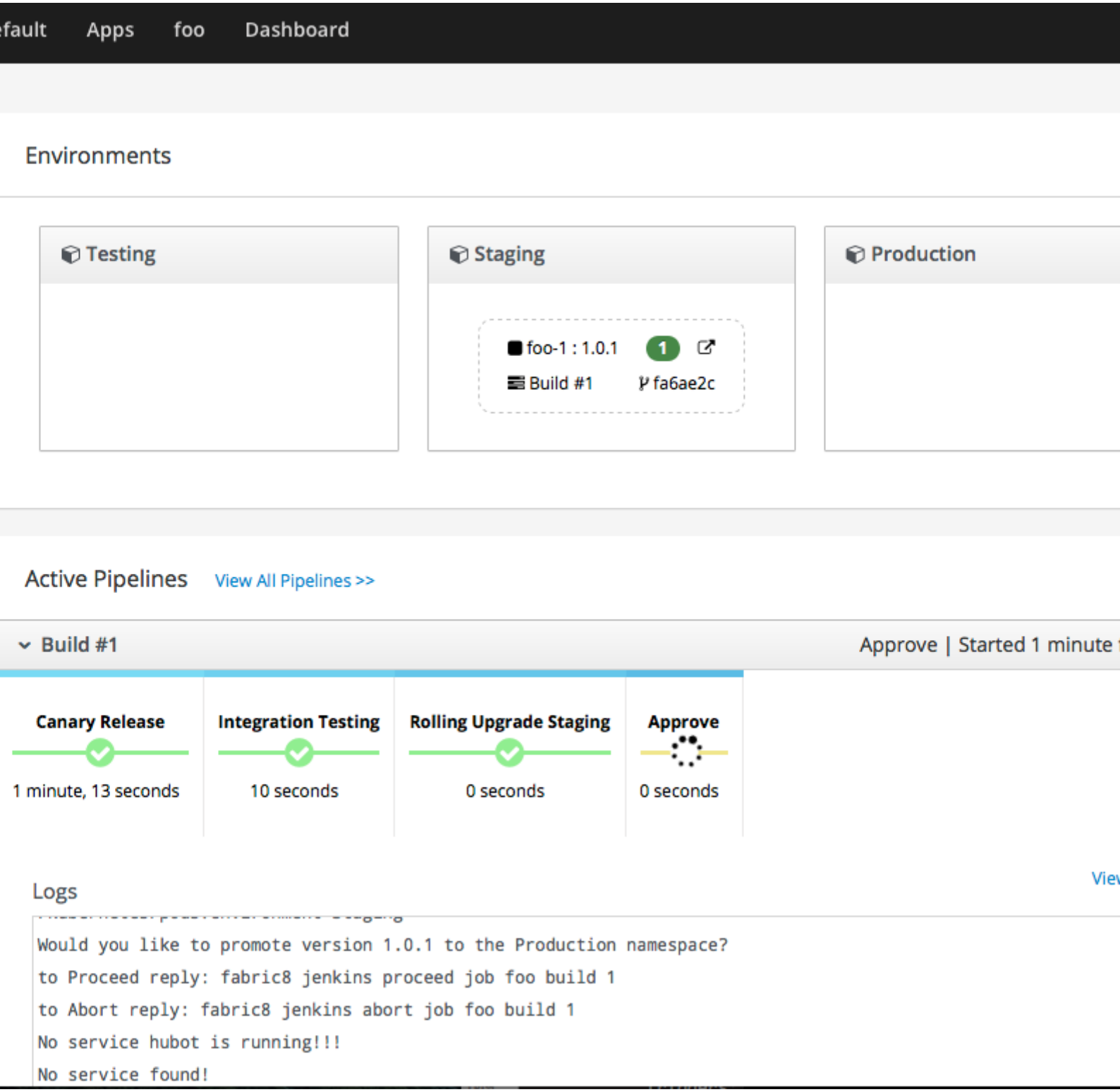
Once you've logged into the Git repo, you can navigate to find your project, and clone it to your IDE and start working where you wish.


Explore
Help
gogsadmin
foo
Unwatch 1
Star
SSH
HTTPS
http://gogs.192.168.64.7.xip.io/gogsadr
Copy
Need help cloning? Visit Help!
ZIP
TAR.GZ
foo
c22b devops-edit -
1 hour ago
c9fd9d953
project-new --type=Spring Boot --topLevelPackage=org.exa…
1 hour ago
c9fd9d953
project-new --type=Spring Boot --topLevelPackage=org.exa…
1 hour ago
a6ae2c22b
devops-edit --copyPipelineToProject=true --pipeline=workflo…
1 hour ago
a6ae2c22b
devops-edit --copyPipelineToProject=true --pipeline=workflo…
1 hour ago
c9fd9d953
project-new --type=Spring Boot --topLevelPackage=org.exa…
1 hour ago
c9fd9d953
project-new --type=Spring Boot --topLevelPackage=org.exa…
1 hour ago
123eabc0d
Stash before a write
1 hour ago



If you go back to the console after the builds take place, you should see that your new project has been automatically attached to the Fabric8 CI/CD system:


fault
Apps
foo
Dashboard
Environments
Testing
Staging
Production
foo-1 : 1.0.1
1
Build #1
fa6ae2c
Active Pipelines
View All Pipelines >>
Build #1
Approve | Started 1 minute
Canary Release
1 minute, 13 seconds
Integration Testing
10 seconds
Rolling Upgrade Staging
0 seconds
Approve
0 seconds
Logs
Would you like to promote version 1.0.1 to the Production namespace?
to Proceed reply: fabric8 jenkins proceed job foo build 1
to Abort reply: fabric8 jenkins abort job foo build 1
No service hubot is running!!!
No service found!


fault
Apps
foo
Dashboard
Environments
Testing
Staging
Production
foo-1 : 1.0.1
1
Build #1
fa6ae2c
Active Pipelines
View All Pipelines >>
Build #1
Approve | Started 1 minute
Canary Release
1 minute, 13 seconds
Integration Testing
10 seconds
Rolling Upgrade Staging
0 seconds
Approve
0 seconds
Logs
Would you like to promote version 1.0.1 to the Production namespace?
to Proceed reply: fabric8 jenkins proceed job foo build 1
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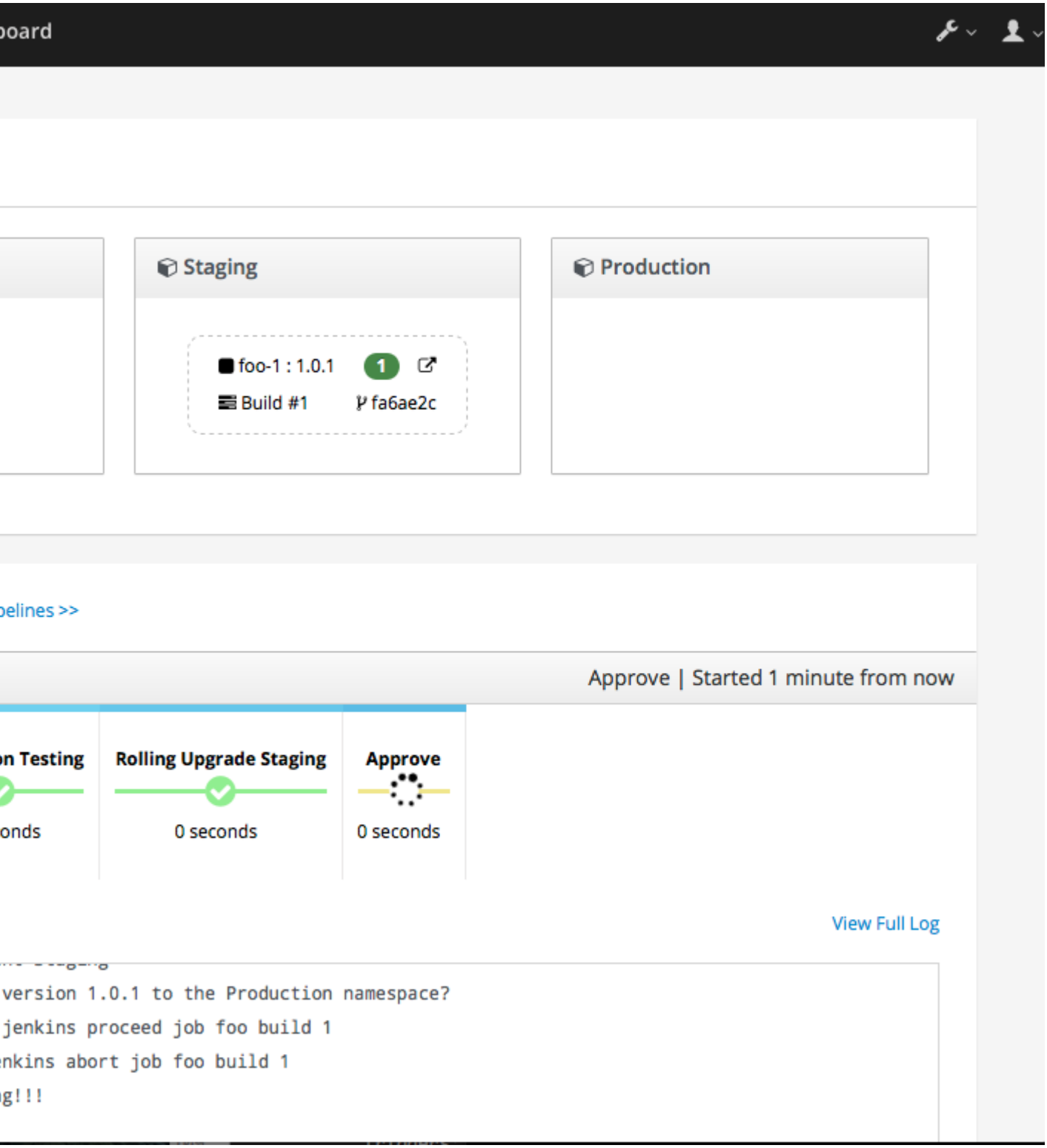

Your new Spring Boot app was checked into git, a new Jenkins Pipeline continuous delivery pipeline was set up, all builds are integrated with Nexus and the Docker registry and you've even deployed into the Staging environment. Take a browse around the Dashboard to get more familiar. The current build is waiting in an "approval" state before it can get to production. In the Build log console you should be able to see the button to "Approve" the build or "Deny" it. Additionally, if we had deployed the chat applications (LetsChat/HipChat/Slack,etc) then we could have approved/denied this build via ChatOps. Or, we could have hooked it up to a ticketing system. Or, if you like crusty old email, we could have done it like that as well.