Openshift Training Lab Content

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Introduction

Install OpenShift Origin 3.11 which is the Open Source implementation of Red Hat OpenShift.

- This workshop is based on the environment as follows.
  - master.example.local: Master Node, Infra Node, Compute Node
- There are AWS systems provided to configure cluster.
  - * Master node has up to 16G memory and up to 4 vCPU.

Installation of Openshift Cluster

- On Master Node, login with a user centos (download the pem file supplied to you).

```
[ubuntu]$ ssh -i xxxx.pem centos@<public_ip_of_master>
(use putty or mobaxterm for windows machine)
A. Putty instructions:
1.Download putty
2.Download puttygen
3.Use puttygen to convert .pem file to .ppk file
4.Start puttygen and select load
5.select your .pem file
6.Putty will convert the .PEM format to .PPK format
7.Select "Save Private Key" A passphrase is not required but can be used if
additional security is required.
B. Connect with Putty
1.Launch Putty and enter the public host IP address.
2.Navigate to Connection/SSH/Auth
3.Click "Browse" and select the .PPK file you exported from puttygen.
```

- Validate if you can ping all the machines by name **(base)**

```
ravi@ravi-ubuntu:~/Documents/openshift-origin$ ssh -i ravi-os.pem
centos@18.219.108.164
The authenticity of host '18.219.108.164 (18.219.108.164)' can't be
established.
ECDSA key fingerprint is SHA256:5W+dooHe2PqQK9wSKErolvATFO9H3sphV1WBQaxwDtA.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '18.219.108.164' (ECDSA) to the list of known
hosts.
Last login: Thu May 23 03:27:18 2019 from master.example.local
```

- Validate if you are able to ping and ssh to all the machines without a password

```
[centos@master ~]$ cat /etc/hosts
27.0.0.1   localhost localhost.localdomain localhost4 localhost4.localdomain4
::1         localhost localhost.localdomain localhost6
localhost6.localdomain6
172.31.28.56 master.example.local
[centos@master ~]$ ping master.example.com
ping: master.example.com: Name or service not known
```

```
[centos@master ~]$ ping master.example.local
PING master.example.local (172.31.28.56) 56(84) bytes of data.
64 bytes from master.example.local (172.31.28.56): icmp_seq=1 ttl=64
time=0.013 ms
64 bytes from master.example.local (172.31.28.56): icmp_seq=2 ttl=64
time=0.011 ms
64 bytes from master.example.local (172.31.28.56): icmp_seq=3 ttl=64
time=0.011 ms
^C
--- master.example.local ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 1999ms
rtt min/avg/max/mdev = 0.011/0.011/0.013/0.004 ms
```

- Validate if you can do the passwordless ssh

```
[centos@master ~]$ ssh master.example.local
Last login: Thu May 23 04:05:19 2019 from 122.11.149.76
[centos@master ~]$ exit
logout
Connection to master.example.local closed.
```

- Install git and ansible on the master node

```
[centos@master ~]$ sudo yum -y install git ansible
… output omitted ...
```

- Clone the git repository configured for training. Cd into the folder oks_origin.

```
[centos@master ~]$ git clone https://github.com/ravi-pmp/oks_origin.git
Cloning into 'oks_origin'...
remote: Enumerating objects: 9, done.
remote: Counting objects: 100% (9/9), done.
remote: Compressing objects: 100% (9/9), done.
remote: Total 9 (delta 0), reused 9 (delta 0), pack-reused 0
Unpacking objects: 100% (9/9), done.
[centos@master ~]$ ls
data  oks_origin  ravi-os.pem
[centos@master ~]$ cd oks_origin/
[centos@master oks_origin]$ ls
ansible.cfg  docker  hosts  install_docker.yml  playbook.yml  ravi-os.pem
sshd_config
[centos@master oks_origin]$
```

- Install Ansible on the master node

```
[centos@master oks_origin]$ sudo yum -y install ansible
… output omitted ...
```

- Check connectivity with hosts using ansible

```
[centos@master oks_origin]$ ansible all -m ping
[WARNING]: log file at /var/log/ansible.log is not writeable and we cannot
create it, aborting

master.example.local | SUCCESS => {
    "changed": false,
    "ping": "pong"
}
```

- Install prerequisites for openshift install

```
[centos@master oks_origin]$ ansible-playbook install_docker.yml

.. output omitted..


PLAY RECAP
*********************************************************************************
***********************************
master.example.local       : ok=11   changed=6    unreachable=0    failed=0
```

- Check openshift packages are installed

```
[centos@master oks_origin]$ rpm -qa |grep openshift
centos-release-openshift-origin311-1-2.el7.centos.noarch
openshift-ansible-playbooks-3.11.37-1.git.0.3b8b341.el7.noarch
openshift-ansible-roles-3.11.37-1.git.0.3b8b341.el7.noarch
openshift-ansible-docs-3.11.37-1.git.0.3b8b341.el7.noarch
openshift-ansible-3.11.37-1.git.0.3b8b341.el7.noarch
[centos@master oks_origin]$
```

- Run openshift prerequisites check. Takes a while..

```
[centos@master oks_origin]$ ansible-playbook
/usr/share/ansible/openshift-ansible/playbooks/prerequisites.yml
.. output omitted..

PLAY RECAP
*********************************************************************************
***********************************
localhost                  : ok=11   changed=0    unreachable=0    failed=0
master.example.local       : ok=82   changed=21   unreachable=0    failed=0



INSTALLER STATUS
*********************************************************************************
*****************************
Initialization  : Complete (0:00:42)
```

- Configure dnsmasq(as root)

```
cat /etc/dnsmasq.d/master.example.local.conf
address=/master.example.local/172.31.18.210

Systemctl restart dnsmasq
Systemctl enable dnsmasq
```

- Reboot the machine

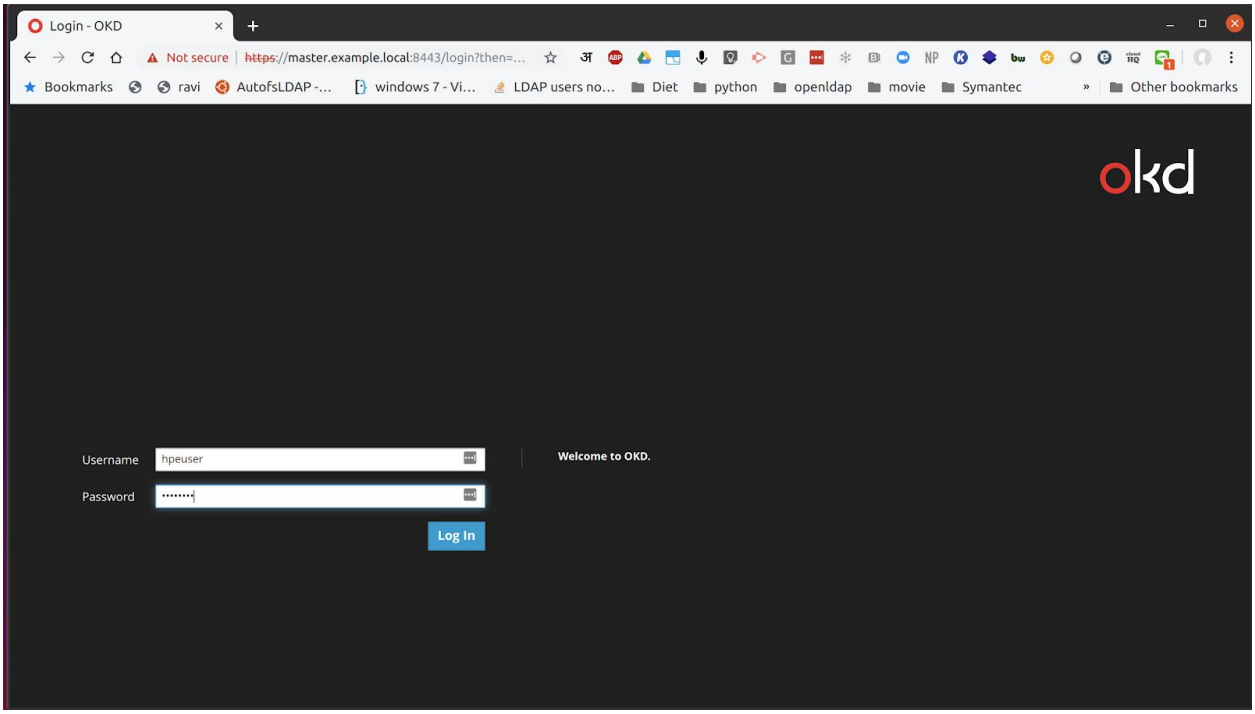
```
sudo reboot
```

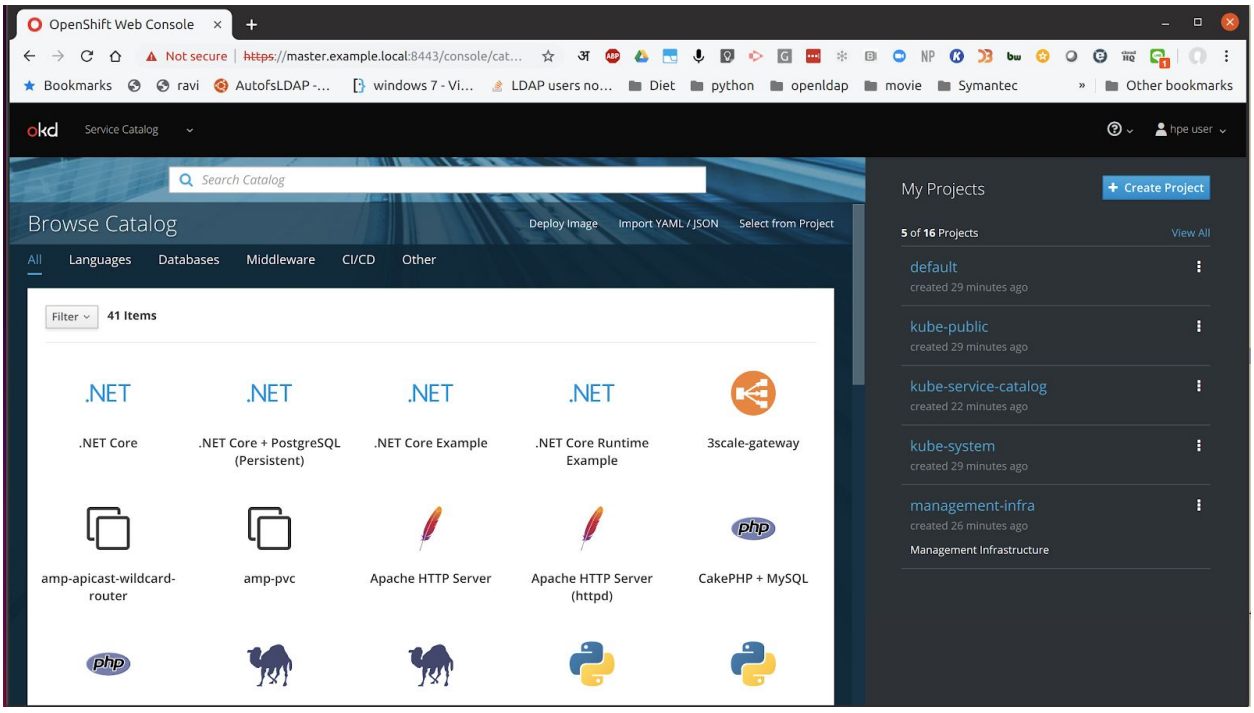
- Run openshift Installation. Takes a while..

```
[centos@master oks_origin]$ ansible-playbook
/usr/share/ansible/openshift-ansible/playbooks/deploy_cluster.yml

.. output omitted..


PLAY RECAP
*********************************************************************************
*************************************
localhost                  : ok=11   changed=0    unreachable=0    failed=0
master.example.local       : ok=723  changed=326  unreachable=0    failed=0



INSTALLER STATUS
*********************************************************************************
*********************************
Initialization                 : Complete (0:00:17)
Health Check                   : Complete (0:00:14)
Node Bootstrap Preparation     : Complete (0:02:28)
etcd Install                   : Complete (0:00:47)
Master Install                 : Complete (0:05:02)
Master Additional Install      : Complete (0:00:42)
Node Join                      : Complete (0:00:12)
Hosted Install                 : Complete (0:00:59)
Cluster Monitoring Operator    : Complete (0:01:17)
Web Console Install            : Complete (0:00:35)
Console Install                : Complete (0:00:28)
metrics-server Install         : Complete (0:00:01)
Service Catalog Install        : Complete (0:02:02)
Node Problem Detector Install  : Complete (0:00:11)
```

- Create an admin user called hpeuser, grant full admin access and create an http password for web access

```
[centos@master oks_origin]$ oc create user hpeuser --full-name="hpe user"
user.user.openshift.io/hpeuser created
[centos@master oks_origin]$ oc adm policy add-cluster-role-to-user
cluster-admin hpeuser --rolebinding-name=cluster-admin
cluster role "cluster-admin" added: "hpeuser"
[centos@master oks_origin]$ oc whoami
system:admin
[centos@master oks_origin]$ sudo htpasswd /etc/origin/master/htpasswd hpeuser
New password:
Re-type new password:
Adding password for user hpeuser
[centos@master oks_origin]$ sudo cat /etc/origin/master/htpasswd

hpeuser:$apr1$wJDPnP9B$ibUOVXC9PGZX.aZhnviuO/
[centos@master oks_origin]$



(base) <local_machine>:~$ cat /etc/hosts
127.0.0.1 localhost
127.0.1.1 ravi-ubuntu

# The following lines are desirable for IPv6 capable hosts
::1     ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
18.222.25.103  master.ravi.local
```


Login - OKD
Not secure
https://master.example.local:8443/login?then=...
Bookmarks
ravi
AutofsLDAP -...
windows 7 - Vi...
LDAP users no...
Diet
python
openldap
movie
Symantec
Other bookmarks
okd
Username
hpeuser
Password
Log In
Welcome to OKD.


OpenShift Web Console
Not secure
https://master.example.local:8443/console/cat...
Bookmarks
ravi
AutofsLDAP -...
windows 7 - Vi...
LDAP users no...
Diet
python
openldap
movie
Symantec
Other bookmarks
okd
Service Catalog
hpe user
Search Catalog
Browse Catalog
Deploy Image
Import YAML / JSON
Select from Project
All
Languages
Databases
Middleware
CI/CD
Other
Filter
41 Items
.NET Core
.NET Core + PostgreSQL (Persistent)
.NET Core Example
.NET Core Runtime Example
3scale-gateway
amp-apicast-wildcard-router
amp-pvc
Apache HTTP Server
Apache HTTP Server (httpd)
CakePHP + MySQL
My Projects
+ Create Project
5 of 16 Projects
View All
default
created 29 minutes ago
kube-public
created 29 minutes ago
kube-service-catalog
created 22 minutes ago
kube-system
created 29 minutes ago
management-infra
created 26 minutes ago
Management Infrastructure

Deploying Application

- Login with a user who has been added as an Openshift user on Master Node.

```
[centos@master ~]$ oc login -u hpeuser
Authentication required for https://master.example.local:8443 (openshift)
Username: hpeuser
Password:
Login successful.

You have access to the following projects and can switch between them with
'oc project <projectname>':

  * default
    kube-public
    kube-service-catalog
    kube-system
    management-infra
    openshift
    openshift-ansible-service-broker
    openshift-console
    openshift-infra
    openshift-logging
    openshift-monitoring
    openshift-node
    openshift-node-problem-detector
    openshift-sdn
    openshift-template-service-broker
    openshift-web-console

Using project "default".
[centos@master ~]$ oc whoami
hpeuser
[centos@master ~]$
```

- Create a project and deploy a sample application

```
[centos@master ~]$  oc new-project test-project
Now using project "test-project" on server
"https://master.example.local:8443".

You can add applications to this project with the 'new-app' command. For
example, try:

    oc new-app centos/ruby-25-centos7~https://github.com/sclorg/ruby-ex.git
```

```
to build a new example application in Ruby.

============================

[centos@master ~]$ oc new-app
centos/ruby-25-centos7~https://github.com/sclorg/ruby-ex.git
--> Found Docker image cb490f3 (7 weeks old) from Docker Hub for
"centos/ruby-25-centos7"

    Ruby 2.5
    --------
    Ruby 2.5 available as container is a base platform for building and
running various Ruby 2.5 applications and frameworks. Ruby is the interpreted
scripting language for quick and easy object-oriented programming. It has
many features to process text files and to do system management tasks (as in
Perl). It is simple, straight-forward, and extensible.

    Tags: builder, ruby, ruby25, rh-ruby25

    * An image stream tag will be created as "ruby-25-centos7:latest" that
will track the source image
    * A source build using source code from
https://github.com/sclorg/ruby-ex.git will be created
      * The resulting image will be pushed to image stream tag
"ruby-ex:latest"
      * Every time "ruby-25-centos7:latest" changes a new build will be
triggered
    * This image will be deployed in deployment config "ruby-ex"
    * Port 8080/tcp will be load balanced by service "ruby-ex"
      * Other containers can access this service through the hostname
"ruby-ex"

--> Creating resources ...
    imagestream.image.openshift.io "ruby-25-centos7" created
    imagestream.image.openshift.io "ruby-ex" created
    buildconfig.build.openshift.io "ruby-ex" created
    deploymentconfig.apps.openshift.io "ruby-ex" created
    service "ruby-ex" created
--> Success
    Build scheduled, use 'oc logs -f bc/ruby-ex' to track its progress.
    Application is not exposed. You can expose services to the outside world
by executing one or more of the commands below:
     'oc expose svc/ruby-ex'
    Run 'oc status' to view your app.
[centos@master ~]$ oc logs -f bc/ruby-ex
Cloning "https://github.com/sclorg/ruby-ex.git" ...
   Commit:     c00ecd7c762590f1d52c316c7d00141a745ede18 (Merge pull request
#25 from pvalena/master)
   Author:     Honza Horak <hhorak@redhat.com>
   Date:  Thu Dec 13 15:35:54 2018 +0100
```

```
Using
centos/ruby-25-centos7@sha256:9866398704db9207862bdb930b1dba4139dbaf71c6eaa6d
084ea036478b28de9 as the s2i builder image
---> Installing application source ...
---> Building your Ruby application from source ...
---> Running 'bundle install --retry 2 --deployment --without
development:test' ...
Warning: the running version of Bundler (1.16.1) is older than the version
that created the lockfile (1.16.4). We suggest you upgrade to the latest
version of Bundler by running `gem install bundler`.
Fetching gem metadata from https://rubygems.org/.............
Using bundler 1.16.1
Fetching puma 3.12.0
Installing puma 3.12.0 with native extensions
Fetching rack 2.0.6
Installing rack 2.0.6
Bundle complete! 2 Gemfile dependencies, 3 gems now installed.
Gems in the groups development and test were not installed.
Bundled gems are installed into `./bundle`
---> Cleaning up unused ruby gems ...
Running `bundle clean --verbose` with bundler 1.16.1
Warning: the running version of Bundler (1.16.1) is older than the version
that created the lockfile (1.16.4). We suggest you upgrade to the latest
version of Bundler by running `gem install bundler`.
Frozen, using resolution from the lockfile

Pushing image docker-registry.default.svc:5000/test-project/ruby-ex:latest
...
Pushed 0/10 layers, 0% complete
Pushed 1/10 layers, 12% complete
Pushed 2/10 layers, 21% complete
Pushed 3/10 layers, 31% complete
Pushed 4/10 layers, 41% complete
Pushed 5/10 layers, 51% complete
Pushed 6/10 layers, 68% complete
Pushed 7/10 layers, 75% complete
Pushed 8/10 layers, 82% complete
Pushed 9/10 layers, 99% complete
Pushed 10/10 layers, 100% complete
Push successful
```

- Create the pod details

```
[centos@master ~]$ oc get pods
NAME              READY     STATUS      RESTARTS   AGE
ruby-ex-1-4tzr4   1/1       Running     0          1m
ruby-ex-1-build   0/1       Completed   0          2m
```

- Get the service details

```
[centos@master ~]$ oc get svc
NAME      TYPE        CLUSTER-IP       EXTERNAL-IP   PORT(S)    AGE
ruby-ex   ClusterIP   172.30.228.129   <none>        8080/TCP   2m

================
```

- Describe the service

```
[centos@master ~]$ oc describe service ruby-ex
Name:              ruby-ex
Namespace:         test-project
Labels:            app=ruby-ex
Annotations:       openshift.io/generated-by=OpenShiftNewApp
Selector:          app=ruby-ex,deploymentconfig=ruby-ex
Type:              ClusterIP
IP:                172.30.228.129
Port:              8080-tcp  8080/TCP
TargetPort:        8080/TCP
Endpoints:         10.128.0.65:8080
Session Affinity:  None
Events:            <none>
[centos@master ~]$
====================
```

- Test the ruby service

```
[centos@master ~]$ curl 172.30.228.129:8080

==================
```

- Expose the ruby service for external access

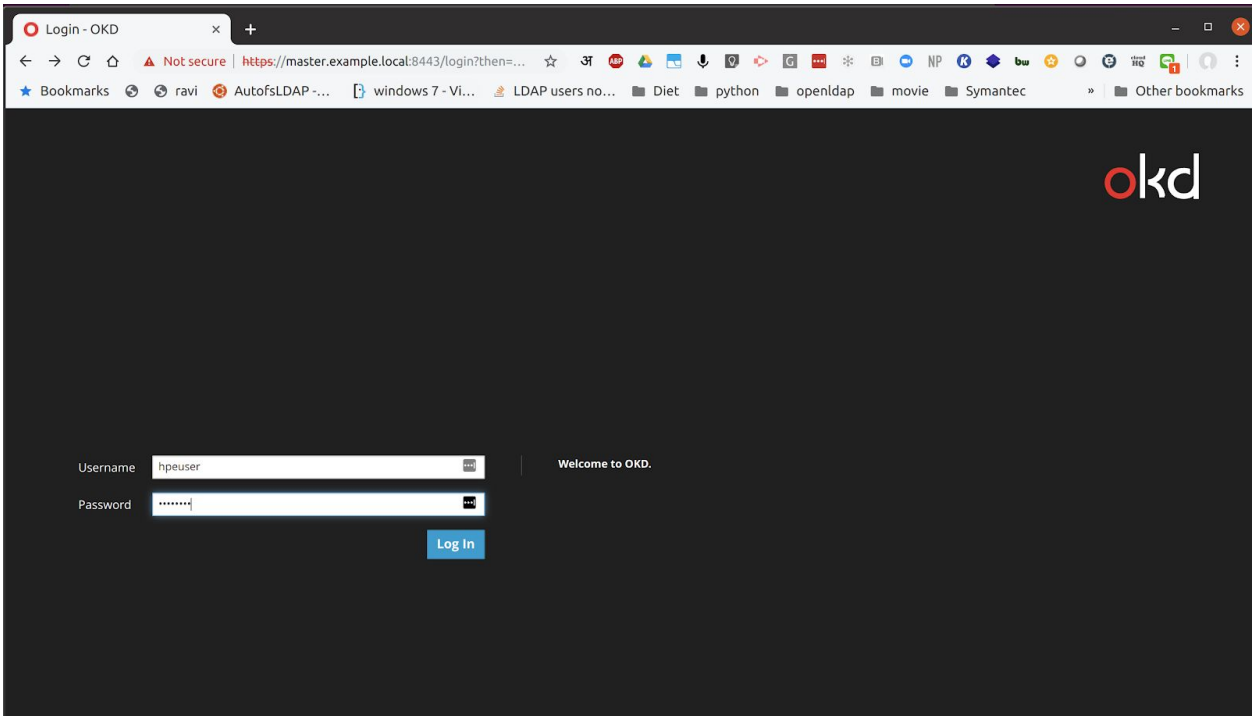
```
[centos@master ~]$ oc expose service ruby-ex
route.route.openshift.io/ruby-ex exposed
[centos@master ~]$ oc get routes
NAME      HOST/PORT                                   PATH      SERVICES   PORT
TERMINATION   WILDCARD
ruby-ex   ruby-ex-test-project.apps.example.local             ruby-ex
8080-tcp                 None

====================
```

- The name ruby-ex-test-project.apps.example.local should be resolved by DNS as a wild card entry. But since we don't have a DNS in place we will modify the /etc/hosts to point the ruby link to the master IP.

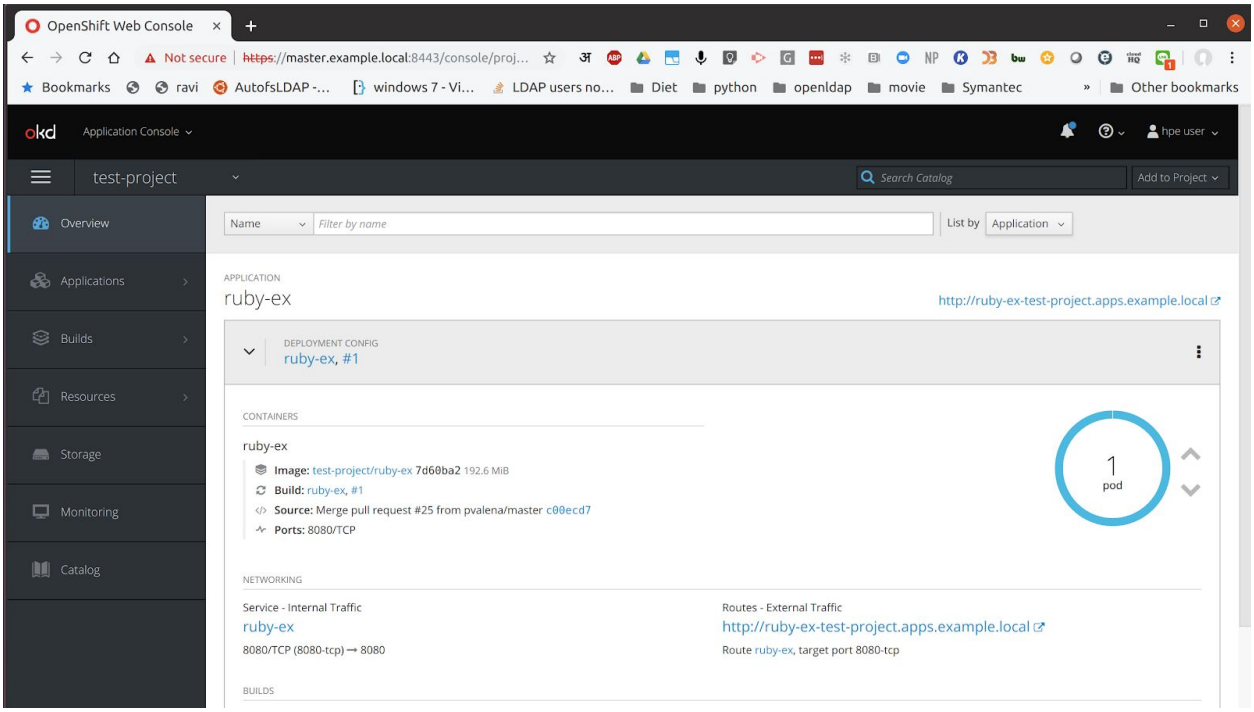
```
(base) ravi@ravi-ubuntu:~$ cat /etc/hosts
127.0.0.1 localhost
127.0.1.1 ravi-ubuntu
```

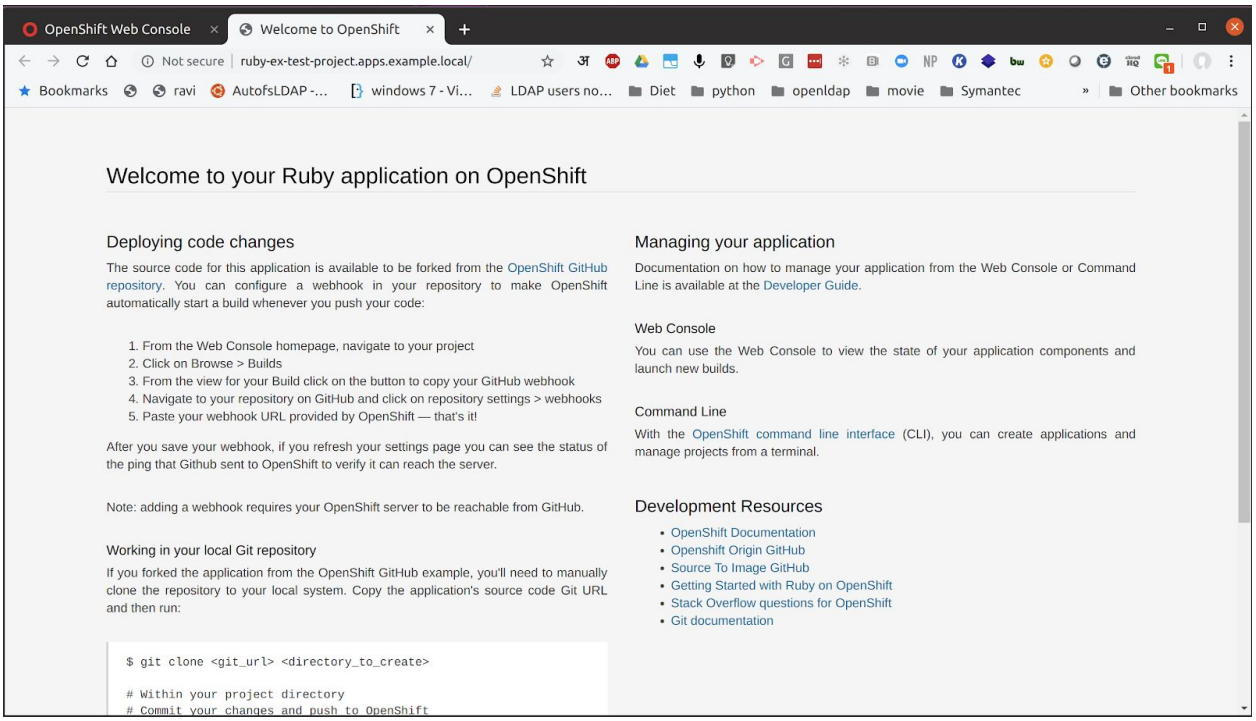
```
# The following lines are desirable for IPv6 capable hosts
::1     ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
18.222.25.103  master.example.local ruby-ex-test-project.apps.example.local

=====================
```

- Log in to the master server. Please note that your local machine's host file must point to the public address of the master server.



- Navigate to the application and see the external link. (your local machine's host file must have an entry for this randomly generated link pointing to the master server.





==========

- Get the route.

```
[centos@master ~]$ oc get route
```

```
NAME      HOST/PORT                                   PATH      SERVICES   PORT
TERMINATION   WILDCARD
ruby-ex   ruby-ex-test-project.apps.example.local             ruby-ex
8080-tcp                None
[centos@master ~]$ oc delete route
error: resource(s) were provided, but no name, label selector, or --all flag
specified
```

- Delete the route.

```
[centos@master ~]$ oc delete route ruby-ex
route.route.openshift.io "ruby-ex" deleted
[centos@master ~]$ oc get routes
No resources found.
```

- Delete the pod.

```
[centos@master oks_origin]$ oc get pods
NAME              READY     STATUS      RESTARTS   AGE
nginx-nfs         1/1       Running     0          4m
ruby-ex-1-44jq8   1/1       Running     0          13s
ruby-ex-1-build   0/1       Completed   0          1h
[centos@master oks_origin]$ oc get dc
NAME      REVISION   DESIRED   CURRENT   TRIGGERED BY
ruby-ex   1          1         1         config,image(ruby-ex:latest)
[centos@master oks_origin]$ oc delete dc ruby-ex
deploymentconfig.apps.openshift.io "ruby-ex" deleted
[centos@master oks_origin]$ oc get pods
NAME              READY     STATUS      RESTARTS   AGE
nginx-nfs         1/1       Running     0          4m
ruby-ex-1-build   0/1       Completed   0          1h

[centos@master oks_origin]$ oc delete pod ruby-ex-1-build
pod "ruby-ex-1-build" deleted
[centos@master oks_origin]$ oc get pod
No resources found.
```

Persistent Storage Creation

- Configure NFS on the master server. We will share the /var/myshare location as the persistent storage

```
[centos@master ~]$ cat /etc/idmapd.conf

Domain = example.local

==================
[centos@master ~]$ cat /etc/exports
/var/myshare  *(rw,no_root_squash)

================

[centos@master ~]$ sudo mkdir /var/myshare
[centos@master ~]$ sudo chcon -R
unconfined_u:object_r:svirt_sandbox_file_t:s0 /var/myshare
[centos@master ~]$ sudo chmod -R 777 /var/myshare

================


[centos@master ~]$ sudo systemctl start rpcbind nfs-server
[centos@master ~]$ sudo systemctl enable  rpcbind nfs-server
Created symlink from
/etc/systemd/system/multi-user.target.wants/nfs-server.service to
/usr/lib/systemd/system/nfs-server.service.
[centos@master ~]$ sudo showmount -e localhost
Export list for localhost:
/var/myshare *

===============
```

- Create the persistent volume

```
[centos@master oks_origin]$ cat nfs-pv.yml
apiVersion: v1
kind: PersistentVolume
metadata:
  # any PV name
  name: nfs-pv
spec:
  capacity:
    # storage size
    storage: 500Mi
  accessModes:
    # ReadWriteMany(RW from multi nodes), ReadWriteOnce(RW from a node),
ReadOnlyMany(R from multi nodes)
    - ReadWriteMany
```

```
  persistentVolumeReclaimPolicy:
    # retain even if pods terminate
    Retain
  nfs:
    # NFS server's definition
    path: /var/myshare
    Server: 172.31.18.210
    readOnly: false

=========================

[centos@master oks_origin]$ vi nfs-pv.yml
[centos@master oks_origin]$ oc create -f nfs-pv.yml
persistentvolume/nfs-pv created
[centos@master oks_origin]$ oc get pv
NAME      CAPACITY   ACCESS MODES   RECLAIM POLICY   STATUS      CLAIM
STORAGECLASS   REASON    AGE
nfs-pv    500Mi      RWX            Retain           Available
12s

============================
```

- Create the persistent volume claim

```
[centos@master oks_origin]$ cat nfs-pvc.yml
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  # any PVC name
  name: nfs-pvc
spec:
  accessModes:
  # ReadWriteMany(RW from multi nodes), ReadWriteOnce(RW from a node),
ReadOnlyMany(R from multi nodes)
  - ReadWriteMany
  resources:
     requests:
       # storage size to use
       storage: 500Mi
[centos@master oks_origin]$ oc create -f nfs-pvc.yml
persistentvolumeclaim/nfs-pvc created
[centos@master oks_origin]$ oc get pvc
NAME      STATUS    VOLUME    CAPACITY   ACCESS MODES   STORAGECLASS   AGE
nfs-pvc   Bound     nfs-pv    500Mi      RWX                           5s

======================
```

- Enable selinux nfs flag since we are running the system with selinux enforcing.

```
[centos@master oks_origin]$ sudo setsebool -P virt_use_nfs on
[centos@master oks_origin]$ sudo getsebool virt_use_nfs
```

```
virt_use_nfs --> on

==================
```

- Create the nginx pod yaml declaration file

```
[centos@master oks_origin]$ cat nginx-nfs.yml
apiVersion: v1
kind: Pod
metadata:
  # any Pod name
  name: nginx-nfs
  labels:
    name: nginx-nfs
spec:
  containers:
    - name: nginx-nfs
      image: fedora/nginx
      ports:
        - name: web
          containerPort: 80
      volumeMounts:
        # mount point in container
        - name: nfs-share
          mountPath: /usr/share/nginx/html
  volumes:
    - name: nfs-share
      persistentVolumeClaim:
        # PVC name you created
        claimName: nfs-pvc
```

- Create the pod using yaml declaration file

```
[centos@master oks_origin]$ oc create -f nginx-nfs.yml
pod/nginx-nfs created
[centos@master oks_origin]$ oc get pods
NAME              READY     STATUS              RESTARTS   AGE
nginx-nfs         0/1       ContainerCreating   0          8s
[centos@master oks_origin]$ oc get dc
NAME      REVISION   DESIRED   CURRENT   TRIGGERED BY
ruby-ex   1          1         1         config,image(ruby-ex:latest)
[centos@master oks_origin]$ oc get pods
NAME              READY     STATUS      RESTARTS   AGE
nginx-nfs         1/1       Running     0          45s
[centos@master oks_origin]$
```

```
==========================
```

- Create the nginx pod to validate if the persistent storage is mounted

```
[centos@master oks_origin]$ oc exec -it nginx-nfs bash
[root@nginx-nfs /]# df -h
Filesystem                  Size  Used Avail Use% Mounted on
overlay                      50G  8.3G   42G  17% /
tmpfs                       7.6G     0  7.6G   0% /dev
tmpfs                       7.6G     0  7.6G   0% /sys/fs/cgroup
/dev/nvme0n1p1               50G  8.3G   42G  17% /etc/hosts
shm                          64M     0   64M   0% /dev/shm
172.31.18.210:/var/myshare   50G  8.3G   42G  17% /usr/share/nginx/html
tmpfs                       7.6G   16K  7.6G   1%
/run/secrets/kubernetes.io/serviceaccount
tmpfs                       7.6G     0  7.6G   0% /proc/acpi
tmpfs                       7.6G     0  7.6G   0% /proc/scsi
tmpfs                       7.6G     0  7.6G   0% /sys/firmware
[root@nginx-nfs /]# echo "this is hpe" > /usr/share/nginx/html/index.html
[root@nginx-nfs /]# exit
exit
command terminated with exit code 127
[centos@master oks_origin]$ oc describe pod nginx-nfs | grep ^IP
IP:                 10.128.0.68
[centos@master oks_origin]$ curl 10.128.0.68
this is hpe
[centos@master oks_origin]$
```

```
==========================
```

Fun with Dockers

- Docker instances are not available to non root users without adding the following

```
[centos@master oks_origin]$ sudo usermod -aG docker centos
[centos@master ~]$ sudo reboot (ask the instructor)
[centos@master ~]$ docker images
REPOSITORY                                                      TAG
IMAGE ID            CREATED             SIZE
docker-registry.default.svc:5000/test-project/ruby-ex           latest
ea8e3b0ababc        About an hour ago   562 MB
docker.io/openshift/origin-node                                 v3.11
14d965ab72d5        2 weeks ago         1.17 GB
docker.io/openshift/origin-control-plane                        v3.11
42f38837c3d6        2 weeks ago         829 MB

……….truncated…….
```

- Create a new dockerfile spec to build image

```
[centos@master docker_build]$ cat Dockerfile
FROM centos
MAINTAINER null <null@null.local>
RUN yum -y install httpd
RUN echo "Hello DockerFile" > /var/www/html/index.html
EXPOSE 80
CMD ["-D", "FOREGROUND"]
ENTRYPOINT ["/usr/sbin/httpd"]
```

- Build the image from the spec

```
========================
[centos@master docker_build]$ docker build -t hpe/web_server:latest .
Sending build context to Docker daemon 2.048 kB
Step 1/7 : FROM centos
 ---> 9f38484d220f
Step 2/7 : MAINTAINER null <null@null.local>
 ---> Using cache
 ---> c4467a51bce0
Step 3/7 : RUN yum -y install httpd
 ---> Using cache
 ---> 4fd8e9ce4382
Step 4/7 : RUN echo "Hello DockerFile" > /var/www/html/index.html
 ---> Using cache
 ---> 21d8f9cc8f7b
Step 5/7 : EXPOSE 80
 ---> Using cache
 ---> fee08f14ef87
```

```
Step 6/7 : CMD -D FOREGROUND
 ---> Using cache
 ---> 36ccc2f43411
Step 7/7 : ENTRYPOINT /usr/sbin/httpd
 ---> Using cache
 ---> c4755d6d54b1
Successfully built c4755d6d54b1
```

- Query the existence of image from the registry

```
[centos@master docker_build]$ docker images hpe/web_server
REPOSITORY          TAG                 IMAGE ID            CREATED
SIZE
hpe/web_server      latest              c4755d6d54b1        2 minutes ago
329 MB
================
```

- Spawn a container from the image

```
[centos@master docker_build]$ docker run -d -p 81:80 hpe/web_server
5caa9a08b9c47716aed08378afedb56db2280e8b3ba51d75a7496ee838c6c34f
[centos@master docker_build]$ docker ps |grep web
5caa9a08b9c4        hpe/web_server
"/usr/sbin/httpd -..."   7 seconds ago       Up 7 seconds
0.0.0.0:81->80/tcp   laughing_ritchie
```

- Test if the container is functioning

```
[centos@master docker_build]$ curl http://localhost:81
Hello DockerFile


=========
```

Upload a docker image to the openshift registry

- Change to the default project which contains the registry

```
[centos@master ~]$ oc project default
Now using project "default" on server "https://master.example.local:8443".
```

- Find out the name of the registry pod and service name

```
[centos@master ~]$ oc get pod
NAME                       READY     STATUS    RESTARTS   AGE
docker-registry-1-knbbb    1/1       Running   1          3h
registry-console-1-lvc5k   1/1       Running   1          3h
router-1-dn4f5             1/1       Running   3          3h


[centos@master ~]$ oc get svc
NAME               TYPE        CLUSTER-IP       EXTERNAL-IP   PORT(S)
AGE
docker-registry    ClusterIP   172.30.196.253   <none>        5000/TCP
3h
kubernetes         ClusterIP   172.30.0.1       <none>
443/TCP,53/UDP,53/TCP     3h
registry-console   ClusterIP   172.30.169.23    <none>        9000/TCP
3h
router             ClusterIP   172.30.126.135   <none>
80/TCP,443/TCP,1936/TCP   3h
```

- Expose the registry if not already done by the system

```
[centos@master ~]$ oc expose service docker-registry
Error from server (AlreadyExists): routes.route.openshift.io
"docker-registry" already exists
[centos@master ~]$ oc get routes
NAME               HOST/PORT                                       PATH
SERVICES           PORT      TERMINATION   WILDCARD
docker-registry    docker-registry-default.apps.example.local
docker-registry    <all>     passthrough   None
registry-console   registry-console-default.apps.example.local
registry-console   <all>     passthrough   None
========================
```

- Modify the docker config file to add the openshift registry to the docker insecure registry

```
[centos@master ~]$ cat /etc/sysconfig/docker
# /etc/sysconfig/docker

# Modify these options if you want to change the way the docker daemon runs
```

```
OPTIONS=' --selinux-enabled  --insecure-registry
registry-console-default.apps.example.local
--signature-verification=False'
……..
```

- Since we don't have a DNS modify the /etc/hosts file on the master to add the openshift registry pointing to master server

```
[centos@master ~]$ cat /etc/hosts
127.0.0.1   localhost localhost.localdomain localhost4
localhost4.localdomain4
::1         localhost localhost.localdomain localhost6
localhost6.localdomain6
172.31.18.210 master.example.local docker-registry-default.apps.example.local

=================
```

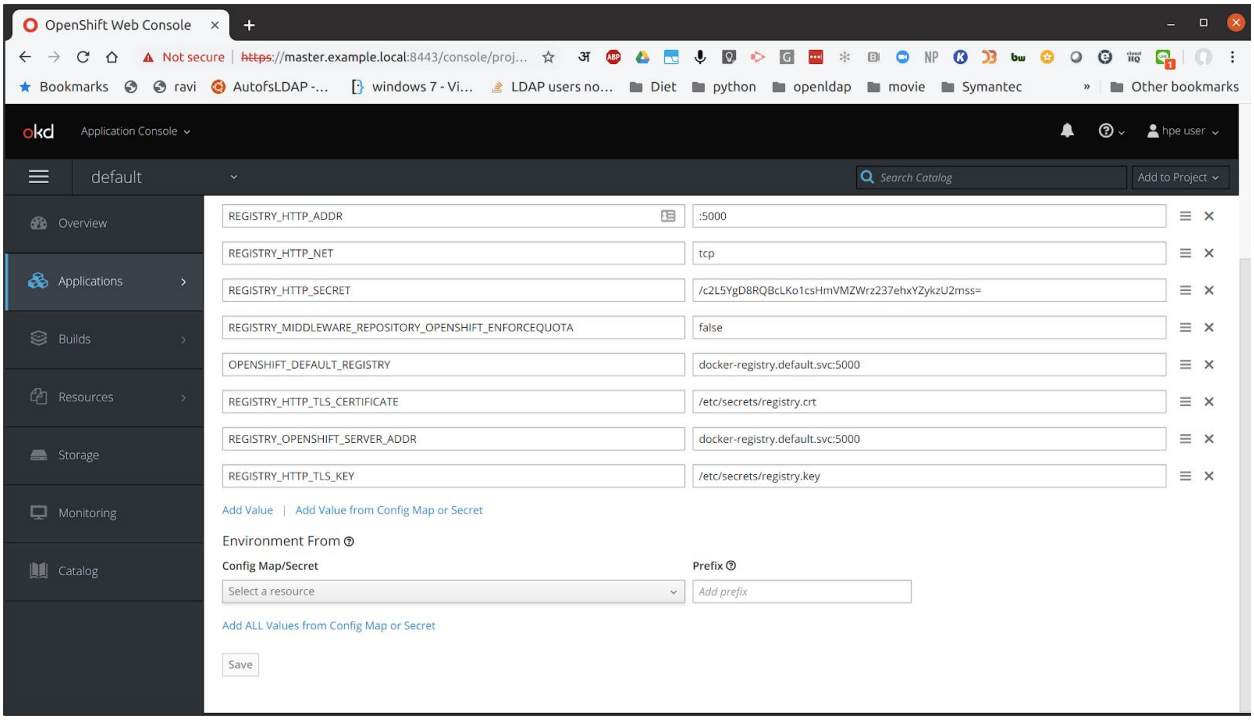
- Reboot the machine for the docker config to take effect. Just restarting the docker daemon might corrupt the openshift config. So we reboot the system.

```
===================
```

- Since the registry is running on self signed certificate, it is now important to import the certificate on the local machine

```
[centos@master docker_build]$ oc project default
Now using project "default" on server "https://master.example.local:8443".
[centos@master docker_build]$ oc get pods
NAME                       READY     STATUS    RESTARTS   AGE
docker-registry-1-knbbb    1/1       Running   2          4h
registry-console-1-lvc5k   1/1       Running   2          4h
router-1-dn4f5             1/1       Running   4          4h
```

- Find out the location of the registry cert file from the web console default project and registry details



- Log in to the registry pod and copy the registry cert content.

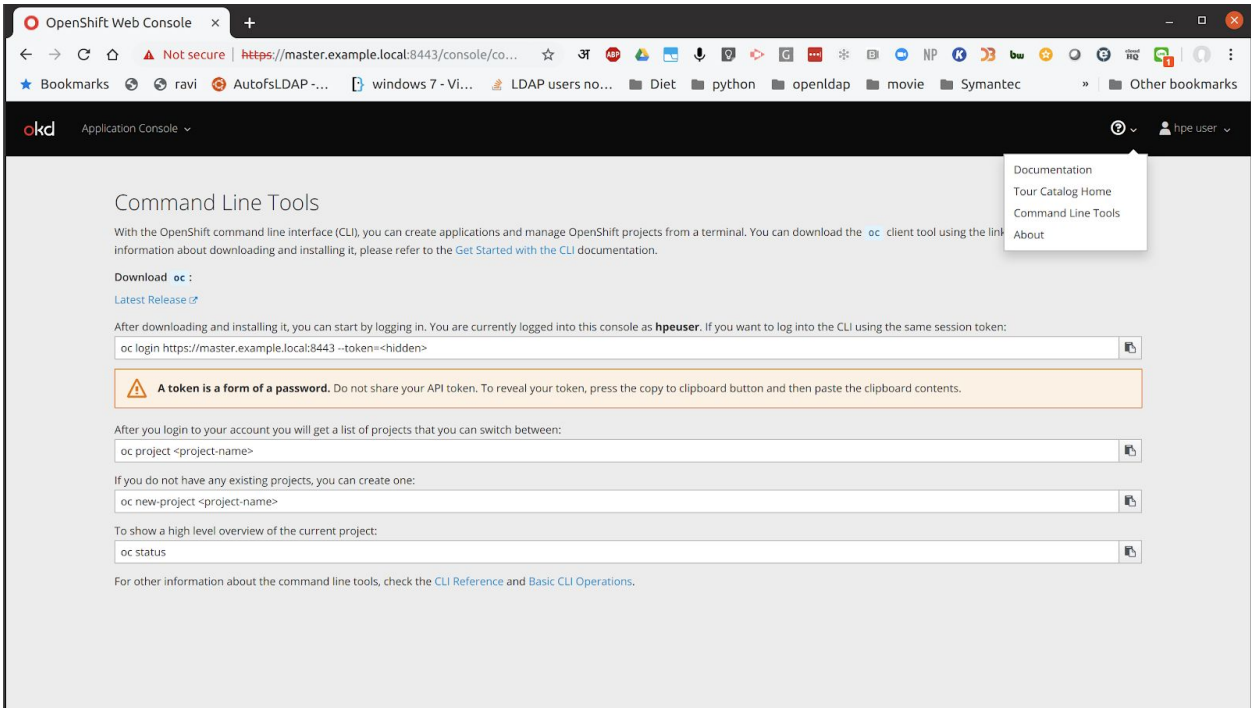
```
[centos@master docker_build]$ oc rsh docker-registry-1-knbbb
sh-4.2$

[centos@master docker_build]$ oc rsh docker-registry-1-knbbb
sh-4.2$ cat /etc/secrets/registry.crt
-----BEGIN CERTIFICATE-----
MIIDiTCCAnGgAwIBAgIBCjANBgkqhkiG9w0BAQsFADAmMSQwIgYDVQQDDBtvcGVu
c2hpZnQtc2lnbmVyQDE1NTg1OTA1NDcwHhcNMTkwNTIzMDU1NTIwWhcNMjEwNTIy
MDU1NTIxWjAZMRcwFQYDVQQDEw4xNzIuMzAuMTk2LjI1MzCCASIwDQYJKoZIhvcN
AQEBBQADggEPADCCAQoCggEBAMtuUExYq/9HwlmrfsA/Q/0cG/XQZCmuHIrCg5Ac
… truncated …
sh-4.2$ exit
```

- Paste the cert content in the following file

```
[centos@master docker_build]$ sudo vi
/etc/pki/ca-trust/source/anchors/registry-console-default.apps.example.local.
crt

[centos@master docker_build]$ sudo update-ca-trust
```

- Reboot the machine (Ask instructor)

- Docker needs to login to the openshift environment to push the image. Login to the openshift web console as under and click on command line tool. This will copy the token docker needs for logging on. We also need the docker registry link to build the login command




```
cat token
oc login https://master.example.local:8443
--token=73M3u477vPHZM_BFWNQEO2ZqoujYSnSkKfEUt6B8DE4
```

- Run the following command for docker login to openshift registry

```
[centos@master ~]$ docker login -u hpeuser -p
73M3u477vPHZM_BFWNQEO2ZqoujYSnSkKfEUt6B8DE4 ^C
[centos@master ~]$ oc get routes
NAME                HOST/PORT                                          PATH
SERVICES            PORT      TERMINATION   WILDCARD
docker-registry     docker-registry-default.apps.example.local
docker-registry     <all>     passthrough   None
registry-console    registry-console-default.apps.example.local
registry-console    <all>     passthrough   None

[centos@master ~]$ docker login -u hpeuser -p
73M3u477vPHZM_BFWNQEO2ZqoujYSnSkKfEUt6B8DE4
registry-console-default.apps.example.local
Login Succeeded

[centos@master ~]$ oc whoami
hpeuser
```

```
[centos@master ~]$ oc project test-project
Now using project "test-project" on server
"https://master.example.local:8443".
[centos@master ~]$ oc project
Using project "test-project" on server "https://master.example.local:8443".
======================
```

- Create openshift image stream in the right namespace (test-project in our case)

```
[centos@master ~]$ oc create is web-server -n test-project
imagestream.image.openshift.io/web-server created
```

- Find out the image name previously created

```
[centos@master ~]$ docker images |grep web
web_server
latest              c4755d6d54b1        2 hours ago         329 MB
docker-registry-default.apps.example.local/test-project/hpe/web-server
latest              c4755d6d54b1        2 hours ago         329 MB
docker-registry-default.apps.example.local/test-project/web-server
latest              c4755d6d54b1        2 hours ago         329 MB
web-server-hpe
latest              c4755d6d54b1        2 hours ago         329 MB
docker.io/openshift/origin-web-console
v3.11               be30b6cce5fa        7 months ago        339 MB
```

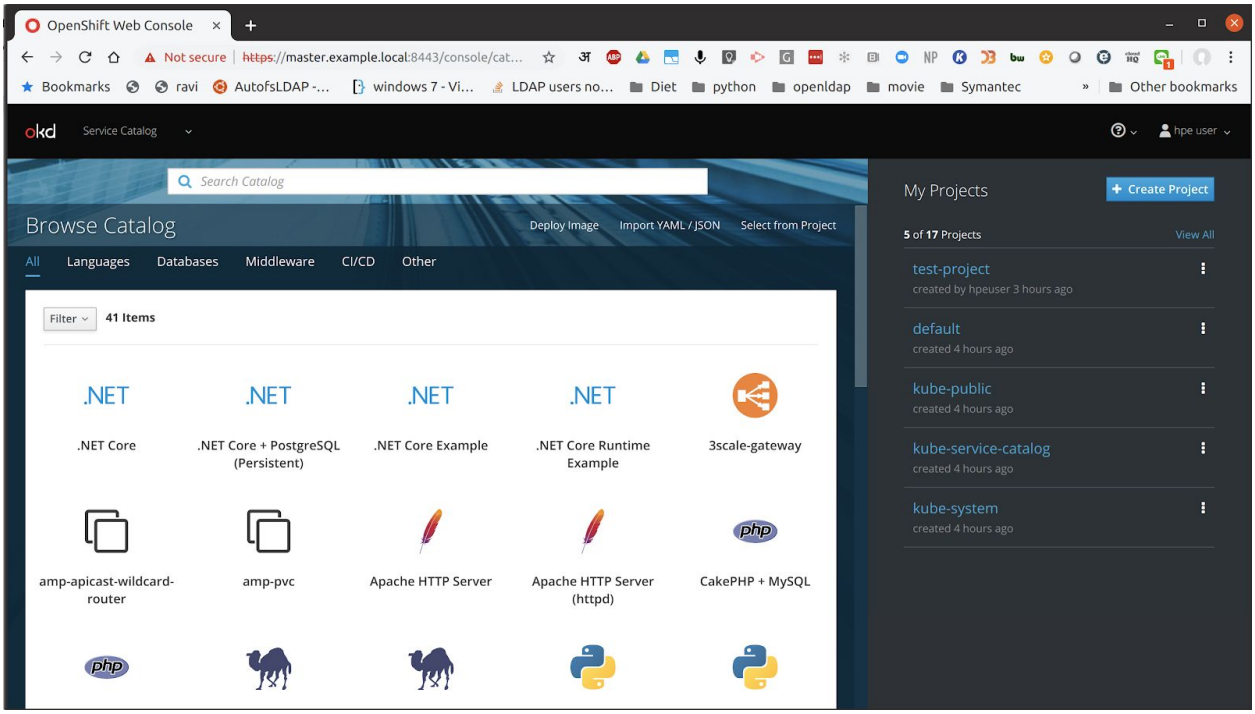
- Create docker tag for the docker image

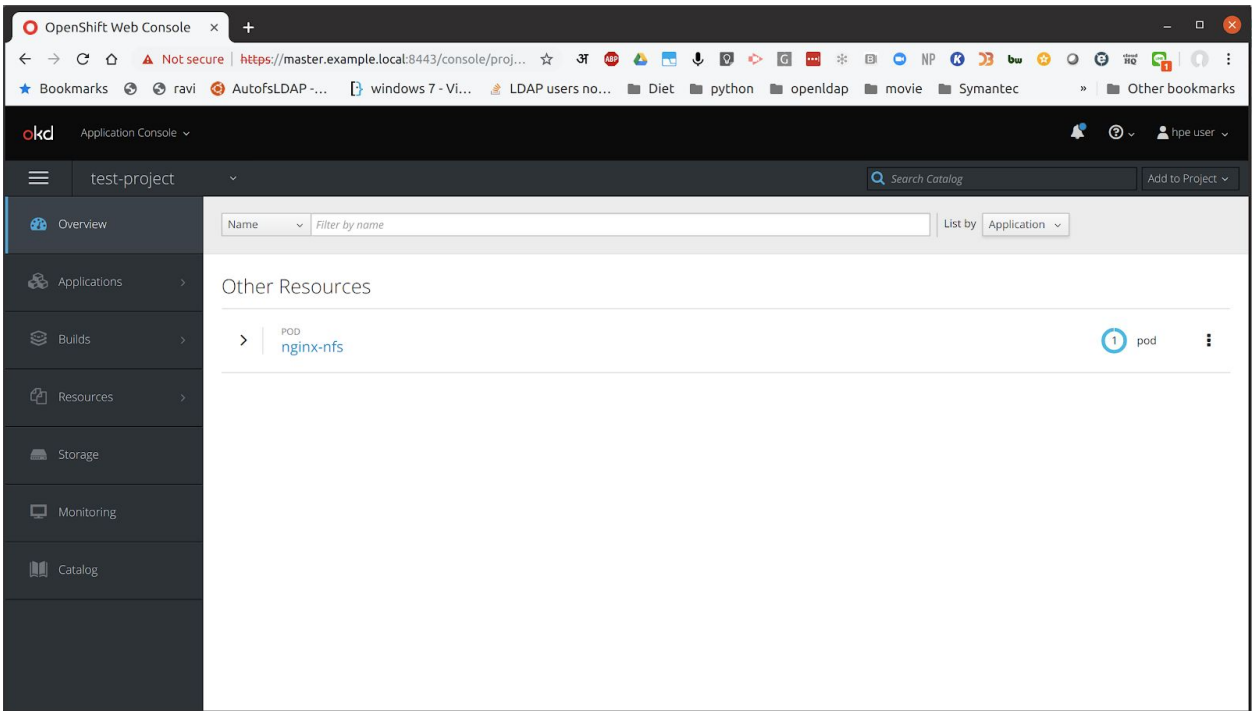
```
[centos@master ~]$ docker tag web_server
docker-registry-default.apps.example.local/test-project/ravi-web
```

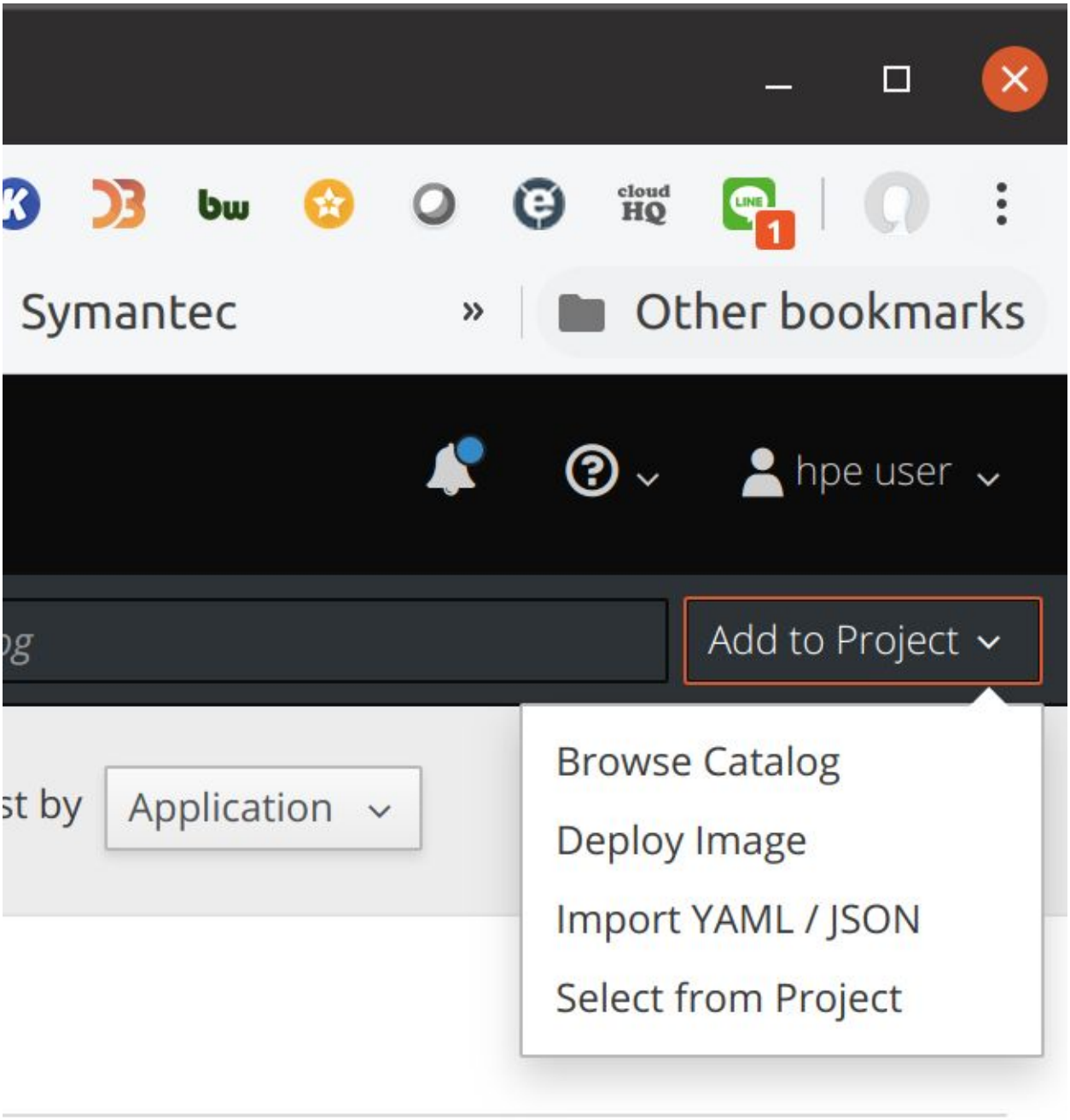
- Push the image to the openshift registry

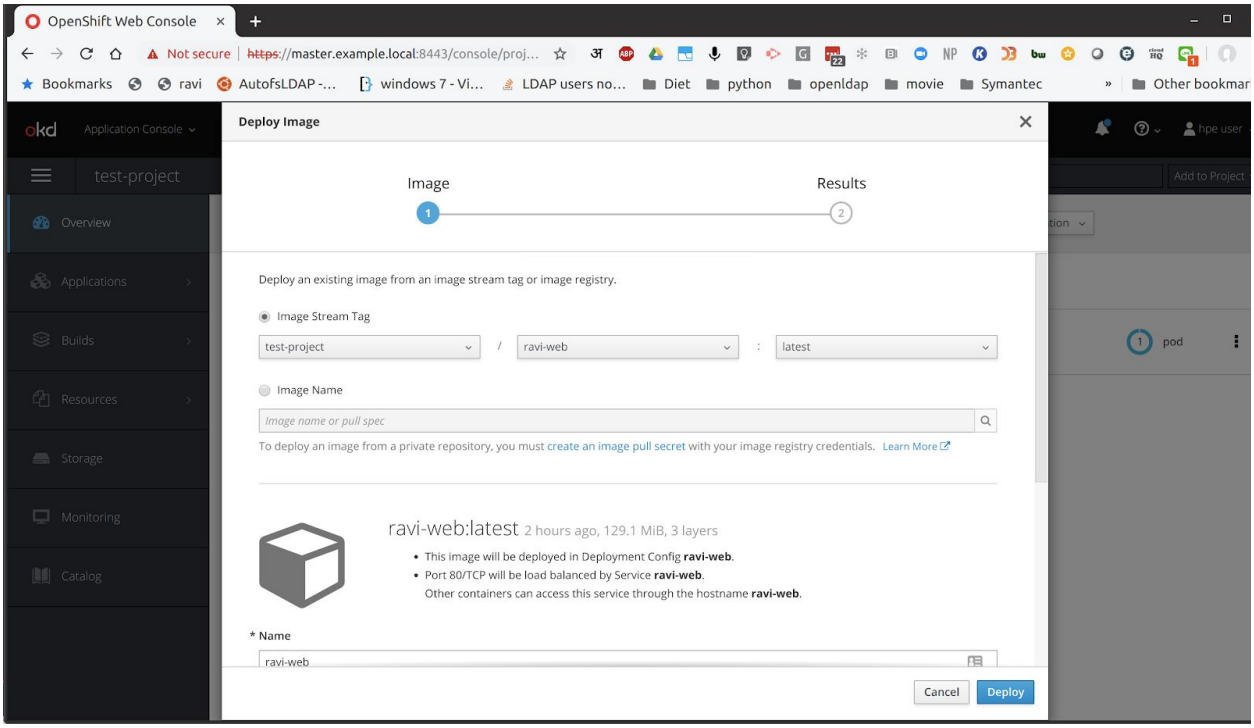
```
[centos@master ~]$ docker push
docker-registry-default.apps.example.local/test-project/ravi-web
The push refers to a repository
[docker-registry-default.apps.example.local/test-project/ravi-web]
2f5e2888a8ae: Pushed
22755ccfcc45: Pushed
d69483a6face: Pushed
latest: digest:
sha256:e386e357e8a09ad57ee6e1bb7f30ec1458405434d7253ab7060f22207be0fc2d size:
948
```

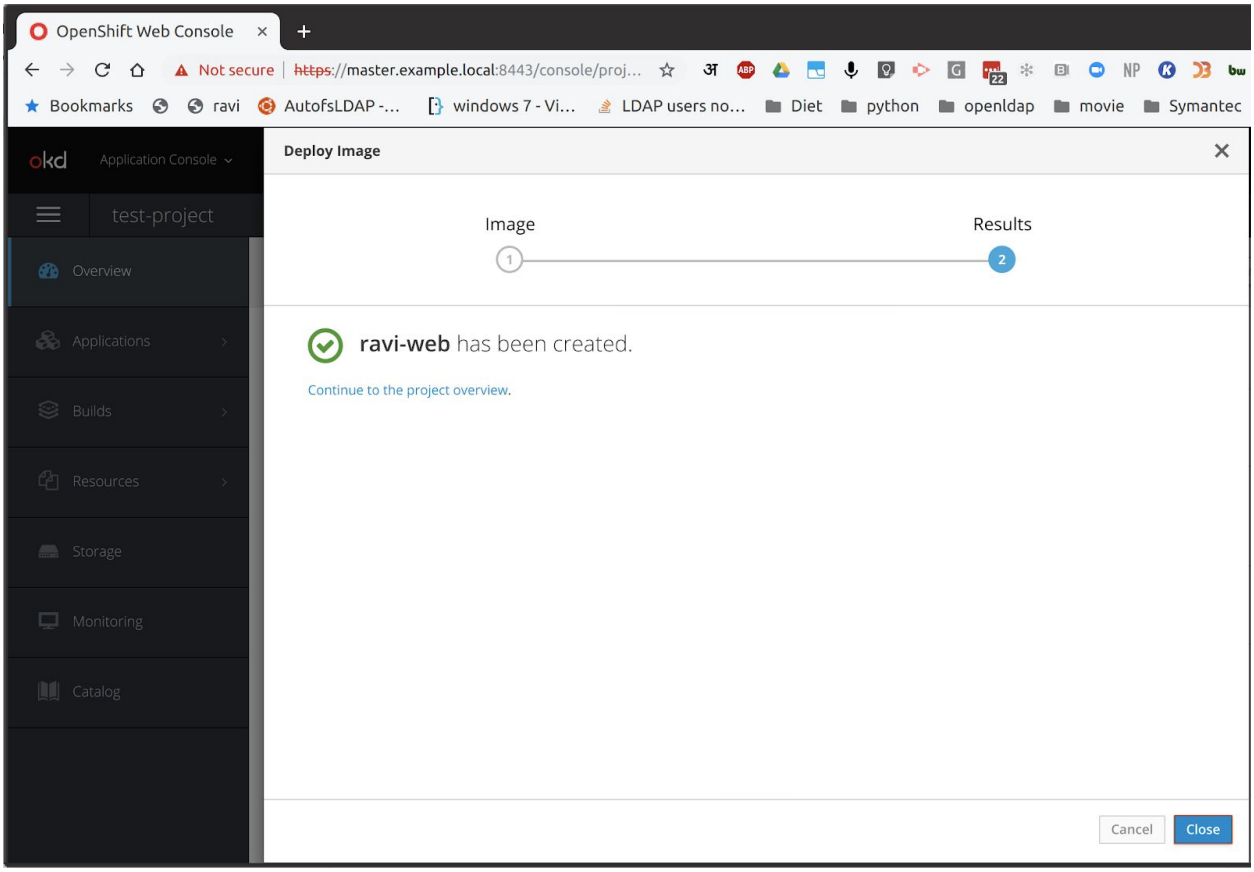
- Go to the web console to launch a pod from the image uploaded

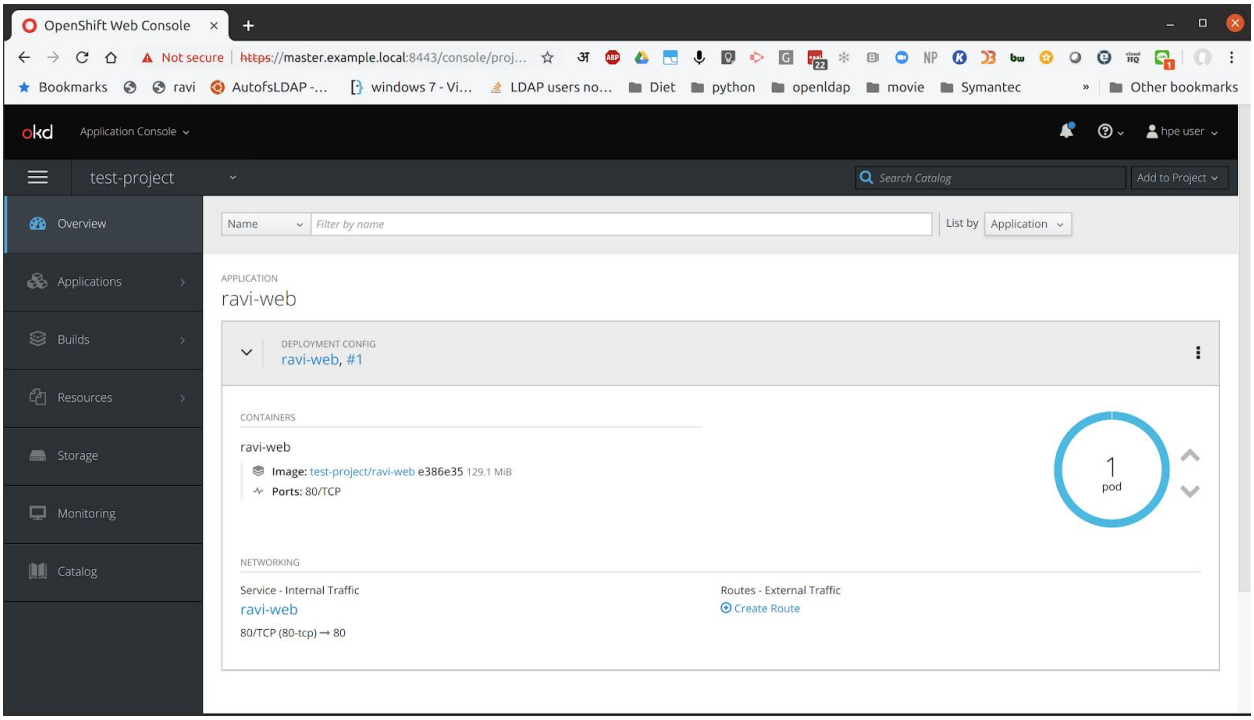

OpenShift Web Console
Not secure | https://master.example.local:8443/console/cat...
Bookmarks ravi AutofsLDAP -... windows 7 - Vi... LDAP users no... Diet python openldap movie Symantec Other bookmarks
okd Service Catalog
hpe user
Search Catalog
Browse Catalog
Deploy Image
Import YAML / JSON
Select from Project
All Languages Databases Middleware CI/CD Other
Filter 41 Items
.NET Core
.NET Core + PostgreSQL (Persistent)
.NET Core Example
.NET Core Runtime Example
3scale-gateway
amp-apicast-wildcard-router
amp-pvc
Apache HTTP Server
Apache HTTP Server (httpd)
CakePHP + MySQL
My Projects
Create Project
5 of 17 Projects
View All
test-project
created by hpeuser 3 hours ago
default
created 4 hours ago
kube-public
created 4 hours ago
kube-service-catalog
created 4 hours ago
kube-system
created 4 hours ago


OpenShift Web Console
Not secure | https://master.example.local:8443/console/proj...
Bookmarks ravi AutofsLDAP -... windows 7 - Vi... LDAP users no... Diet python openldap movie Symantec Other bookmarks
okd Application Console
hpe user
test-project
Search Catalog
Add to Project
Overview
Applications
Builds
Resources
Storage
Monitoring
Catalog
Name
Filter by name
List by Application
Other Resources
POD
nginx-nfs
pod


Symantec
Other bookmarks
hpe user
Add to Project
Browse Catalog
Deploy Image
Import YAML / JSON
Select from Project
Application


OpenShift Web Console
Not secure
https://master.example.local:8443/console/proj...
Bookmarks
ravi
AutofsLDAP -...
windows 7 - Vi...
LDAP users no...
Diet
python
openldap
movie
Symantec
Other bookmar
okd
Application Console
test-project
Overview
Applications
Builds
Resources
Storage
Monitoring
Catalog
Deploy Image
Image
Results
Deploy an existing image from an image stream tag or image registry.
Image Stream Tag
test-project
ravi-web
latest
Image Name
Image name or pull spec
To deploy an image from a private repository, you must create an image pull secret with your image registry credentials. Learn More
ravi-web:latest 2 hours ago, 129.1 MiB, 3 layers
This image will be deployed in Deployment Config ravi-web.
Port 80/TCP will be load balanced by Service ravi-web.
Other containers can access this service through the hostname ravi-web.
* Name
ravi-web
Cancel
Deploy
hpe user
Add to Project
pod


OpenShift Web Console
Not secure https://master.example.local:8443/console/proj...
Bookmarks ravi AutofsLDAP -... windows 7 - Vi... LDAP users no... Diet python openldap movie Symantec
okd Application Console
test-project
Overview
Applications
Builds
Resources
Storage
Monitoring
Catalog
Deploy Image
Image
Results
1
2
ravi-web has been created.
Continue to the project overview.
Cancel
Close


OpenShift Web Console
Not secure https://master.example.local:8443/console/proj...
Bookmarks ravi AutofsLDAP -... windows 7 - Vi... LDAP users no... Diet python openldap movie Symantec Other bookmarks
okd Application Console
hpe user
test-project
Search Catalog
Add to Project
Overview
Applications
Builds
Resources
Storage
Monitoring
Catalog
Name
Filter by name
List by Application
APPLICATION
ravi-web
DEPLOYMENT CONFIG
ravi-web, #1
CONTAINERS
ravi-web
Image: test-project/ravi-web e386e35 129.1 MiB
Ports: 80/TCP
1
pod
NETWORKING
Service - Internal Traffic
ravi-web
80/TCP (80-tcp) → 80
Routes - External Traffic
Create Route

- Validate the pod creation

```
[centos@master ~]$ oc project test-project
Already on project "test-project" on server
"https://master.example.local:8443".
[centos@master ~]$ oc get pods
NAME               READY     STATUS    RESTARTS   AGE
nginx-nfs          1/1       Running   3          2h
ravi-web-1-ncz4k   1/1       Running   0          1m
```

- Find out the pod ip address

```
[centos@master ~]$ oc get svc
NAME       TYPE        CLUSTER-IP       EXTERNAL-IP   PORT(S)   AGE
ravi-web   ClusterIP   172.30.162.228   <none>        80/TCP    1m
```

- Check if the pod web server is functioning

```
[centos@master ~]$ curl -I 172.30.162.228
HTTP/1.1 200 OK
Date: Thu, 23 May 2019 10:51:39 GMT
Server: Apache/2.4.6 (CentOS)
Last-Modified: Thu, 23 May 2019 08:42:50 GMT
ETag: "11-5898a1129d680"
Accept-Ranges: bytes
Content-Length: 17
Content-Type: text/html; charset=UTF-8

[centos@master ~]$ curl  172.30.162.228
Hello DockerFile
```