FUNDAMENTALS OF CONTAINERS, KUBERNETES, AND RED HAT OPENSHIFT:
LAB SET-UP INSTRUCTIONS FOR EXERCISES

INTRODUCTION

The edX course *Fundamentals of Containers, Kubernetes, and Red Hat OpenShift* (DO081x) includes a number of guided exercises, which give you an opportunity to practice the skills you are learning in the course presentations. To complete these exercises, you need to configure a practice environment that you completely control.

The exercises in this course assume that you have Red Hat Container Development Kit (CDK) installed and running on your workstation. These instructions assume that you are running Apple macOS, Microsoft Windows 10 Pro, or a Linux distribution on your workstation. If you are using a Linux distribution, we recommend that you use Red Hat Enterprise Linux 7.3.

Red Hat CDK does not support using nested virtualization; the operating system cannot be running on a virtual machine.

You can download a free copy of Red Hat Enterprise Linux for development purposes from the Red Hat Developer Program.

These instructions were tested on the following configurations:

- Apple macOS 10.12, Oracle VirtualBox 5.1.22, Red Hat CDK 3.0.0-2 running OpenShift Container Platform 3.5.5.8
- Microsoft Windows 10 Pro, Oracle VirtualBox 5.1.22, Red Hat CDK 3.0.0-2 running OpenShift Container Platform 3.5.5.8.
- Red Hat Enterprise Linux 7.3, Oracle VirtualBox 5.1.22, Red Hat CDK 3.0.0-2 running OpenShift Container Platform 3.5.5.8
- Fedora 26, VirtualBox 5.1.22, Red Hat CDK 3.0.0-2 running OpenShift Container Platform 3.5.5.8

This guide provides the necessary steps to install Red Hat CDK 3 and run an OpenShift cluster.

HARDWARE REQUIREMENTS

By default, the Red Hat CDK (minishift) creates a docker machine with 4GB of RAM. You must have enough RAM for your host operating system to run efficiently plus the 4GB RAM taken up by the docker machine. You may lower the RAM required by the docker machine with the **minishift config** command. We recommend that you configure the docker machine RAM to no lower than 2 GB.

The docker machine requires a maximum of 20 GB of storage. Initially, the docker machine will consume much less storage (approximately 3.1 GB).

You must have sufficient CPU cores to run your host operating system efficiently while allocating, by default, 2 CPU cores to the docker machine. The number of CPU cores required by the docker machine can be modified with the **minishift config** command.

INSTALLATION OVERVIEW

The installation of the lab environment consists of the following tasks:

1. Install Oracle VirtualBox to serve as a virtualization manager for Red Hat CDK[1].
2. Install Red Hat CDK 3.
3. Verify the installation by starting an OpenShift cluster.

INSTALLING VIRTUALBOX

Oracle VirtualBox 5.1 can be downloaded free of charge from this website[2]. Download and install the appropriate package for the operating system you are running on your workstation.

For Microsoft Windows only

You must disable Microsoft Hyper-V to create virtual machines with VirtualBox. Execute the following command in an elevated PowerShell to uninstall Hyper-V:

Disable-WindowsOptionalFeature -Online -FeatureName Microsoft-Hyper-V-All

When prompted, restart your Windows workstation.

For Linux only

The VirtualBox rpm installation needs to compile a kernel driver specific to the version of the running kernel. Make sure the most recent kernel is running and that the version of the installed kernel source code and headers match. Restart the workstation after any kernel updates. The following packages, or their equivalents, must be installed before installing the VirtualBox rpm:

- gcc
- make

[1] Additional hypervisors are supported by Red Hat CDK 3, please review the documentation. Other configurations have not been tested for this lab environment. We recommend using Oracle VirtualBox.
[2] https://www.virtualbox.org

- kernel-devel

If the rpm installation script is unable to build the drivers, follow the instructions given. You may have to build and install the driver manually with the following command as root:

```
/sbin/vboxconfig
```

Consult the VirtualBox documentation for further information.

INSTALLING RED HAT CDK 3

If you have not already done so, register for a free Red Hat Developer Program account at https://developers.redhat.com. Be sure to record the user name and password that you create during the registration process.

For Microsoft Windows

1. Download the Red Hat Container Development Kit 3 for Windows from https://developers.redhat.com/products/cdk/overview.
2. Rename the downloaded file to **minishift.exe**. Copy the **minishift.exe** file to a suitable folder on your system and ensure the path does not have any spaces (for example, create a folder called **"minishift"** under the **C:** drive and copy the **minishift.exe** binary to this location).
3. Edit your **PATH** environment variable and add the folder created in the previous step to it. This will ensure that the **minishift.exe** is available in the system path, and can be invoked from the command line terminal.
4. Open a Powershell window.
5. Execute the following commands in the Powershell window:

```
minishift setup-cdk
minishift config set vm-driver virtualbox
```

The **minishift config** command may issue a warning message, "No Minishift instance exists...". This message can safely be ignored.

For macOS and Linux

1. Download the Red Hat Container Development Kit 3 from https://developers.redhat.com/products/cdk/overview . Download the appropriate package for the operating system you are running on your workstation.
2. Rename the downloaded file to **minishift** and copy the binary file to **/usr/local/bin** or another directory that is accessible in your command-shell path. Make sure the command is executable: **chmod +x /usr/local/bin/minishift**
3. Execute the following commands in a terminal session:

```
minishift setup-cdk
minishift config set vm-driver virtualbox
```

The **minishift config** command may issue a warning message, "No Minishift instance exists...". This message can safely be ignored.

STARTING AN OPENSHIFT CLUSTER

The **minishift start** command builds a virtual docker machine using Oracle VirtualBox, if one does not exist, starts the docker machine, and creates an instance of an OpenShift cluster. Before executing this command for the first time, you need to set the environment variables **MINISHIFT_USERNAME** and **MINISHIFT_PASSWORD** to your developer subscription credentials, created during the registration process.

For Linux

Add the following lines to your profile at **$HOME/.bashrc** substituting your credentials:

```
export MINISHIFT_USERNAME=myusername
export MINISHIFT_PASSWORD=mypassword
```

Make the settings effective immediately by executing the following command:

```
source $HOME/.bashrc
```

For macOS

Add the following lines to your profile at **$HOME/.bash_profile** substituting your credentials:

```
export MINISHIFT_USERNAME=myusername
export MINISHIFT_PASSWORD=mypassword
```

Make the settings effective immediately by executing the following command:

```
source $HOME/.bash_profile
```

For Microsoft Windows

Execute the following commands from a PowerShell window substituting your credentials:

```
setx MINISHIFT_USERNAME myusername
setx MINISHIFT_PASSWORD mypassword
```

The settings will be effective immediately and for future PowerShell sessions.

For all operating systems

Execute the following command to start an OpenShift cluster:

```
minishift start
```

If the above command indicates that no user name or password was passed, make sure you have set the two minishift environment variables correctly for your operating system. You may also be prompted for your Red Hat Developer credentials to get access to the Red Hat Container

registry (*registry.redhat.io)* to pull OpenShift container images during start up. Provide the same username and password that you set in the **MINISHIFT_USERNAME** and **MINISHIFT_PASSWORD** variables respectively.

For all operating systems

Execute the following command to learn how to set up the command-shell path so that the shell can execute the **oc** command:

minishift oc-env

Follow the instructions given in the output of this command. You must do this every time you open a new terminal window or make the settings permanent in your shell profile. To verify that the path has been set up correctly, execute the following command:

oc version

You should receive output similar to the following:

```
oc v3.5.5.8
kubernetes v1.5.2+43a9be4
features: Basic-Auth
...
```

IMPORTANT INFORMATION FOR MICROSOFT WINDOWS USERS

The practice exercises ask the student to type commands in a PowerShell window. In the command examples, the dollar sign ($) prompt, a Unix convention, has been given. In Windows, consider this the same as a PowerShell prompt such as **PS C:\Users\myusername>**. Type the command given after the $ prompt at the PowerShell prompt. Do not type the $ character.

TROUBLESHOOTING

If you are having issues setting up the lab environment, you may find answers here: https://github.com/RedHatTraining/DO081x-lab/blob/master/Troubleshooting.md