Exercise 9.1: Installing OpenDaylight and First Run

Please Note

The actual command output may vary from what is displayed here, mostly due to condensation of long outputs to keep things simple. But it can also be due to usually unimportant host system variations.

This lab will enable you to setup and run the **ODL KARAF** Container, explore **karaf** commands, install features and access the **karaf** shell over SSH.

Installation of **OpenDaylight** is straightforward, using the pre-built releases that utilize the **Karaf** container. Be aware that the controller uses a lot of memory. If you have less than 4G available you may experience strange behavior.

1. Download the tarball from http://www.opendaylight.org/software/downloads:

```
student@ubuntu:~$ cd $HOME
student@ubuntu:~$ wget -nd -c "https://nexus.opendaylight.org/content/repositories/public/org/\
                  opendaylight/integration/opendaylight/0.9.1/opendaylight-0.9.1.tar.gz"
```

Please Note

For convenience a copy of the tarball is provided in the RESOURCES/s_09/ directory for this class. Once you have downloaded and expanded this you will find it at opendaylight-0.9.1.tar.gz

2. Ensure you have a copy of **JAVA** installed. You may also want to set the JAVA_HOME environment setting. The JAVA_HOME directory may be different, depending on the source and version of **JAVA** in use.

```
student@ubuntu:~$ sudo apt update
student@ubuntu:~$ sudo apt install -y default-jdk
```

3. Open a new terminal and extract **ODL** tarball, and then start **./bin/karaf** as a foreground process in the extracted folder:

```
student@ubuntu:~$ cd $HOME
student@ubuntu:~$ tar -xf opendaylight-0.9.1.tar.gz
student@ubuntu:~$ cd opendaylight-0.9.1
student@ubuntu:~$ export JAVA_HOME=/usr/lib/jvm/java-8-openjdk-amd64
student@ubuntu:~/opendaylight-0.9.1$ ./bin/karaf

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Hit '<tab>' for a list of available commands
and '[cmd] --help' for help on a specific command.
Hit '<ctrl-d>' or type 'system:shutdown' or 'logout' to shutdown OpenDaylight.


opendaylight-user@root>
```

You will see the **OpenDaylight** prompt, `opendaylight-user@root>`. The running **karaf** session has a huge list of commands available (see https://karaf.apache.org/manual/latest-2.x/commands/commands.html). We will introduce the commands to install features and operate **OpenDaylight** within the **Karaf** container below:

- `feature:list` : lists the available features; with the option `-i` lists only the installed features.

  ```
  opendaylight-user@root>feature:list | grep odl-
  Name                                       | Version          | Required | State   \
          | Repository   | Description
  ---------------------------------------------------------------------------------------------------------
  odl-lispflowmapping-mappingservice-shell  | 1.8.1            |          | Uninstalled \
          | odl-lispflowmapping-mappingservice-shell | ODL :: lispflowmapping :: odl-lispflowmapping-map
  odl-mdsal-distributed-datastore          | 1.8.1            |          | Started      \
          | odl-mdsal-distributed-datastore          |  odl-mdsal-distributed-datastore
   features-mdsal                           | 1.8.1            |          | Uninstalled \
         | features-mdsali |  features-mdsal
  [...]
  ```

  This feature maps names to their respective **OpenDaylight** projects.

Please Note

Not all features can be installed at the same time. There are restrictions on which components can work together, listed in the Installation Guide at (https://docs.opendaylight.org/en/stable-fluorine/getting-started-guide/installing_opendaylight.html).

- `feature:install <feature-name>`: Installs the feature with the given name. The `-v` option turns on verbose output.

  ```
  opendaylight-user@root>feature:install -v odl-netconf-ssh
  Adding features: odl-netconf-ssh/[1.5.1,1.5.1]
  Changes to perform:
    Region: root
      Bundles to install:
        mvn:org.apache.sshd/sshd-netty/2.0.0
  .........
  ```

- `feature:info <feature-name>`: Gets the installed feature information. Below is the command for getting information about the feature `odl-netconf-ssh`.

  ```
  opendaylight-user@root>feature:info odl-netconf-ssh
  Feature odl-netconf-ssh 1.5.1
  Description:
    OpenDaylight :: Netconf Connector :: SSH
  Details:
    OpenDaylight is leading the transformation to Open Software Defined Networking (SDN).
    For more information, please see https://www.opendaylight.org
  Feature has no configuration
  Feature has no configuration files
  Feature depends on:
    odl-aaa-netconf-plugin 1.5.1
    odl-netconf-util 1.5.1
    odl-netconf-tcp 1.5.1
    wrap 0.0.0
  Feature contains followed bundles:
    mvn:org.opendaylight.netconf/netconf-ssh/1.5.1
  Feature has no conditionals.
  ```

- `feature:uninstall <feature-name>`: Uninstalls a feature. Below is the command to uninstall the feature `odl-netconf-ssh`

  ```
  opendaylight-user@root>feature:uninstall odl-netconf-ssh
  ```

4. **ODL** karaf container comes with the default **SSH** feature installed. This allows one to directly **SSH** into the karaf container from remote hosts.

- Make sure you have the default **SSH** feature installed and started.

```
opendaylight-user@root>feature:list | grep -i started | grep ssh
ssh  | 4.1.6 | | Started | standard-4.1.6  | Provide a SSHd server on Karaf
```

- Open a new terminal session and **SSH** into the ODL karaf container port 8081. Use the default **SSH** username = karaf and password = karaf.

```
student@ubuntu:~$ ssh -p 8101 karaf@localhost
The authenticity of host '[localhost]:8101 ([127.0.0.1]:8101)' can't be established.
RSA key fingerprint is SHA256:o3sQwv6IgTyUmN0ou6jqyoCeSMblI3r7ZEeo40bYQ5A.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '[localhost]:8101' (RSA) to the list of known hosts.
Password authentication
Password:

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Hit '<tab>' for a list of available commands
and '[cmd] --help' for help on a specific command.
Hit '<ctrl-d>' or type 'system:shutdown' or 'logout' to shutdown OpenDaylight.
```

- You should be able to execute all karaf commands in the remote **SSH** shell. For now, let us logout from the karaf shell.

```
opendaylight-user@root>logout
Connection to localhost closed.
```

5. A plain installation of **OpenDaylight Fluorine** comes as a bare container. For the northbound interface, the odl-restconf and odl-mdsal-apidocs features should be installed.

   - Install the odl-restconf and odl-mdsal-apidocs features:

   ```
   opendaylight-user@root>feature:install -v odl-restconf odl-mdsal-apidocs
   ```

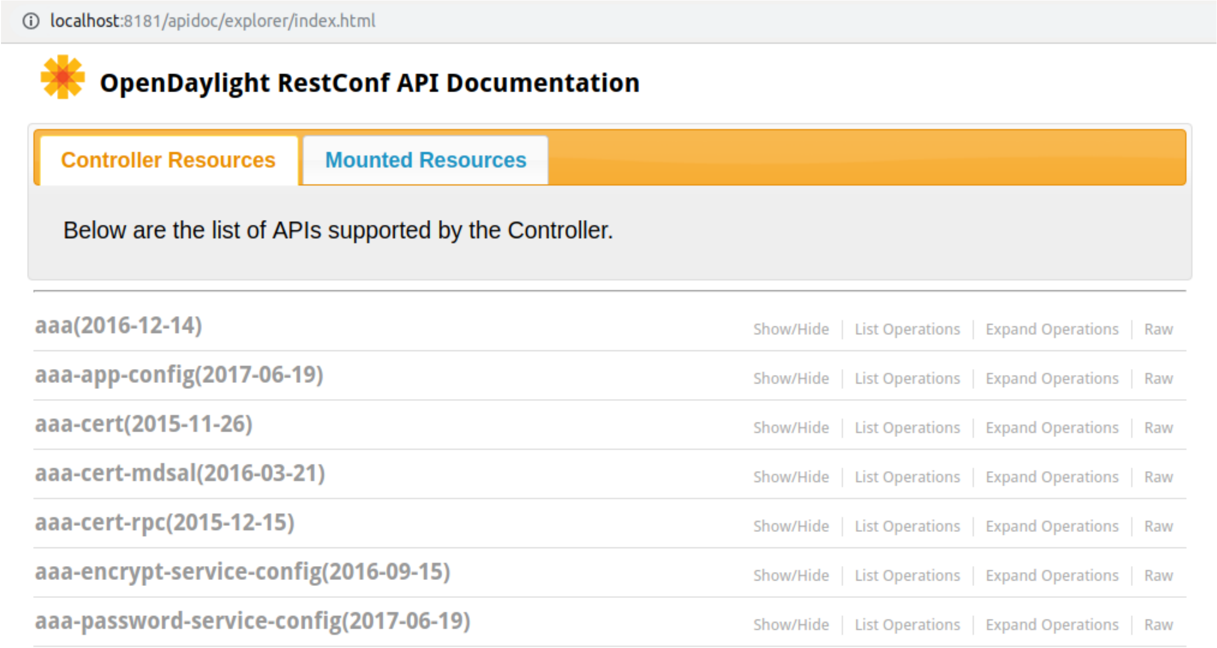
   - Check whether odl-restconf has started:

   ```
   opendaylight-user@root>feature:list | grep odl-restconf
   odl-restconf  |1.8.1  |  x  |Started|odl-netconf-1.8.1
   ```

   - Check whether odl-mdsal-apidocs has started:

   ```
   opendaylight-user@root>feature:list | grep odl-mdsal-apidocs
   odl-mdsal-apidocs  |1.8.1|x  |Started  |odl-netconf-1.8.1  | OpenDaylight :: MDSAL :: APIDOCS
   ```

   - Open a browser window and try accessing the odl-mdsal-apidocs URL http://YOUR_HOST_IP:8181/apidoc/explorer/index.html using default login username = admin and password = admin.
     You should able to see the API docs explorer UI as shown below:



localhost:8181/apidoc/explorer/index.html

OpenDaylight RestConf API Documentation

Controller Resources | Mounted Resources

Below are the list of APIs supported by the Controller.

aaa(2016-12-14) Show/Hide | List Operations | Expand Operations | Raw

aaa-app-config(2017-06-19) Show/Hide | List Operations | Expand Operations | Raw

aaa-cert(2015-11-26) Show/Hide | List Operations | Expand Operations | Raw

aaa-cert-mdsal(2016-03-21) Show/Hide | List Operations | Expand Operations | Raw

aaa-cert-rpc(2015-12-15) Show/Hide | List Operations | Expand Operations | Raw

aaa-encrypt-service-config(2016-09-15) Show/Hide | List Operations | Expand Operations | Raw

aaa-password-service-config(2017-06-19) Show/Hide | List Operations | Expand Operations | Raw

Figure 9.3: **ODL MDSAL API EXPLORER**

6. You can shutdown the **ODL** karaf container using `system:shutdown` or `shutdown` or `system:shutdown -f`.

   - Now go back to the terminal where you started **ODL** karaf and execute `system:shutdown` command to exit from **ODL** karaf:

     ```
     opendaylight-user@root>system:shutdown
     Confirm: halt instance root (yes/no): yes
     ```