OpenStack Debugging Training – Student Lab Book

Setup

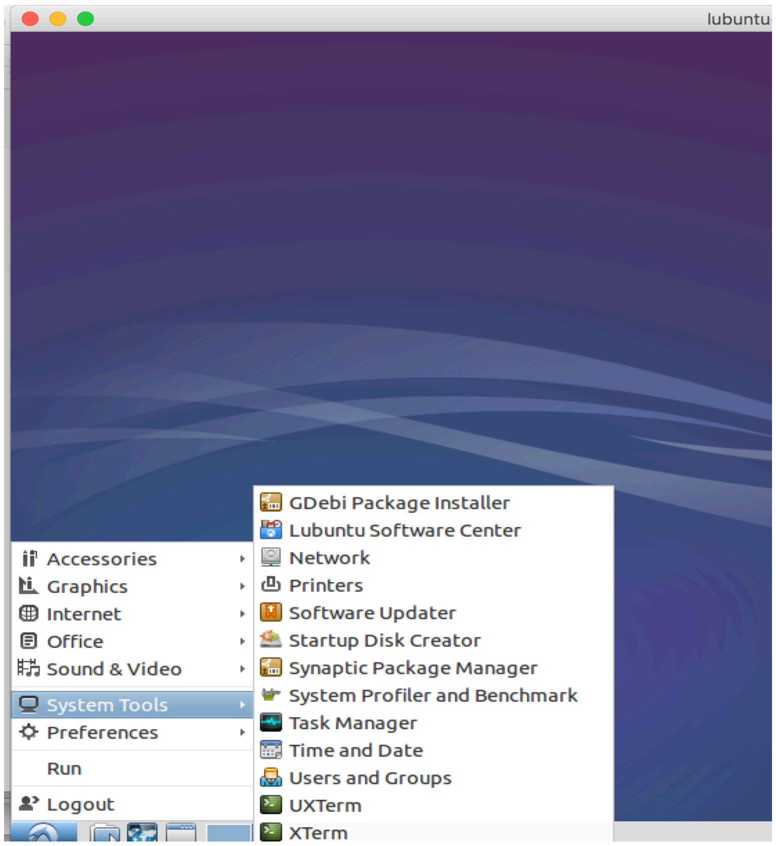
1. Setup Devstack VM prior to the class using instructions from https://github.com/txdev/OpenStack-Debugging

Using Devstack

Start the VM from VirtualBox by clicking on the "Start" button.
The VM will boot up and automatically log you in.

Starting Devstack

- Open *xtem* (`start menu -> system tools -> xterm`)



- Run following commands from the *xterm*
  - `cd ~/devstack`
  - `./restart-devstack.sh`

Navigating Devstack Screens

In devstack, each OpenStack process is started in a virtual terminal called *screen.*
You can navigate among screens using following keystrokes:
(Eg: ctrl A + N means hold "control A" and press n)

- Go to next screen - *ctrl A + N*
- Go to previous screen – *ctrl A + P*
- List all screens – *ctrl A + "*
- Detach from screen – *ctrl A + D*
- Go to screen 9 – *ctrl A + 9*

Using Horizon

- Open Firefox
- Goto URL – http://localhost/horizon
- Login with admin/foundry123 (Login could be slow, be patient)
- Try options such as images, networks, instances

Using CLI

Openstack CLI provides tools to interact with various sub-systems

- Open a terminal and try commands such as
  - `nova list`
  - `neutron net-list`
  - `glance image-list`

Using PyCharm

Open Terminal and run following commands to start PyCharm.

- `cd ~/pycharm*`
- `bin/pycharm.sh &`

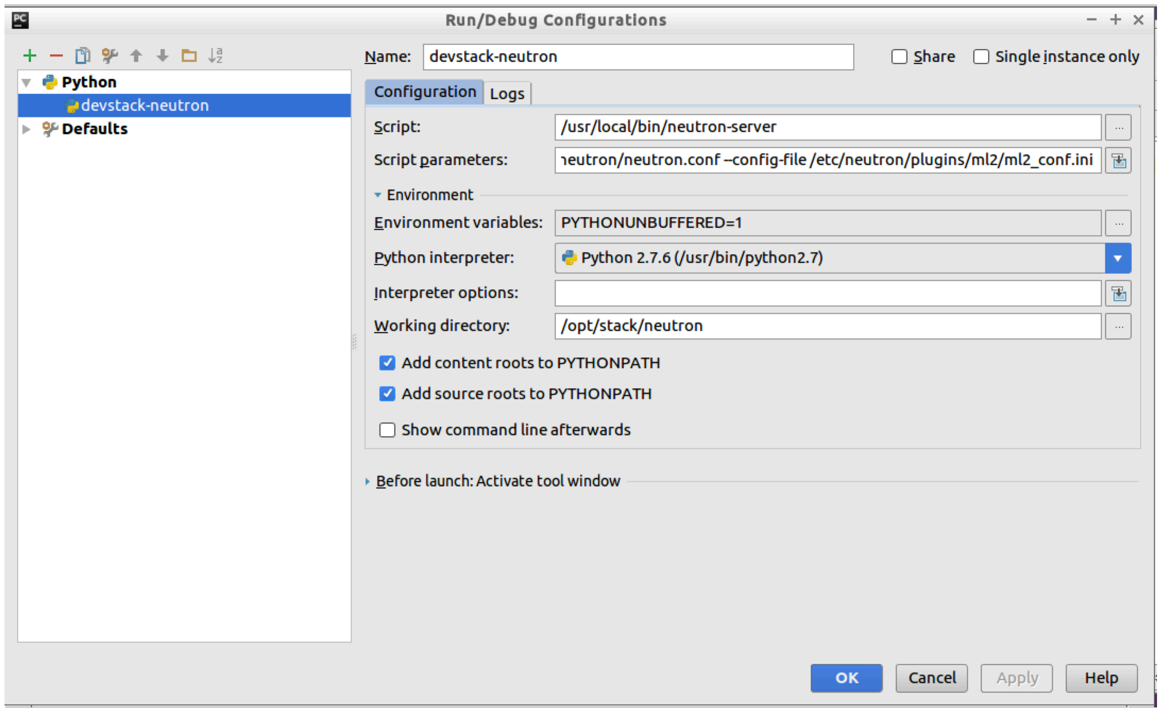
PyCharm already has two projects configured – Neutron and Horizon. You can create a new project by simply opening the correct OpenStack folder. As an example, to create "Nova" project, run these commands from PyCharm

- `File -> Open`
- `Select /opt/stack/nova folder`

It may take a while to open the new project since PyCharm has to index all files.

Exercise 1 - Debug Neutron “Create Network”

- Open Neutron project in PyCharm
- Make sure that following debug configuration is present. If not, create new one.



Run/Debug Configurations

- Python
  - devstack-neutron
- Defaults

Name: devstack-neutron ☐ Share ☐ Single instance only

Configuration | Logs

Script: /usr/local/bin/neutron-server

Script parameters: neutron/neutron.conf –config-file /etc/neutron/plugins/ml2/ml2_conf.ini

Environment

Environment variables: PYTHONUNBUFFERED=1

Python interpreter: Python 2.7.6 (/usr/bin/python2.7)

Interpreter options:

Working directory: /opt/stack/neutron

✓ Add content roots to PYTHONPATH

✓ Add source roots to PYTHONPATH

☐ Show command line afterwards

Before launch: Activate tool window

OK | Cancel | Apply | Help

Configuration details:

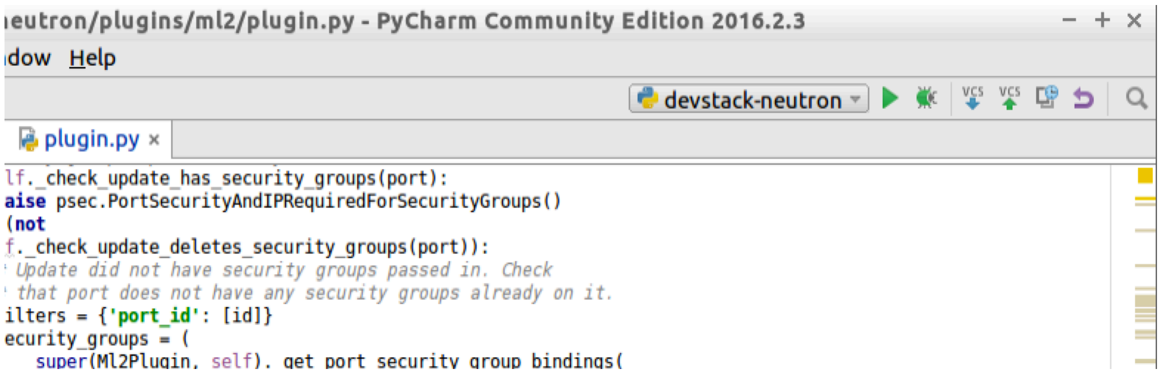
```
script ->/usr/local/bin/neutron-server
script parameters -> --config-file /etc/neutron/neutron.conf –
config-file /etc/neutron/plugins/ml2/ml2_conf.ini
Working directory -> /opt/stack/neutron
```

- Discuss the monkey patch (check the file neutron/common/eventlet_utils.py line number 32)
- Put a break point at neutron/neutron/plugins/ml2/plugin.py in update_port() method

Start Debugging

Go to the screen for “q-svc” and do Ctrl +C to stop the neutron server.

Start Neutron Debugging from PyCharm by clicking on the “Debug devstack-neutron” icon.


ıeutron/plugins/ml2/plugin.py - PyCharm Community Edition 2016.2.3
ıdow Help
devstack-neutron
plugin.py

```
lf._check_update_has_security_groups(port):
aise psec.PortSecurityAndIPRequiredForSecurityGroups()
(not
f._check_update_deletes_security_groups(port)):
' Update did not have security groups passed in. Check
' that port does not have any security groups already on it.
ilters = {'port_id': [id]}
ecurity_groups = (
   super(Ml2Plugin, self). get port security group bindings(
```

Create a VM:

A VM can be created using Horizon GUI or OpenStack command line.

To create from command line, gather information about the following:

- Image name
  - Run "`glance image-list`" to get list of images
- Flavor name
  - Run "`nova flavor-list`" to get list of flavors
- Network id
  - Run "`neutron net-list`" to get list of networks

Run the following command to start a VM:

```
>nova boot --image <image name> --flavor <flavor name> --
nic net-id=<network-id>  <VM Name>
```

Example:

```
>nova boot --image cirros-0.3.4-x86_64-uec --flavor m1.tiny
--nic net-id=01328ca1-0c25-42ab-8da1-49c9f927aadae TestVM1
```

Work through the PyCharm debugger.

Exercise 2 - Debug Neutron "list network"

- Remove all existing break points by clicking "`Run -> View Breakpoints`" and unclicking all existing breakpoints
- Put a break point at `get_networks()` method in the file `neutron/neutron/plugins/ml2/plugin.py` in method
- Stop the existing debugging session and start new (Alternatively, you can try "Rerun Devstack" option)
- List network from Horizon or CLI (`neutron net-list`)
- Work through the PyCharm debugger

Cleanup:

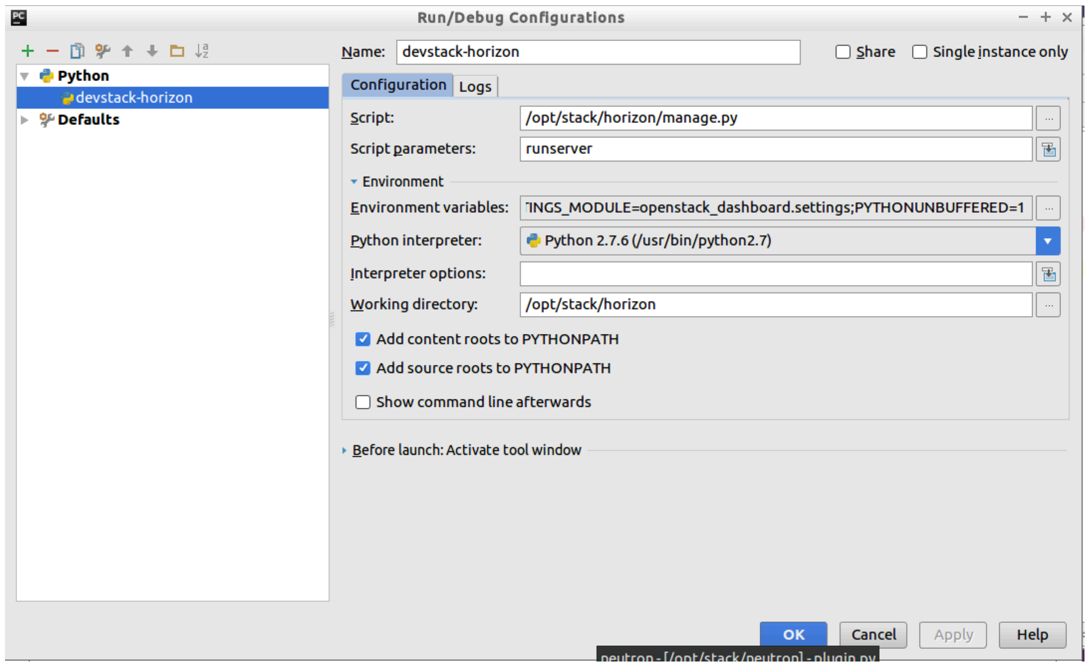
- Stop the Neutron debugger and close Neutron project
- From the neutron screen, restart the neutron service (Recall the previous command using up arrow key and hit enter)

Exercise 3 - Debug Horizon

Open Horizon project from PyCharm.

When you start Horizon debugging from PyCharm, the websever will be started on port 8000. However, you still have to login to http://localhost to establish the session.

- Open Horizon project in PyCharm
- Check the debug configuration



Name: devstack-horizon
Script: /opt/stack/horizon/manage.py
Script parameters: runserver
Environment variables: 'INGS_MODULE=openstack_dashboard.settings;PYTHONUNBUFFERED=1
Python interpreter: Python 2.7.6 (/usr/bin/python2.7)
Interpreter options:
Working directory: /opt/stack/horizon
[✓] Add content roots to PYTHONPATH
[✓] Add source roots to PYTHONPATH
[ ] Show command line afterwards

Configuration details:

```
Script -> /opt/stack/horizon/manage.py
Script parameters -> runserver
Env variables ->
SETTINGS_MODULE=openstack_dashboard.settings;PYTHONUNBUFFERED=1
Python interpreter -> /usr/bin/python2.7
Working directory -> /opt/stack/horizon
```

- Put a break point at `get _subnets()` function at`/opt/stack/horizon/openstack_dashboard/dashboards/project/networks/tables.py` file
- Start the debugger
- Point the browser to http://localhost and login with username/password of admin/foundry123 to create the session.
- Point the browser to http://localhost:8000
- From the Horizon dashboard, click on Project -> Network -> Networks
- You will be automatically switched to the PyCharm debugger. Work through the debugger.

Cleanup

- Close Horizon project from PyCharm by choosing File->Close Project

Exercise 4 – Debug using pdb

- Stop the Neutron server from the screen
- Edit file `neutron/neutron/plugins/ml2/plugin.py` and add this code in the `get_networks()` method:

```
import pdb
pdb.set_trace()
```

- Start the neutron from the screen by recalling the previous command
- Run the following command
  - `neutron net-list`
- Observe the console of Neutron screen and you may see many debug statements. Press "Enter" and you will be placed on pdb prompt.
- Common pdb commands
  - Navigating the code
    - l(list) – list 11 lines surrounding the current line
    - w(here) – display file and line number of current line
    - n(ext) – execute current line
    - s(tep) – step into function
    - r(eutrn) – return from the current function
  - Controlling execution
    - b <line no> - create breakpoint at line number
    - b – list break points
    - c(ontinue) – execute until a breakpoint is encountered
    - clear [#] – clear break point of index #
  - Others
    - p <name> - print value of the variable name
    - !<expr> - execute the expression
    - run args – restarts the debugger with arguments
    - q(uit) – quit the debugger

Exercise 5 – Adding logging statements

OpenStack services use standard logging levels – DEBUG, INFO, AUDIT, WARNING, ERROR, CRITICAL and TRACE.

Adding a debug statement

Add a custom debug statement at `get_networks()` in the file `neutron/neutron/plugins/ml2/plugin.py` in method:

```
LOG.debug("entering get_networks")
```

Restart the neutron from the Screen and run the command "`neutron net-list`". Observe the console of screen to see the above message getting printed.

Exercise 6 – Development workflow

There are many ways to setup a development workflow to test your code changes using Devstack. As an easy solution, you can make the code changes directly under `/opt/stack` and restart services.

A better option is setting up your own local repository and pushing the changes to Devstack. Please see these instructions for one possible workflow.

1. Remove /opt/stack/horizon directory
   a. `mv /opt/stack/horizon /opt/stack/horizon.old`
2. Create horizon.git repository
   a. `mkdir horizon.git`
   b. `cd horizon.git`
   c. `git init --bare`
3. Clone horizon
   a. `cd`
   b. `git clone https://git.openstack.org/openstack/horizon`
4. Add remote
   a. `git remote add remote file://home/foundry/horizon.git`
5. Make code changes and commit
   a. `cd ~/horizon`
   b. Make code changes
   c. `git commit —am "comments"`
   d. `git push remote master`
6. Clone your repository
   a. `cd /opt/stack`
   b. `git clone file:///home/foundry/horizon.git`
7. On-going code updates

a. Update code using step 5
b. `cd /opt/stack`
c. `git pull`