Instructions for OpenWhisk Kubernetes Cluster on CloudLab

Erika Hunhoff, University of Colorado Boulder

Overview:

These instructions will allow you to create a CloudLab image with all the software installed that is needed to create a Kubernetes OpenWhisk cluster. To do this, use the following materials:

- `mycluster.yaml`
- `install.sh`
- `install_ow.sh`
- `start.sh`
- `testfunc.py`

Also included is the code to create a CloudLab experiment:

- `exp.py`

Notes:

I've had trouble with AMD nodes with this setup, so I recommend Intel nodes. I usually use m510 nodes at Utah, but it's worked with other types of Intel nodes too.

I've had performance issues with clusters smaller than 3 nodes.

One reason I install the software before I create the CloudLab image is to ensure you don't accidentally install new versions that may destabilize the system the next time you create a cluster. Along these lines, if updates to docker or Kubernetes aren't compatible with current OpenWhisk or something like that, the script as-is may not work.

Step 1: Creating the CloudLab Image:

Use the standard Ubuntu 18.04 CloudLab image as a base. Create a directory `/home/openwhisk_kubernetes` at the root of the file system. `chown/chgrp` the directory to your user/group and `chmod` to add read/write permissions to it.

Copy all supporting files to that directory (`mycluster.yaml, install.sh, install_ow.sh, start.sh, testfunc.py`). `chmod` to make all the scripts executable.

Next run:

```
$ sudo ./install.sh
```

And then – presuming there are no errors – run:

```
$ ./install_ow.sh
```

Log out and create a new CloudLab image from this setup.

Step 2: Creating the CloudLab Experiment Profile:

Under Experiments in the upper-left corner on CloudLab, select “Create Experiment Profile”

Click “Edit code” and copy/paste the contents of `exp.py` into the dialogue. You’ll need to replace `<imagename>` with the name of your actual disk image from step 1.

Save the image profile!

Step 3: Create your cluster!

Select create an experiment in CloudLab and select your new experiment profile. Create a 3 node cluster to use for a test. The profile should have instructions embedded from exp.py, but I’ll include here too. I usually use node1 as my master node, and the others as worker nodes but you don’t have to do this. The IP address of each node is 10.10.1.n where n is the node number.

Instructions:
On each worker node, run:
* `cd /home/openwhisk_kubernetes`
* `sudo ./start.sh worker`

Wait for the profile instance to start, and then log in to any host. One the master node, run:
* `cd /home/openwhisk_kubernetes`
* `sudo ./start.sh master`

And then follow all prompts