Using Juju with LXC Containers on a single machine in Ubuntu 14.04 LTS

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Introduction

Juju’s primary intent is to work either with various cloud providers or on bare metal in a MAAS environment. However, Juju can be configured to run on a single machine via the Local Provider.

The Local Provider furnishes a way to use Juju to deploy services in Linux Containers (LXC) on your local machine instead of on a cloud or several bare metal systems.

What are some of the reasons for using the Local Provider?

- The Local Provider can be used as a test bed for users to experiment with Juju without having to spend money on hardware or cloud providers.
- It gives users a way to simulate a ‘production-like’ cloud environment. The user leverages cloud-images just like they would on a public cloud such as AWS, Azure, or Joyent.
  - This helps speed up the process of evaluating or developing charms and charm bundles.
  - A charm can be written in a local environment and be deployed straight to a cloud environment with little to no modifications.
- A user wishes to do demonstrations of juju on a portable device such as a laptop.
- A user many want to deploy several services on a single-server system.

Configuring the Environment

This document will focus on using Ubuntu 14.04 LTS for the local Juju environment. The first thing to be done is connect the Ubuntu system to the Juju stable PPA. This will provide the latest, stable versions of Juju:

```bash
$ sudo apt-add-repository ppa:juju/stable
$ sudo apt-get update
```

From there, install the juju-core, juju-quickstart, and juju-local packages

```bash
$ sudo apt-get install juju-core juju-quickstart juju-local
```

What just got installed?

juju-core is the main juju package and contains the needed tools to bootstrap an environment and deploy charms.

juju-quickstart is a plugin that allows users to set up a juju environment in just a few, easy steps. The plugin automatically bootstraps the environment and sets up the Juju GUI for managing the environment via a Web interface.

juju-local is a convenience package that supplies everything needed to get local containers working, including the installation of the lxc package.
Bootstrapping with juju-quickstart

Now that the packages are installed, let's fire up a local environment!

To kick off a local installation, run the following command:

```
$ juju-quickstart
```

If this is being run for the first time, the screen below will be displayed. Select the "automatically create and bootstrap a local environment":

![Screen shot of juju-quickstart command](image)

Enter the sudo password when prompted, sudo access is needed for some functions such as creating LXC containers.

The following will occur in the background:

- Juju bootstraps the environment.
- The bootstrap node is installed.
- Juju GUI is installed in an LXC container.

After about 3-5 minutes, depending on the internet connection speed, a browser window will open automatically. Proceed through the certificate warnings to be automatically logged into the Juju GUI:
The juju-status and lxc-ls commands reveal the current status of the juju environment and their respective lxc-containers:

```plaintext
charm: cs:trusty/juju-gui-2
exposed: true
units:
  juju-gui/0:
    agent-state: started
    agent-version: 1.18.4.1
    machine: "1"
    open-ports:
      - 80/tcp
      - 443/tcp
    public-address: 10.0.3.18

$ sudo lxc-ls --fancy
NAME                   STATE    IPV4       IPV6  AUTOSTART
-----------------------------------------------
kentb-local-machine-1  RUNNING  10.0.3.18  -    YES
```

In this example, we will switch our default operating system series to Ubuntu Precise to try out some charms deployed with 12.04 LTS:
Charms can now be deployed and relations added, as usual:

$ juju deploy mysql
$ juju deploy mediawiki
$ juju add-relation mysql:db mediawiki:db
$ juju expose mediawiki

The Juju GUI is now populated with our charms and their relations:

![Juju GUI screenshot]

There are also two additional LXC instances up and running:

$ sudo lxc-ls --fancy
NAME                      STATE      IPV4        IPV6      AUTOSTART
---------------------------------------------------------------
juju-precise-template    STOPPED    -           -         NO
juju-trusty-template     STOPPED    -           -         NO
kentb-local-machine-1    RUNNING    10.0.3.86   -         YES
kentb-local-machine-2    RUNNING    10.0.3.62   -         YES
kentb-local-machine-3    RUNNING    10.0.3.112  -         YES

According to the juju-status command, our mediawiki instance is accessible via the 10.0.3.112 IP address, which is the IP address of our third container above:
Typing the IP address into our browser brings us to the Main Page of the wiki:
Our local environment also allows users to take advantage of charm bundles, which deploy workloads in one single step.

**Things to Consider**

When running the Juju Local Provider, please be mindful of system resources when deploying charms, especially when deploying larger charm bundles. Some LXC containers can take up to 1GB or more of memory once they are deployed. If multiple service units are deployed on a system, they can quickly consume all of a system’s memory. Juju and the Local Provider do not provide any policing of system resources.

**Additional Resources**

https://juju.ubuntu.com/docs/config-local.html
https://juju.ubuntu.com/docs/config-LXC.html