Docker Management: fig, OpenStack

Florian Dudouet, Researcher, ICCLab
• Fast, isolated development environments using Docker: http://orchardup.github.io/fig/
• Can also be used to run environments in production
• Useful to automatically deploy environment using multiple containers, with on-demand scaling
• Usage:
  – If you need to build an image with your code/config/etc.
  – Write a fig.yml describing links between your containers
  – Run the environment

• Fig-managed apps have their own lifecycle
  – Build, Run, Scale, Stop
    • Build and Run grouped in Up
• Sample wordpress application
  – Two containers automatically linked
**Use-Case: Load-Balanced environment with Fig**

- Automatically managed Load-balanced application using HAProxy and Serf
  - HAProxy is a Load Balancer
  - Serf is a decentralized solution for cluster membership, failure detection and orchestration
- Fig allows the duplication of containers from an app (scaling)
- Serf can automate the additions of new containers to the LB configuration
- Lifecycle: fig up (initial), fig scale web==5
• Goal: Integrate Docker in a VM-oriented IaaS framework: OpenStack
OpenStack components

- Dashboard Horizon
- Identity Keystone
- Telemetry Ceilometer
- Images Glance
- Orchestration Heat
- Compute Nova
- Storage Swift / Cinder
- Network Neutron
- Your App
- Your App
– **Nova** as a compute controller supports Docker as a new hypervisor since the Havana release
  
  - Deploy Containers instead of VM with the same API
Enables control of Docker via OpenStack:
- Nova API
- Horizon UI

Supports: launch, terminate, reboot, snapshot, glance, neutron (new)

Not supported yet: Cinder volumes, suspend/resume, pause/unpause, Live-migration
Docker Nova Image management

• docker-registry is a proxy

• users can upload through docker-registry or to glance directly

• docker pulls images through the docker-registry proxy
Features missing from Nova

- Link container networks
- Pass environment variables
- Specify working directories
- Create docker-volumes
- Share docker-volumes between containers
- Arbitrary commands
• Since OpenStack Summit of Late 2013, Docker also supports to Heat as another interaction method with OpenStack.

• From the Icehouse release, a docker plugin is available for Heat and integrated into the core Heat release

• The nova hypervisor plugin for Docker has been moved to stackforge.
Heat can now talk directly to Docker

Docker Heat Architecture

- Heat
  - Plugin API
  - OS::Heat::Docker (plugin)
  - HTTP API
- Nova
- Docker
  - Container A
  - Container B
  - docker-registry (container)
heat_template_version: 2013-05-23

description: Single compute instance running cirros in a Docker container.

resources:

my_instance:
  type: OS::Nova::Server
  properties:
    key_name: dudo
    image: ubuntu-trusty
    flavor: m1.small
    user_data: #include https://get.docker.io

my_docker_container:
  type: DockerInc::Docker::Container
  properties:
    docker_endpoint: { get_attr: [my_instance, first_address] }
    image: cirros
Heat or Nova plugins?

<table>
<thead>
<tr>
<th>Nova driver</th>
<th>Heat plugin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integration with other services</td>
<td>Closer to the Docker Workflow</td>
</tr>
<tr>
<td>Nova features (quota, auth)</td>
<td>Hybrid-cloud compatible</td>
</tr>
<tr>
<td>Integrated scheduling</td>
<td>Microservices-friendly</td>
</tr>
</tbody>
</table>

- Different approaches
  - One does not replace the other though the officially integrated plugin is now Heat-only
References

- Docker Website
- Orchard Fig Website
- Docker and OpenStack
- Performance of Docker vs KVM in OpenStack
- Docker Presentation by Docker Inc.