Operating and managing an Atomic container-based infrastructure

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Agenda

Agenda

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Where can I get it?

Super Privileged Containers
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Utility Images

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Updating an Atomic Host

Deployment Options
Cloud-init
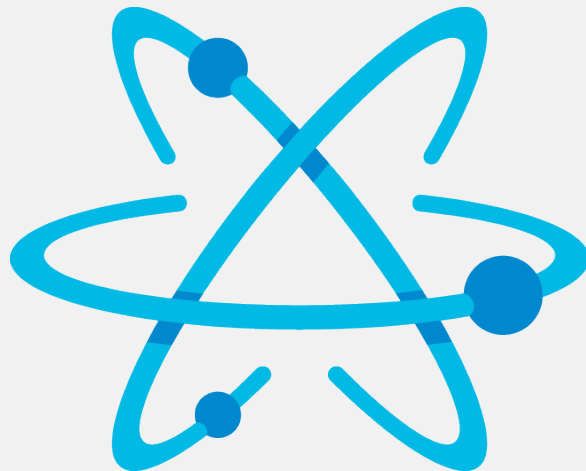RHEV
OpenStack

Satellite
Containers

Wrap-Up
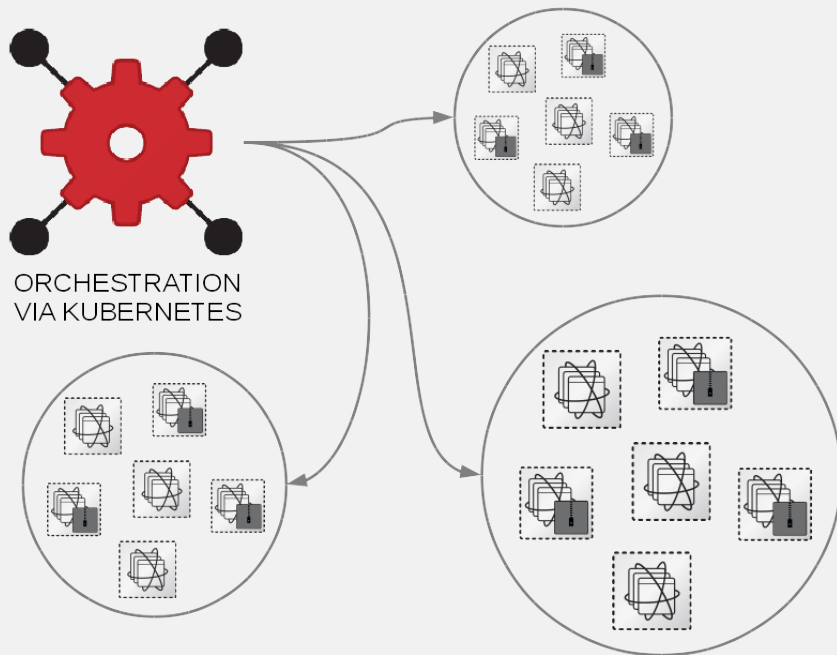Summary, questions, comments and feedback

Overview

What is Atomic?

- RHEL Atomic is a variation of Red Hat Enterprise Linux 7
- Components
    - systemd
    - Kubernetes
    - Docker
    - SELinux
- JEOS for Containers
- OSTree vs. Yum / RPM
- Everything is a Container

RED HAT ATOMIC

CONTAINER ORCHESTRATION, SCHEDULING, AND MANAGEMENT VIA KUBERNETES

ORCHESTRATION VIA KUBERNETES

- Orchestrate application services that span multiple containers across multiple Linux hosts
- Schedule containers across multiple hosts in desired topology
  - Enable manual and automated scaling up & down
- Manage container lifecycle with declarative model for health management to detect and restart on failure

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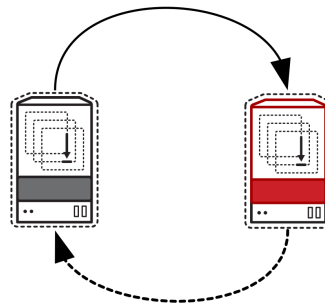
Atomic Features
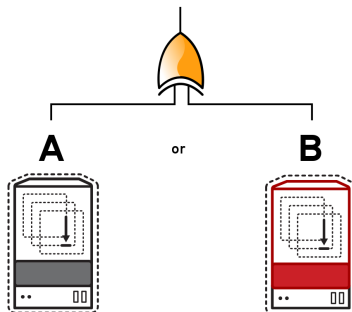
Super Privileged Containers

Base and Utility Images

Staying Up to Date

Atomic Host Upgrade

- ## Before

```
$ atomic host status
   TIMESTAMP (UTC)          VERSION       ID           OSNAME          REFSPEC
* 2015-04-02 20:14:06       7.1.1-1       21bd99f9f3    rhel-atomic-host rhel-atomic-host:rhel-atomic-host/7/x86_64/standard
```

- ## Upgrade

```
$ subscription-manager register --username <username> --password <password> --auto-attach
$ atomic host upgrade && reboot
```

- ## After

```
$ atomic host status
   TIMESTAMP (UTC)          VERSION     ID           OSNAME          REFSPEC
* 2015-05-07 19:00:48       7.1.2       203dd666d3    rhel-atomic-host rhel-atomic-host-ostree:rhel-atomic-host/7/x86_64/standard
  2015-04-02 20:14:06       7.1.1-1     21bd99f9f3    rhel-atomic-host rhel-atomic-host-ostree:rhel-atomic-host/7/x86_64/standard
```

Infrastructure Deployment Options

Where can I get this cool software?
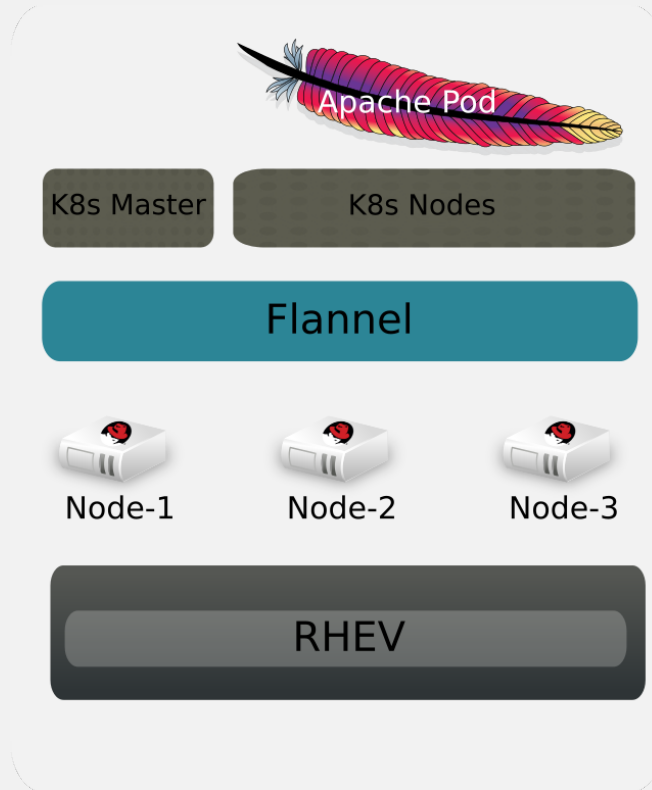
Obtaining Atomic

Red Hat Customer Portal

- Cloud Image
- RHEV Image
- Hyper-V Image
- vSphere Image
- Installer ISO

What can I deploy on?

- GCE
- AWS
- KVM
- VMware

- etc...

- Bare Metal
- PXE
- RHEV
- OpenStack

Deployment Options - RHEV

OpenStack

Deployment Options - OpenStack

Manual deployment for a single server (or small number of servers)

OR

Automated deployment using OpenStack Heat

Configuration with cloud-init

- Reads "metadata" (hostname, ssh public keys, etc) and "user data" (arbitrary shell scripts and other configuration data)

- Information may be sourced from network (the "metadata service"), from a "configuration drive", or may be baked into your disk image.

- Performs a variety of initial system configuration tasks

```
#cloud-config

packages:
 - git
 - httpd
```

```
#!/bin/sh

sed -i '
  /^SELINUX=/ s/=.*/=enforcing/
' /etc/selinux/config
setenforce 1
```

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Manual Deployment

Launch Instance   ✕

| Details * | Access & Security | Networking * | **Post-Creation** | Advanced Options |

Customization Script Source

Direct Input ▾

You can customize your instance after it has launched using the options available here.

"Customization Script" is analogous to "User Data" in other systems.

Script Data ❓

```
#cloud-config
password: atomic
write_files:
 - path: /etc/sysconfig/docker-storage-setup
   permissions: 0644
   owner: root
   content: |
     ROOT_SIZE=6G
     SETUP_LVM_THIN_POOL=yes
```

Cancel   Launch

```
$ nova boot \
  --image rhel-atomic-20150615 \
  --key-name lars --flavor m1.small \
  --user-data my-script.sh \
  --nic net-id=... atomic
```

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Using OpenStack Heat to deploy a cluster
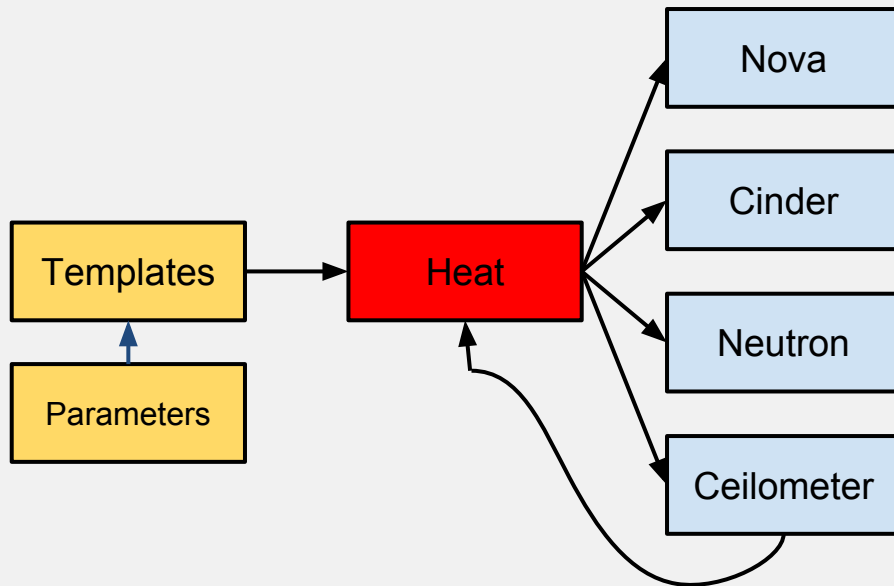
Heat templates

Major sections:

- parameters
  - input into your templates
- resources
  - describes the resources Heat will create
- outputs
  - Information derived from the deployed stack

```
heat_template_version: 2014-10-16

description: >
  This is an example.

parameters:

resources:

outputs:
```

Heat templates

```
heat_template_version: 2014-10-16

resources:

  node:
    type: OS::Nova::Server
    properties:
      image: rhel-atomic-20150615
      flavor: m1.small
      key_name: lars
      networks:
        - port: {get_resource:
node_eth0}
```

```
  node_eth0:
    type: OS::Neutron::Port
    properties:
      network: net0
      security_groups:
        - default
      fixed_ips:
        - subnet: net0-subnet0

  node_floating:
    type: OS::Neutron::FloatingIP
    properties:
      floating_network: public
      port_id: {get_resource:
node_eth0}
```

Heat-Kubernetes Templates

https://github.com/projectatomic/heat-kubernetes/
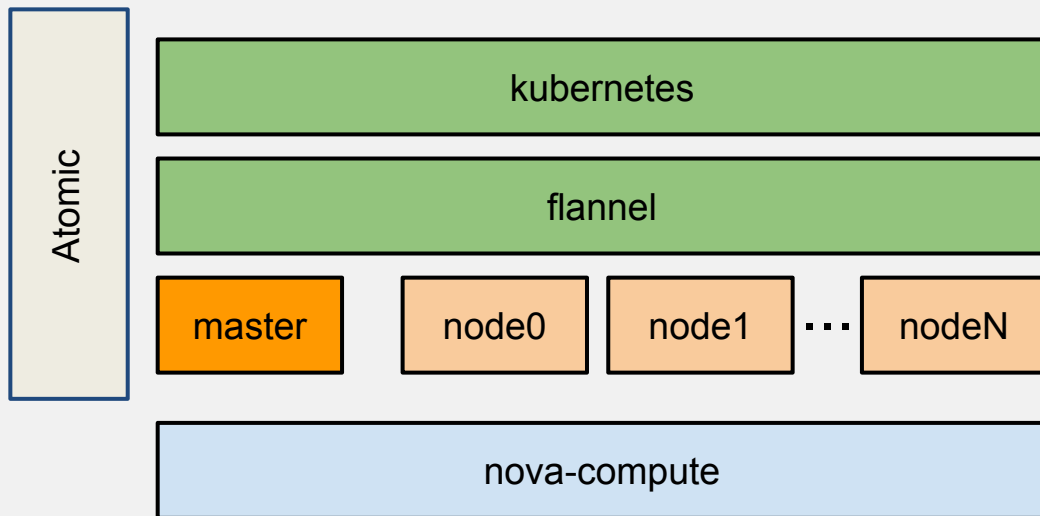
Using the Templates

Clone and deploy:

```
git clone https://github.com/projectatomic/heat-kubernetes
cd heat-kubernetes
heat stack-create -f kubecluster.yaml -e local.yaml my-kube-cluster
```

Deploying directly from GitHub:

```
heat stack-create -f https://raw.githubusercontent.
com/projectatomic/heat-kubernetes/master/kubecluster.yaml -e local.yaml
my-kube-cluster
```

Using the Templates

Providing required (and optional) parameters:

```
parameters:
  ssh_key_name: lars
  server_image: rhel-atomic-20150615
  dns_nameserver: 192.168.122.1
  docker_volume_size: 5
```

Demo

Satellite

Satellite 6 with Containers

- Deploy RHEL Atomic Host

- Atomic Host Preparation

- Atomic Host Compute Resource

- Content Management

- Container Deployment

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Deploy RHEL Atomic Host From Satellite

- Although not explicitly supported at this time it is possible and planned in future Satellite releases

- Reference blog for deployment: https://access.redhat.com/blogs/1169563/posts/1318283

Preparing the RHEL Atomic Host

- Install the Satellite certificate to the RHEL Atomic host

- Copy the .crt and .pem files to the appropriate locations

- Execute update-ca-trust to trust the installed cert

- Restart docker for changes to take effect

- Register the atomic host with the Satellite server via subscription-manager

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RHEL Atomic host as a compute resource in Satellite

- Add the RHEL Atomic host as a compute resource in Satellite

Content Management

- Multiple options exist within Satellite for Red Hat docker image content:
  - **Custom product**
    - Used to host docker content locally
    - Created as a new product with an associated repository
    - Added and promoted to a content view, associated to a lifecycle environment
  - **External docker registries**
    - Red Hat
    - custom

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Container Deployment

- There are several options to choose from when deploying containers:
    - (<u>From Satellite</u>) **Content View**

        - Utilizes locally stored content

    - (<u>From Satellite</u>) **External Registry**

        - Utilizes externally hosted content

    - (<u>From RHEL Atomic Host</u>) **docker pull and docker run**

        - Pulling and running images from Satellite

Demo

Summary

Summary

- Deployment Options
- Updates
- Providers
- Utility Images
- Cloud-init
- OpenStack
- Satellite Integration

Q&A

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