OpenStack

Open Source Day - Grace Hopper 2016

https://github.com/spotzz/GHC-OpenStack2016

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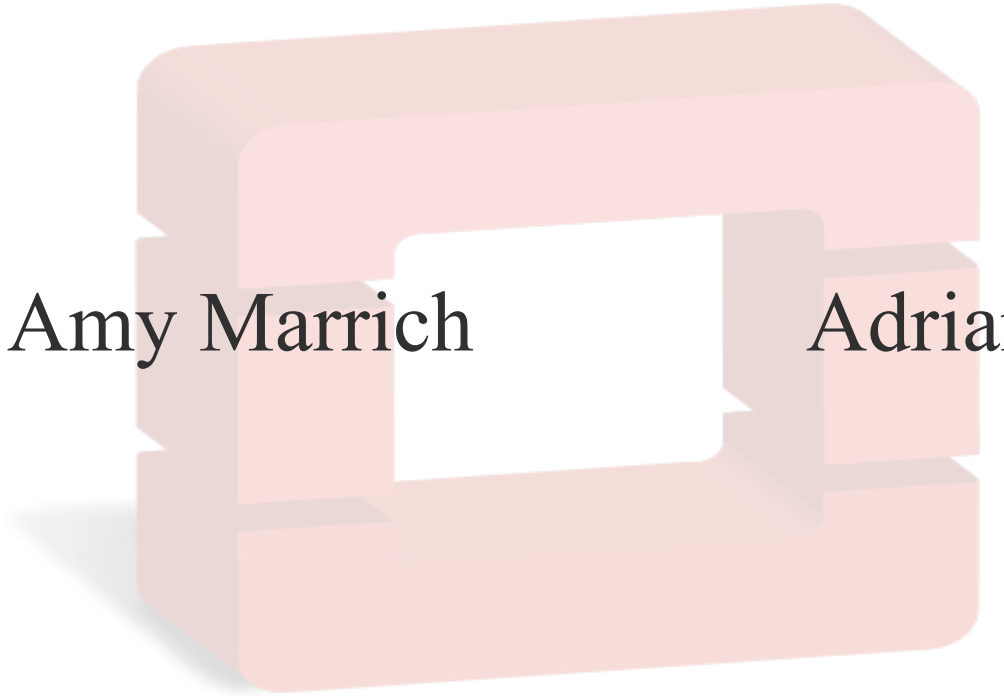
  - Using the OpenStack CLI
  - What is Heat
  - Heat Templates
  - Using the OpenStack CLI for Heat
  - Customize your WordPress Stack

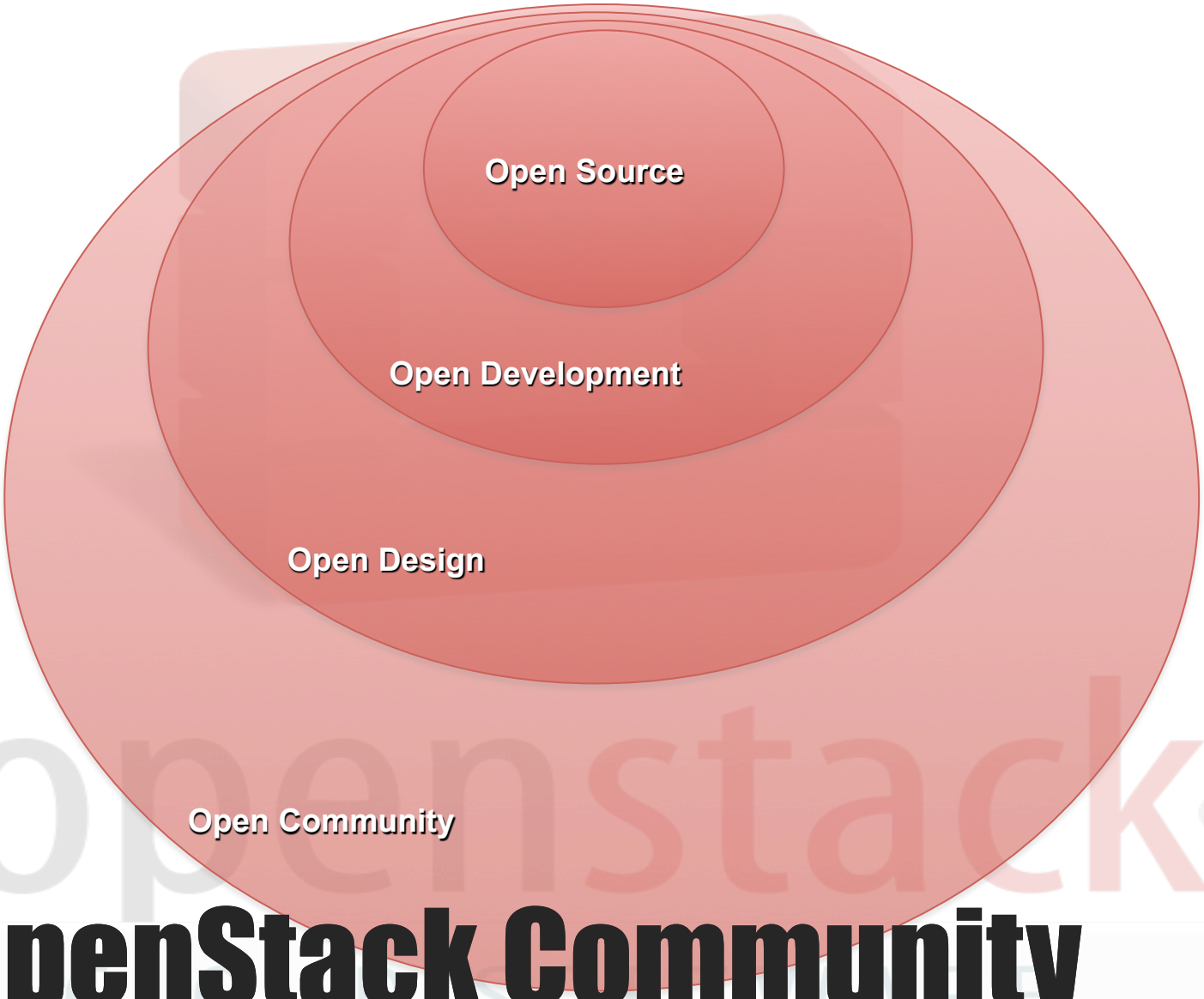


Amy Marrich

Adrian Otto

Introductions

https://github.com/spotzz/GHC-OpenStack2016



OpenStack Community

https://github.com/spotzz/GHC-OpenStack2016

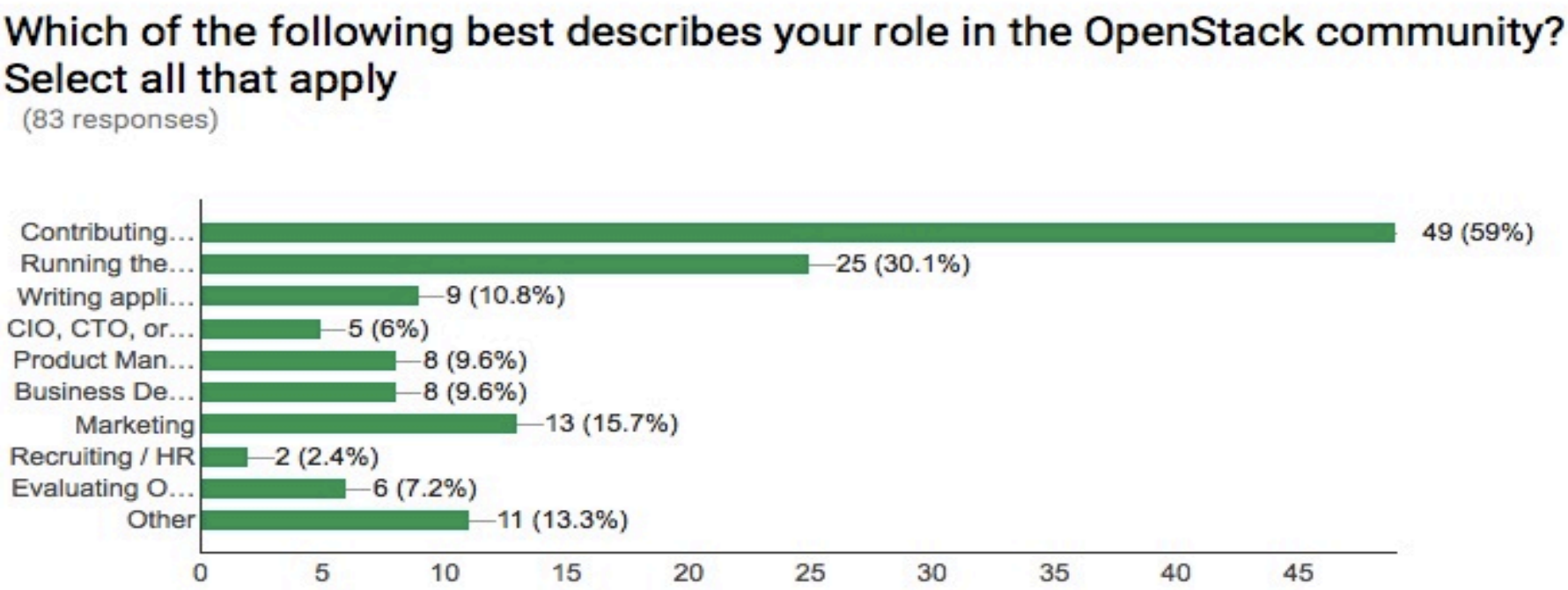
- Global Reach
  - We have users and contributors who are headquartered worldwide and deployments all over the world. There is also an ongoing translation effort that has content in more than a dozen languages.
- Who Supports It?
  - Over 150 companies have agreed to support the mission of OpenStack by providing architectural input, contributing code, and / or integrating it into their business offering.
- How can I join?
  - Start coding, writing or translating - it is an open source project! Many companies are also hiring developers to work on the OpenStack project.

OpenStack Community

- Community Stats (Women)
  - 9% Community Members
  - 11% (24% ATCs) Tokyo Summit Attendees

Women In OpenStack

https://github.com/spotzz/GHC-OpenStack2016



Women In OpenStack

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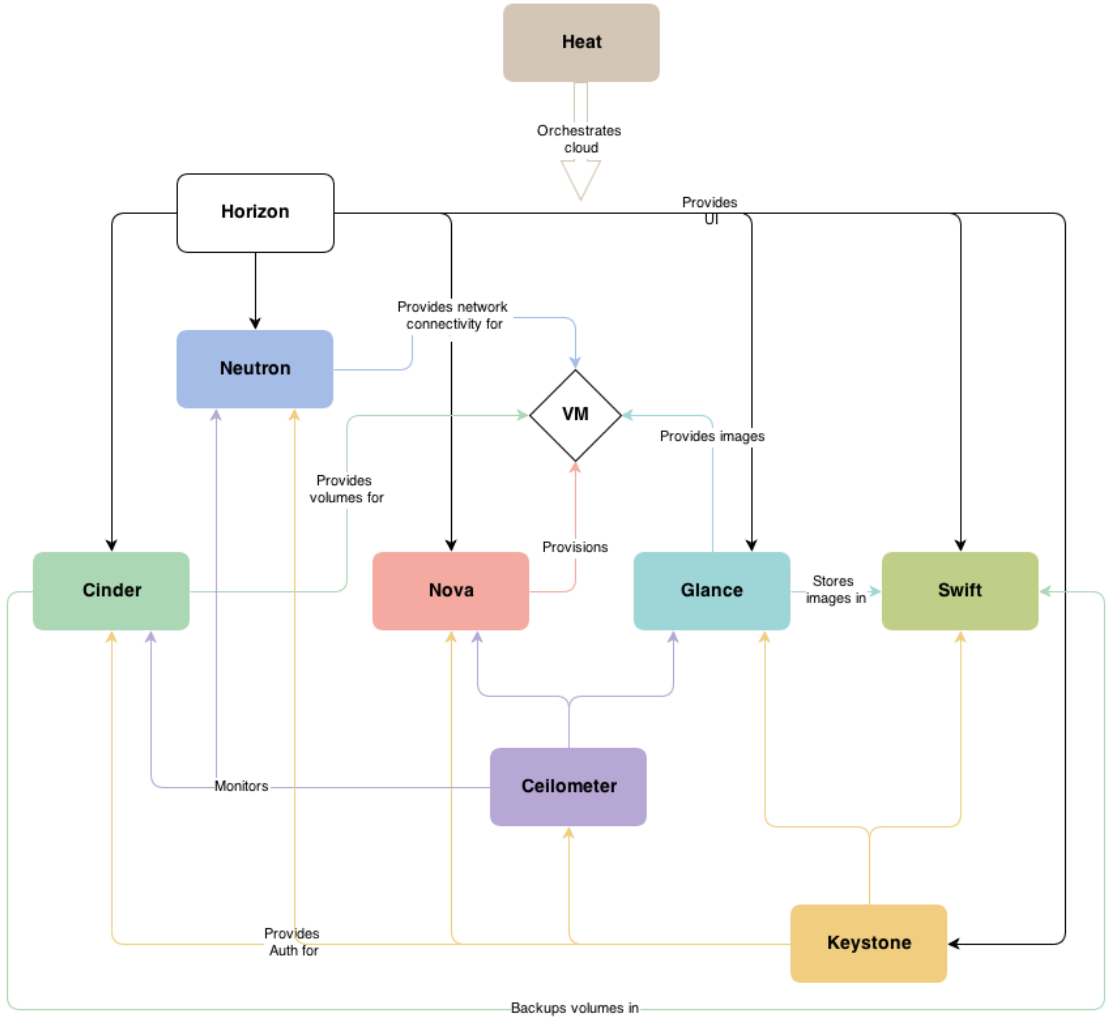
- Non-profits and universities and how they're using OpenStack
  - Kilowatts for Humanity: http://superuser.openstack.org/articles/kilowatts-for-humanity-harnesses-the-wind-and-sun-to-electrify-rural-communities/
  - Cambridge University & Monash University: http://superuser.openstack.org/articles/how-cambridge-university-and-monash-university-leverage-openstack-for-high-performance-computing/
  - Harvard University: http://www.slideshare.net/barton808/harvard-university-cloud-presentation-an-openstack-case-studies

OpenStack Helping Others

- Open Source cloud software for cloud operators and cloud users for both public and private clouds.
- Allows your organization to create your own IaaS.
- An extensive open development community for continued evolution of the software, with no single corporate sponsor.
- The OpenStack Foundation, to ensure the future of OpenStack Cloud Software.

What is OpenStack?



OpenStack Overview

https://github.com/spotzz/GHC-OpenStack2016

- Layer 4: Consumption Services
  - Heat (Orchestration), Magnum (Containers), Marconi (Queues), Murano (Catalog), Trove (DBaaS), Sahara (BigData), Solum (SDLC Lifecycle)
- Layer 3: Optional Enhancements
  - Ceilometer (Telemetry), Barbican (Encryption), Horizon (Dashboard)
- Layer 2: Extended Infrastructure
  - Cinder (Block Storage), Swift(Object Storage), Neutron (Networking), Designate (DNS), Ironic (Bare Metal)
- Layer 1: Base Compute Infrastructure
  - Nova (Compute), Glance (Image Storage), Keystone (Identity)

OpenStack Overview

- OpenStack API Services have REST APIs
  - Each service has its own asynchronous API
- Services are modeled based on an SOA architecture
- Service components communicate over AMQP
- Designed to scale out horizontally
- Common Interfaces
  - Horizon Dashboard
  - OpenStack Client (python-openstackclient)

How Does OpenStack Work?

- Log into the jump server with the IP, user and password provided.
- Download and install pip

  sudo apt-get install python-pip
- Install the OpenStack Client

  sudo pip install python-openstackclient
- Install the Heat Client.

  sudo pip install python-heatclient

Setting Up (Exercise 1)

https://github.com/spotzz/GHC-OpenStack2016

- Edit the openrc and add the password

  nano openrc
- Source the credentials file

  source openrc

Setting Up (Exercise 1)

https://github.com/spotzz/GHC-OpenStack2016

- Create credentials file

```
cat >> ~/openrc <<EOF
export OS_AUTH_URL=https://
identity.api.rackspacecloud.com/v2.0/
export OS_USERNAME=ghchacker$MY_NODE_ID
export OS_TENANT_NAME=1017872
export OS_PASSWORD=
export OS_REGION_NAME=DFW
EOF
```

Setting Up (Exercise 1)

https://github.com/spotzz/GHC-OpenStack2016

- OpenStack CLI provides an unified CLI for many of the OpenStack projects.
- We will be using the CLI to find the Image(OS) and Flavor(Size) to create our stack. In addition, it can be used to administer most of an OpenStack cluster.
  - Additional things we can use if for are creating and mounting volumes, creating networks, etc.

The OpenStack CLI

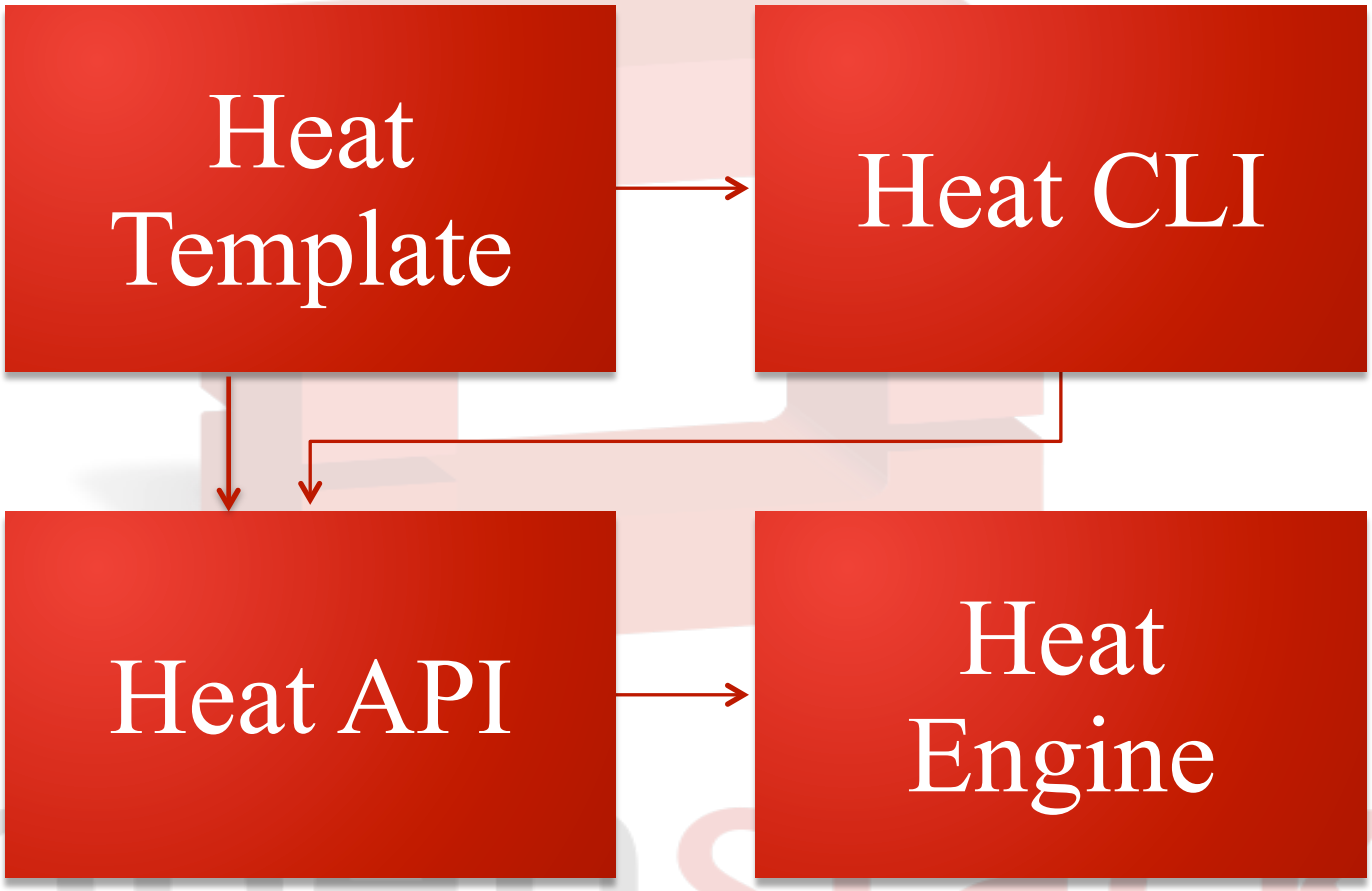
- View all available actions with the OpenStack Client
  openstack —help
- View all images available in your Rackspace Public Cloud Account
  openstack image list
- View all flavors
  openstack flavor list
- View all servers
  openstack server list

Using The OpenStack CLI (Exercise 2)

https://github.com/spotzz/GHC-OpenStack2016

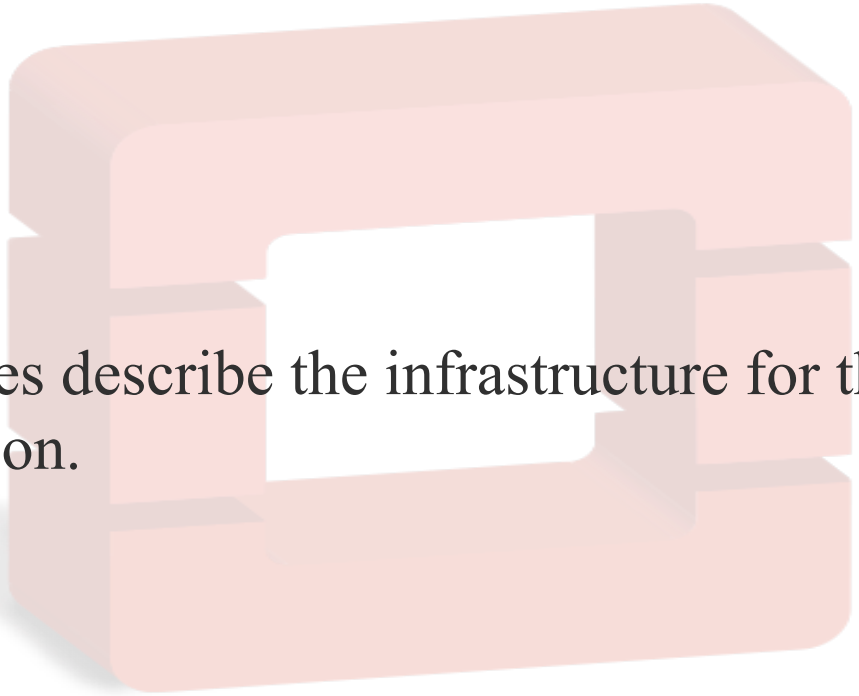
Heat is the main project in the OpenStack Orchestration program. Heat implements an orchestration engine to launch multiple composite cloud applications based on templates in the form of text files that can be treated like code.

What Is Heat Orchestration?



How Heat Works

https://github.com/spotzz/GHC-OpenStack2016



- Templates describe the infrastructure for the cloud application.

Heat Template Overview

https://github.com/spotzz/GHC-OpenStack2016

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- Heat can manage the lifecycle of the application by updating the template and then the stack.

Heat Template Overview

- Templates describe the infrastructure for the cloud application.
- Templates can define relationships between resources.
- Heat can manage the lifecycle of the application by updating the template and then the stack.
- Heat templates can be tied into existing software management systems such as chef or puppet.

Heat Template Overview

https://github.com/spotzz/GHC-OpenStack2016

- heat_template_version
  - Formatting and supported features can vary based upon the version.

heat_template_version: 2015-10-15

Parts of a Heat Template

- description
  - The description provides the purpose of the template.

```
description: |
  #### Grace Hopper Demonstration

  This template is meant as an example on how to use Heat
```

Parts of a Heat Template

- parameter_groups
  - The parameter_groups section specifies how the input parameters are grouped. Note a parameter can only be part of one group.
  - parameter groups are only to inform user interfaces and other tooling and have not direct impact on the actual orchestration

parameter_groups:

Parts of a Heat Template

- parameters
  - The parameters section is where you customize the deployment.
  - Sections we will be customizing through parameters are images, flavor, url, title, dns_zone and email

Parts of a Heat Template

```
flavor:
   type: string
   default: 'Invalid Flavor'
   label: Server flavor
   description: |
     Name or ID of the flavor to use.  Flavor must support
PVHVM images.
   constraints:
     - custom_constraint: nova.flavor
```

Parts of a Heat Template

```
url:
  type: string
  default: www.example.com
```

Parts of a Heat Template

```
title:
  type: string
  default: Example WordPress Site
```

Parts of a Heat Template

```
dns_zone:
   type: string
   default: example.com
```

Parts of a Heat Template

```
email:
  type: string
  default: admin@example.com
```

Parts of a Heat Template

- Resources
  - The resources are declarations of the single resources of the template.
  - We will be calling a child template which will be creating our actual WordPress site utilizing the information in this template.

Parts of a Heat Template

```
resources:
  wordpress_stack:
    type: 'https://raw.githubusercontent.com/rackspace-orchestration-templates/wordpress-dev/master/wordpress-dev.yaml'
    properties:
      wordpress_url: { get_param: url }
      wordpress_sitename: { get_param: title }
      wordpress_email: { get_param: email }
      flavor: { get_param: flavor }
      server_image: { get_param: image }
```

Parts of a Heat Template

```
dns_record:
  type: Rackspace::Cloud::DNS
  properties:
    emailAddress: { get_param: email }
    name: { get_param: dns_zone }
    records:
      - name: { get_param: url }
        data: { get_attr: [ wordpress_stack,
wordpress_public_ip ] }
        type: "A"
```

Parts of a Heat Template

- outputs
  - The outputs are how you receive information about the stack from your Heat Orchestration Template

Parts of a Heat Template

```
outputs:
  wordpress_login_user:
    description: WordPress Admin User
    value: { get_attr: [ wordpress_stack, wordpress_login_user ] }
  wordpress_login_password:
    description: WordPress Admin Password
    value: { get_attr: [ wordpress_stack, wordpress_login_password ] }
  wordpress_public_ip:
    description: WordPress IP
    value: { get_attr: [ wordpress_stack, wordpress_public_ip ] }
  ssh_private_key:
    description: SSH Private Key
    value: { get_attr: [ wordpress_stack, ssh_private_key ] }
```

Parts of a Heat Template

- Except for the heat_template_version it is important to note that the other sections of a template can be optional depending on what you need for your stack.

What is Optional

- Use the following command on the command-line to create your stack utilizing the flavor and image names you retrieved earlier with the OpenStack CLI

```
openstack stack create -t ghwp.yaml --parameter
image="Ubuntu 14.04 LTS (Trusty Tahr) (PVHVM)
(Orchestration)" --parameter flavor="4 GB General
Purpose v1" –parameter url="demo
$MY_NODE_ID.ghc-openstack.org" MyStack
$MY_NODE_ID
```

Creating the Stack (Exercise 4)

- View the status of the stacks

  openstack stack list
- View the openstack client Heat options

  openstack stack --help

Monitoring Progress (Exercise 4)

https://github.com/spotzz/GHC-OpenStack2016

- You can get your Wordpress Password and other information directly from the stack using the Heat CLI
  - See what outputs are available

  openstack stack output-list <stackname>
  - Get your username and then password

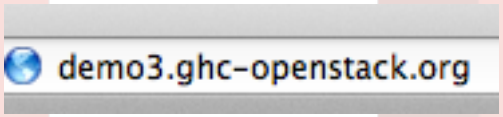
  openstack stack output show MyStack$MY_NODE_ID --all

Getting your Password (Exercise 4)

https://github.com/spotzz/GHC-OpenStack2016

Logging In To WordPress

- Once you have your admin password from the control panel you're ready to login into your site



- The Login link is on the bottom right of the page under Meta

WordPress Resources

- If you're unfamiliar with WordPress, here are a few tutorials:
  - https://learn.wordpress.com/
  - https://codex.wordpress.org/WordPress_Lessons
  - https://wordpress.com/start/delta-site/survey