The Little Cloud Foundry Book

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About This Book

License

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Thanks, Yall

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Latest Version

The latest source of this book is available at:

http://github.com/letolabs/the-little-cloud-foundry-book.

Introduction

Graecum est; non legitur -- ``It's Greek to me''

What is a Platform-As-A-Service (PaaS)?

A PaaS is middleware between the low-level infrastructure (i.e. the actual CPUs, hard-drives, RAM, etc) and the high-level applications that run on top of the platform. The boundary between the platform and the application is clear, but the boundary between the infrastructure and the platform is still largely in flux.

While there are many different definitions of PaaS floating around the market currently, there are a few functions that are specifically the task of PaaS: * live deploying web application code * allocating server resources dynamically * server monitoring * sending http requests to IaaS servers (this needs work)

What is Cloud Foundry?

The name ``Cloud Foundry'' can be used to refer to either the still beta commercial VMware product at cloudfoundry.com or the Cloud Foundry Open Source Project. In this book, ``Cloud Foundry'' will always refer to the open source project, unless otherwise stated.

Cloud Foundry consists of a large amount of Ruby code along with a small amount of C and Shell scripts that run on top of Ubuntu LTS. The C code is used to manage Linux containers at the kernel level using a similar strategy as the Linux kernel user space program ``lxc''. CF also consists of many configuration files in YAML format.

Features

Supported Languages

Supported languages in mainline:

- Ruby (MRE 1.8.x, MRE 1.9.x, JRuby)
- Java
- NodeJS 0.4.x, 0.6.x
- PHP 5.3, 5.4 (ActiveState, AppFog, paas.io)
- Erlang

Supported languages in forks:

- Perl 5 (ActiveState)
- .NET (IronFoundry)
- .NET (Uhuru)
- Haskell 2011.4.0 (paas.io)

Supported Frameworks

Mainline:

- Rails
- Sinatra
- Rack (contributed recently by paas.io)
- Java Spring

Forks:

- Catalyst (ActiveState)
- Dancer (ActiveState)

Glosssary

ACM

Access Control Manager. A general system for implementing access control features for applications.

caldecott

A Ruby gem which allows you to ``tunnel'' into the various services attached to your application. As an example, you can use caldecott to connect to the mysql command-line of your application running in the cloud with a command similar to

```
vmc tunnel mysql-12345
```

cloud controller

The Cloud Controller can be thought of as the maestro or orchestrator. It also includes the endpoints which vmc communicates with.

Chef

Chef is an open-source systems integration framework to automate cloud-related tasks.

DEA

Droplet Execution Agent. A process which manages the running application instances.

devops

The boundary layer between development and operations is referred to as ``devops''.

droplet
An application, along with all dependencies, in a compressed archive file.

Gerrit
A code review tool based on Git. Gerrit was originally written for the Android Open Source Project at Google and allows many kinds of complex requirements and business rules to be taken into account when reviewing code.

IAAS
Infrastructure-as-a-service

health
Applications can exhibit different states of ``health'' which include:

- healthy
- stopped
- flapping
- restarting

health manager
The subsystem of CF which monitors the health of applications and classifies them into a certain number of ``states'', such as ``healthy'' or ``stopped''.

IAAS
Infrastructure-as-a-service. This is the layer below Platform-as-a-service. An example is Amazon EC2, which takes care of the ``infrastructure'' of the actual physical hardware.

lxc
Linux ``containers'' which are similar to FreeBSD ``jails''. They allow many ``virtual'' instances of Linux to run inside of a ``host'' Linux, which is actually running on hardware. These have been available in the mainline Linux kernel since 2.6.29.

manifest
A Manifest is a YAML configuration file which lists various properties and metadata about the application, such as endpoint URLs, package versions and checksums.

PAAS
Platform-as-a-service. Examples of this are Cloud Foundry, OpenShift, Rackspace, Google App Engine and many more.

router
The Router takes HTTP requests and sends them to the appropriate running application instance. It usually sits behind one or more load balancers.

stager
The stager takes an application, which is often a directory of files on disk, and turns it into a package that can be deployed to an application instance as part of an update or initial deploy.

Ubuntu LTS
Long-term supported releases of Ubuntu are supported for 2 years by Canonical.

UAA
User Account and Authentication. UAA uses OpenID Connect for authentication (also known as Single Sign On) and the OAuth2 protocol for granting access to resources.

vcap
VMware's Cloud Application Platform. This is the central Git repository which contains the Cloud Foundry codebase.

vmc
Stands for ``VMware Cloud'' or ``VMware controller'' or whatever you want it to mean, really. It is a ruby gem which is the command-line client to endpoints which implement the Cloud Foundry API.

warden
Warden is the security subsystem. It manages Linux containers, including their creation, destruction and monitoring. It can be thought of as a delicious layer of Ruby on top of a bit of C which uses Linux kernel hooks.

Community
Many individuals and companies have contributed to Cloud Foundry to make it what it is today. Things that were added by the community include PHP, Rack, etc…

In the past, VMware was overwhelmed with Github pull requests, so some of them went seemingly ignored. This is explained by the fact that it was VMware's practice to sync from their private Gerrit repos to their public Github mirror roughly monthly which greatly increases the likelihood of merge conflicts.

To the delight of many, a public Gerrit instance was recently announced. This will allow internal VMware CF developers and external CF developers to work together, in public, which is a huge step in the right direction for VMware. http://reviews.cloudfoundry.org Developers can sign in with OpenID or a Google Account and participate in the development of Cloud Foundry.

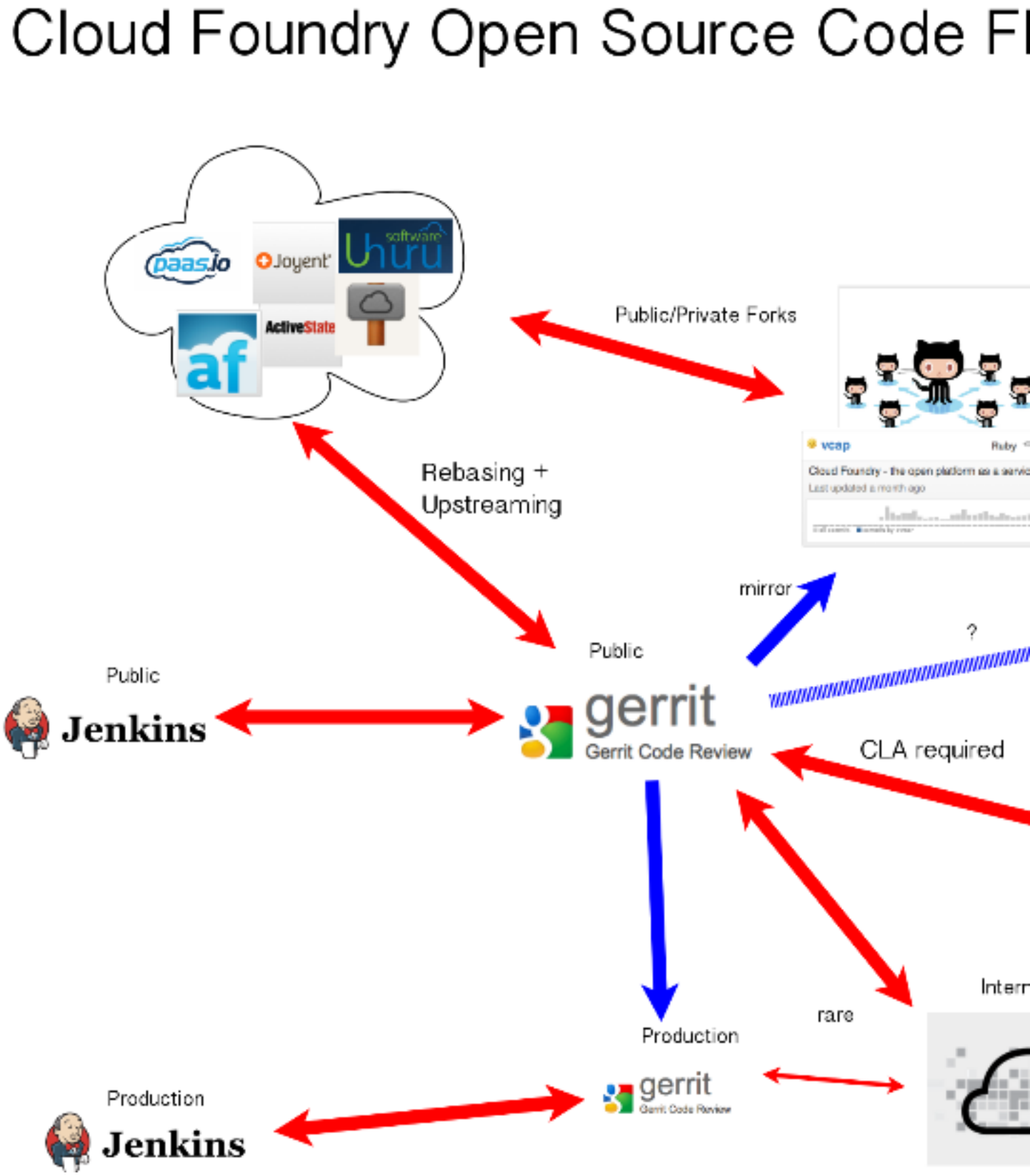

Figure 1: CF Community Process

There is an ``unofficial'' cloudfoundry IRC channel on Freenode at #cloudfoundry.

Deploying your App to Cloud Foundry

If you just want to deploy apps to a Cloud Foundry instance, you just need to install a single Ruby gem called ``vmc''

```
gem install vmc
```

Installing Cloud Foundry

Simplest

ActiveState Stackato provides the easiest way to get a working Cloud Foundry instance running locally. There is a single, simple, beautiful command which takes care of everything, including creating a pristine VM:

```
curl get.stackato.com/microcloud | bash
```

From Github

On a 64bit Ubuntu LTS (10.04.2 works well) with at least 1GB RAM

```
sudo apt-get install openssh-server curl
bash < <(curl -s -k -B https://raw.github.com/cloudfoundry/vcap/master/
   dev_setup/bin/vcap_dev_setup)
```

History of Cloud Foundry

Case Studies

ql.io

node.js grumbles

CF multi-node using AWS

Load Balancer: AWS elastic load balancer

Routers: 2 small instances (1.7 GB of RAM each)

DEA: 2 2xlarge instances (32 GB of RAM each), 1 xlarge instance (15 GB of RAM)

CC/HM/Nats: 1 xlarge instance (15 GB of RAM)

Database: AWS relational database service

NTT

Contributed memcached pull request on Github, has large internal CF cloud.

Links

http://cloudfoundry.org

https://github.com/cloudfoundry

http://apidocs.cloudfoundry.com