



# Build Your Own PaaS, Just Like Red Hat's OpenShift

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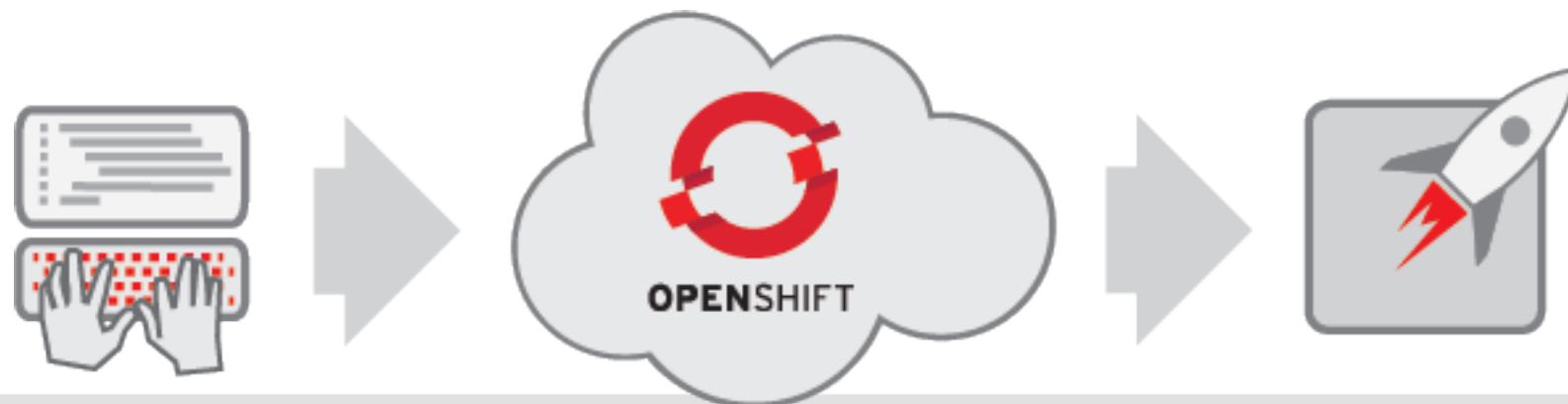
Twitter: @pythondj

<http://openshift.github.io>



# Agenda

- Cloud Vision @ RedHat
- Why PaaS Matters
- What is OpenShift?
- OpenShift Architecture & Internals
- Extending OpenShift with Cartridges
- How do you like your PaaS?
- The Road Ahead
- HP & Red Hat Collaboration



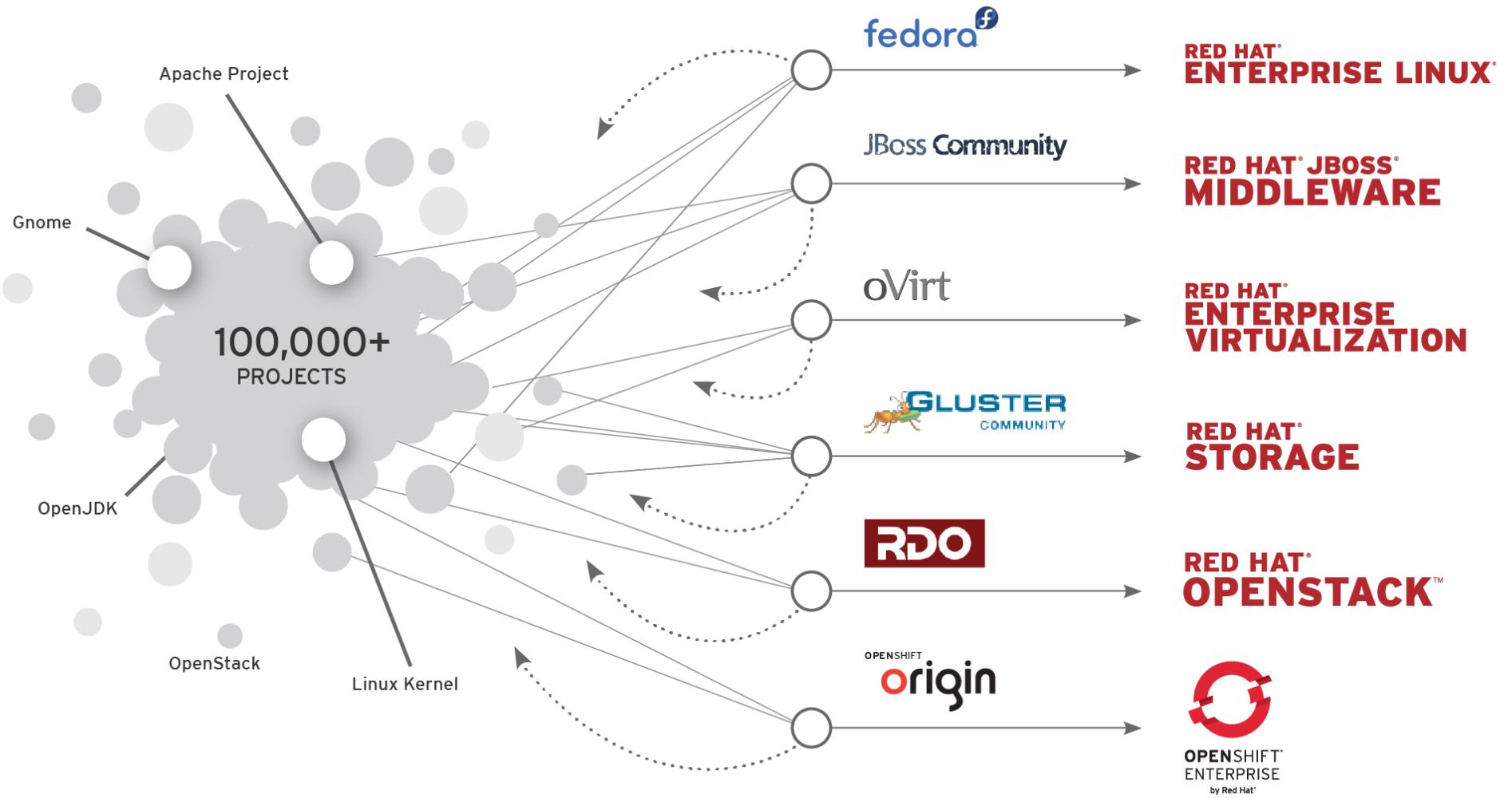
# THE FIRST CLOUDS WERE BUILT ON RED HAT TECHNOLOGY



salesforce.com®

80% OF TOP PUBLIC CLOUDS RUN ON LINUX

# RED HAT LEADS THROUGH OPEN INNOVATION



PAAS AS GARTNER SEES IT:

RED HAT IS IN THE LEAD

OPENSHIFT, JBOSS, RHEL

Figure 1. Magic Quadrant for On-Premises Application Platforms



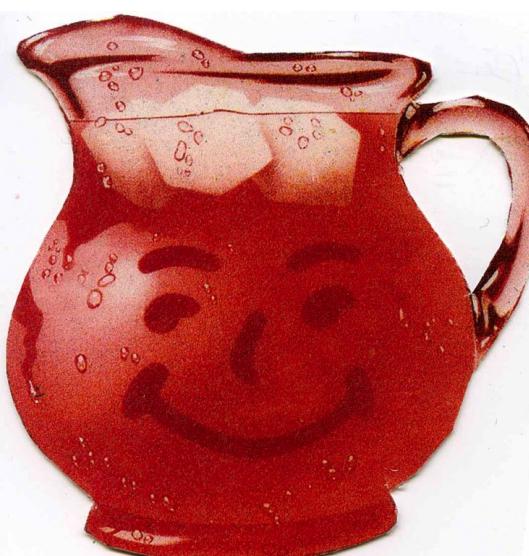
Source: Gartner (June 2013)

# How to Build an App *Old School* vs. *Today with PaaS*

1> HAVE IDEA 2> GET BUDGET 3>  
SUBMIT HARDWARE ACQUISITION  
REQUEST 4> WAIT 5> GET  
HARDWARE 6> DEPLOY  
FRAMEWORK/APPSERVER 7>  
DEPLOY TESTING TOOLS 8> TEST  
TESTING TOOLS 9> CODE, TEST,  
REPEAT 10> CONFIGURE PROD  
SOURCES (AND BUY THEM IF  
NEEDED) 11> PUSH TO PROD 12>  
LAUNCH 13> ORDER MORE  
SOURCES TO MEET DEMAND 14>  
WAIT 15> DEPLOY NEW SOURCES  
16> ETC



HAVE IDEA > CODE, TEST,  
REPEAT > LAUNCH > SCALE



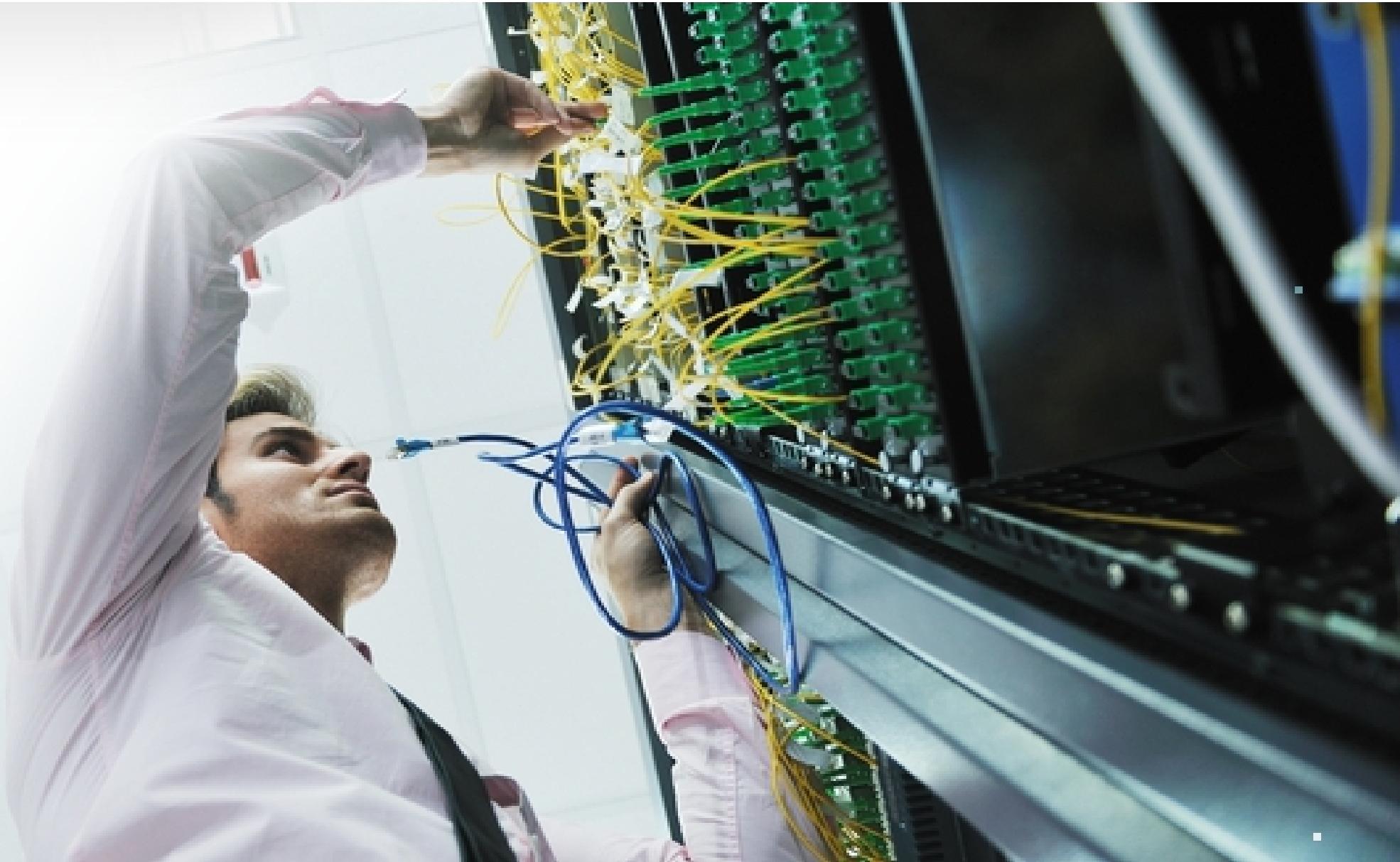
“THE USE OF PLATFORM-AS-A-SERVICE TECHNOLOGIES WILL ENABLE IT ORGANIZATIONS TO BECOME MORE AGILE AND MORE RESPONSIVE TO THE BUSINESS NEEDS.” -GARTNER



PaaS is the Future

\*<http://www.gartner.com/technology/research/cloud-computing/report/paas-cloud.jsp>

# Focus is still on delivering Cloud Infrastructure



# and managing expectations in the Cloud



# New Cloud World Order

## ESSENTIAL CHARACTERISTICS

- On-demand self-service
- Broad network access
- Resource pooling
- Rapid elasticity
- Measured service

## SERVICE MODELS

- Software-as-a-Service
- Platform-as-a-Service
- Infrastructure-as-a-Service

## DEPLOYMENT MODELS

- Public
- Private
- Hybrid
- Community



**National Institute of Standards and Technology**  
U.S. Department of Commerce

The NIST definition characterizes important aspect of cloud computing and is intended to serve as a means for broad comparisons of cloud services and deployment strategies and to provide a baseline for discussion from what is cloud computing to how to best use cloud computing.

# Infrastructure as a Service gives you

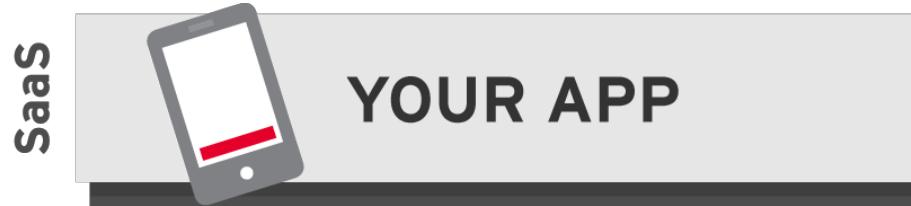
- Network, storage & compute as an on-demand service
- Basically, servers in the cloud
- You're still on the hook to configure & manage the cloud & stack



*“How do I use this?”*

# Software as a Service gives you

- An on-demand application
- Nothing to install or configure



*“This is all my customers and users care about!”*

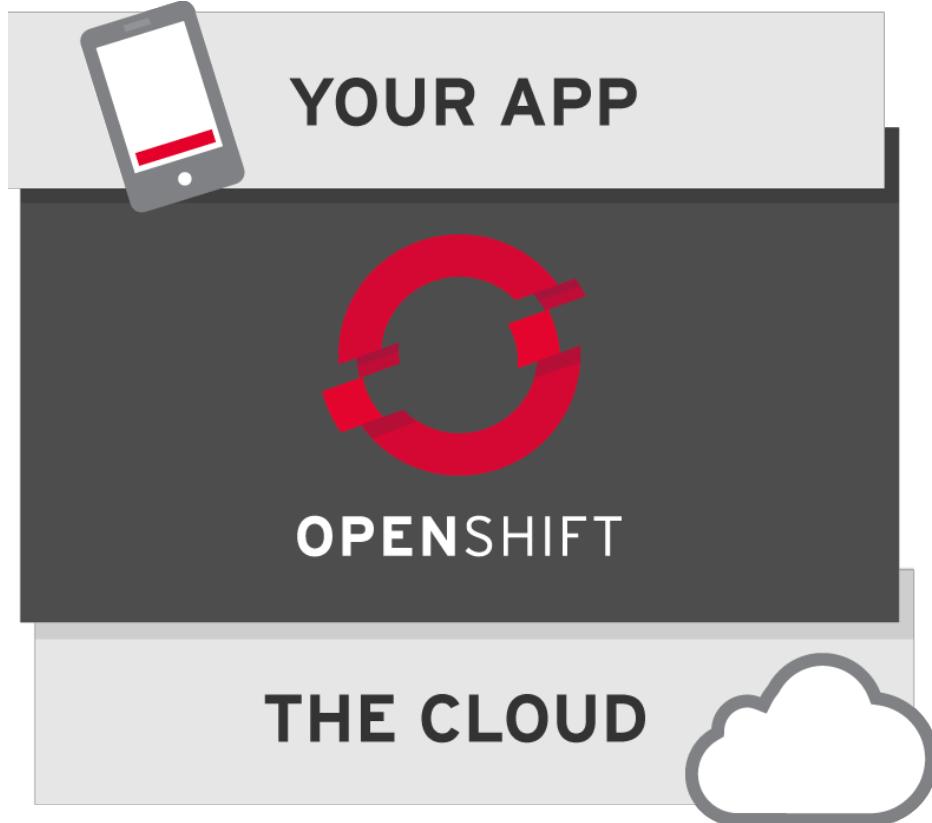
# Platform as a Service delivers

- Application run-time environment in the cloud
- Configures & manages both the cloud & stack for your application



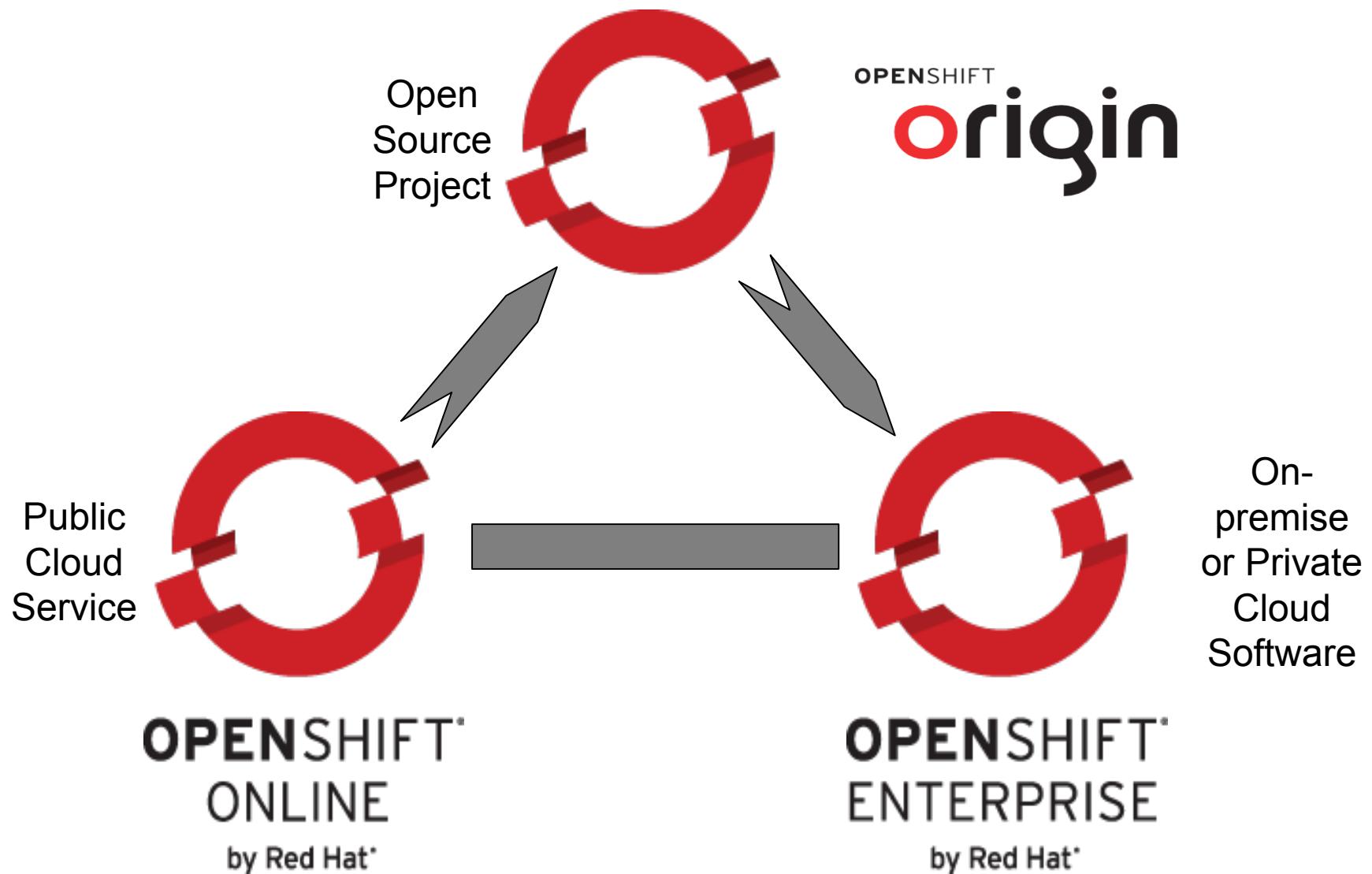
*“The cloud is now useful!”*

# What is OpenShift?

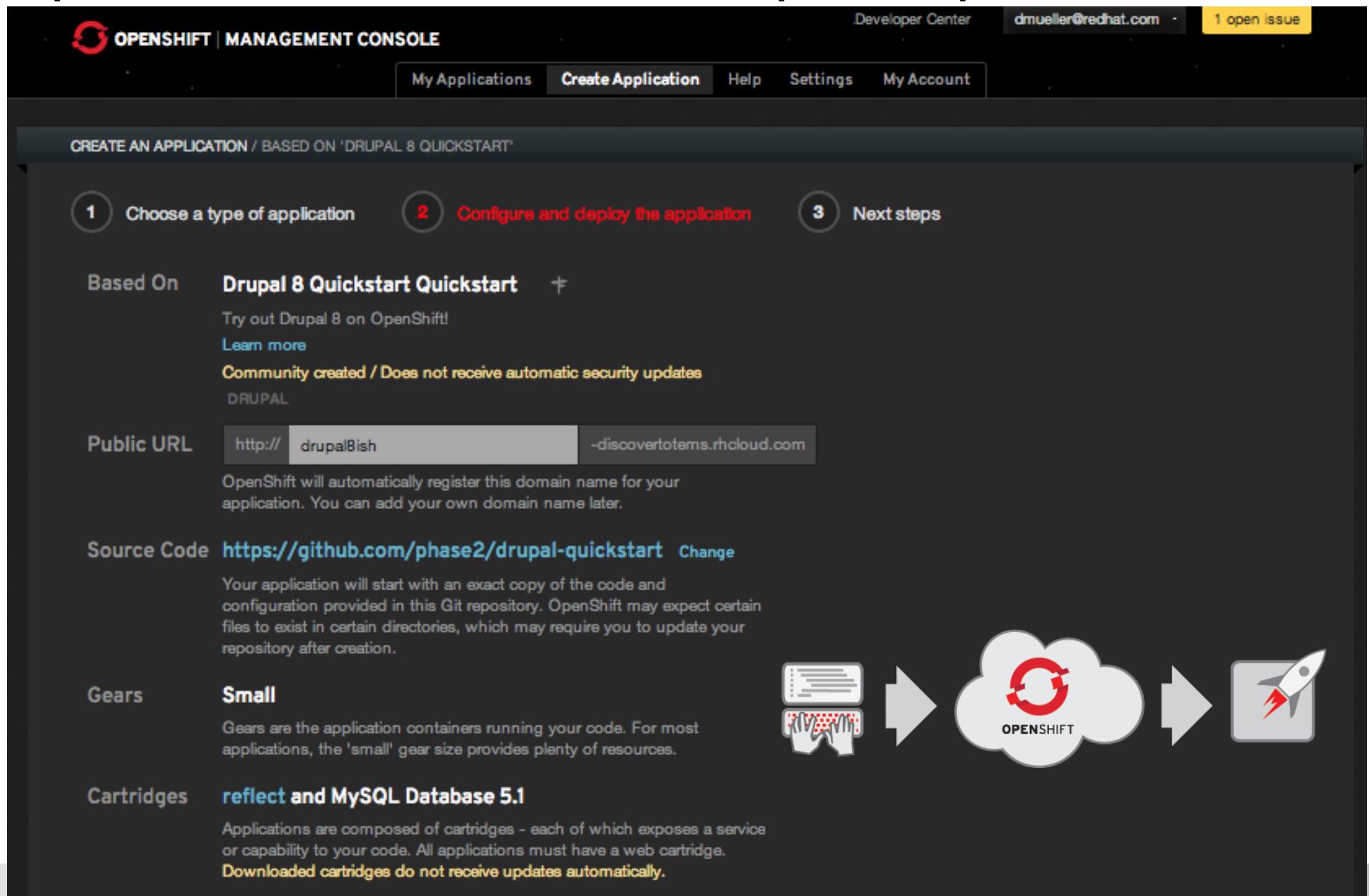


The Next Generation  
Open Source  
Platform as a Service  
for Applications in  
the Cloud

## FLAVORS OF OPENSHIFT



# OpenShift Online (<http://openshift.com>)



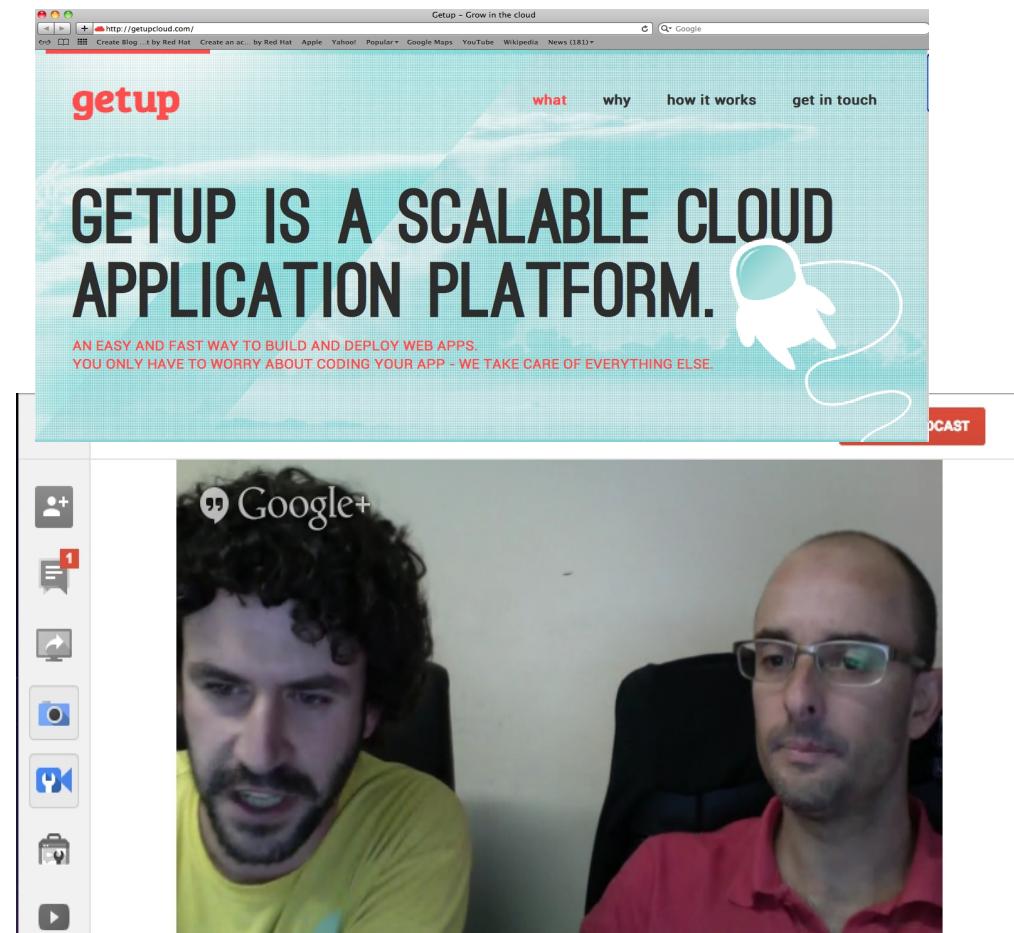
The screenshot shows the OpenShift Online Management Console interface. At the top, there's a navigation bar with the OpenShift logo, developer center link, email (dmueler@redhat.com), and a yellow button for '1 open issue'. Below the header, a banner says 'CREATE AN APPLICATION / BASED ON 'DRUPAL 8 QUICKSTART''. The main area has three steps: 1. Choose a type of application (highlighted in red), 2. Configure and deploy the application (current step), and 3. Next steps. Step 2 details the application configuration:

- Based On:** Drupal 8 Quickstart Quickstart 
- Try out Drupal 8 on OpenShift!**
- Learn more**
- Community created / Does not receive automatic security updates**
- DRUPAL**
- Public URL:**  -discovertotems.rhcloud.com
- OpenShift will automatically register this domain name for your application. You can add your own domain name later.**
- Source Code:** <https://github.com/phase2/drupal-quickstart> Change  
Your application will start with an exact copy of the code and configuration provided in this Git repository. OpenShift may expect certain files to exist in certain directories, which may require you to update your repository after creation.
- Gears:** **Small**  
Gears are the application containers running your code. For most applications, the 'small' gear size provides plenty of resources.
- Cartridges:** **reflect and MySQL Database 5.1**  
Applications are composed of cartridges - each of which exposes a service or capability to your code. All applications must have a web cartridge.  
Downloaded cartridges do not receive updates automatically.



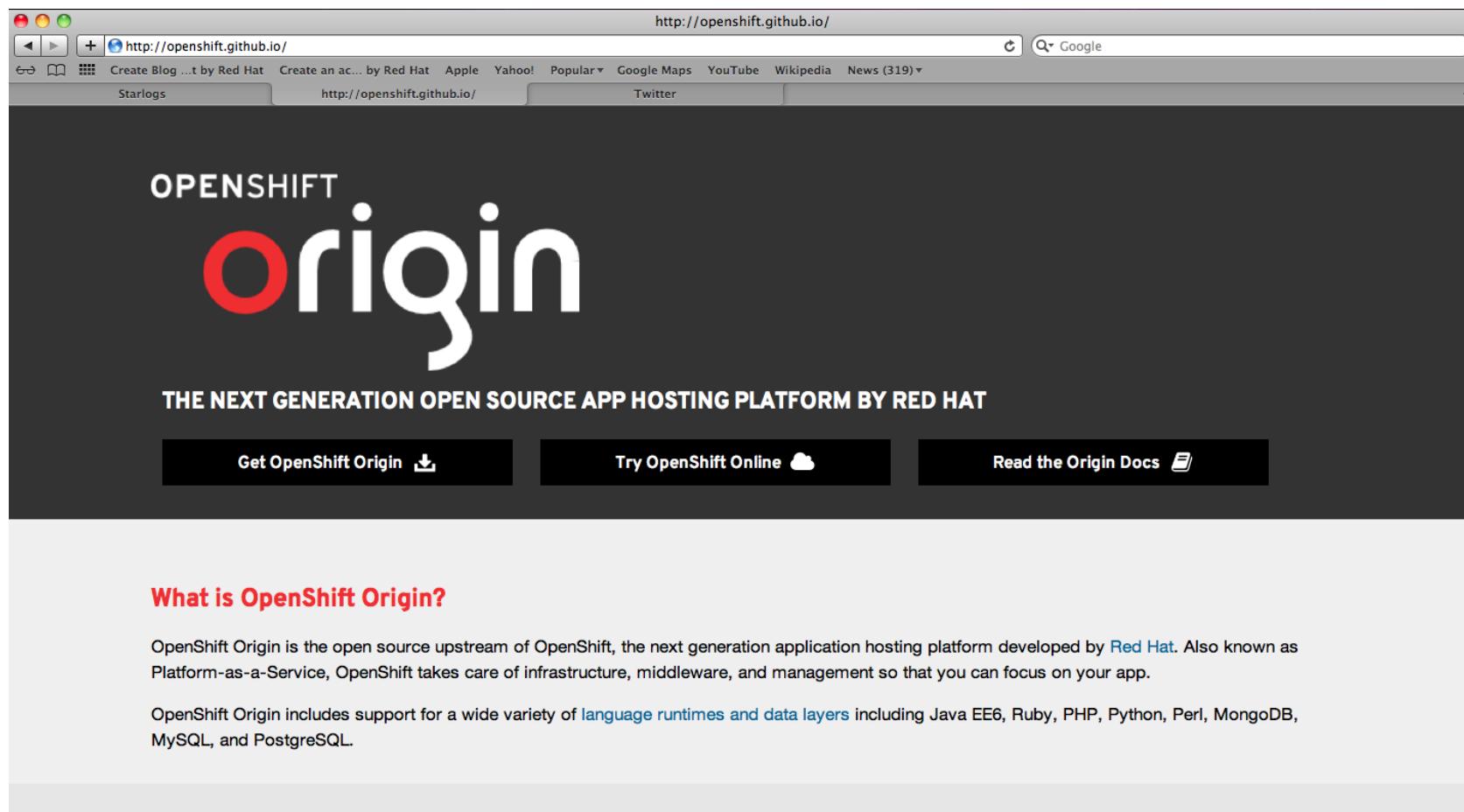
# We're not the only ones using OpenShift

- On Premise Private Clouds
- Public Clouds
  - For Enterprises
  - For SaaS providers
  - For Developers
- Other Public PaaSes



A screenshot of a web browser showing the GetUpCloud website. The page has a light blue header with the word "setup" in red. Below it, a large text area says "GETUP IS A SCALABLE CLOUD APPLICATION PLATFORM." in bold black letters. Underneath, smaller text reads "AN EASY AND FAST WAY TO BUILD AND DEPLOY WEB APPS. YOU ONLY HAVE TO WORRY ABOUT CODING YOUR APP - WE TAKE CARE OF EVERYTHING ELSE." To the right, there's a white cartoon character of a person with a speech bubble. Below the header, there's a video player window showing two men in a video conference. On the left side of the video player is a sidebar with icons for user, bookmark, video, camera, and play/pause.

# OpenShift Origin on Github



<http://openshift.github.io/>

# OpenShift Enterprise

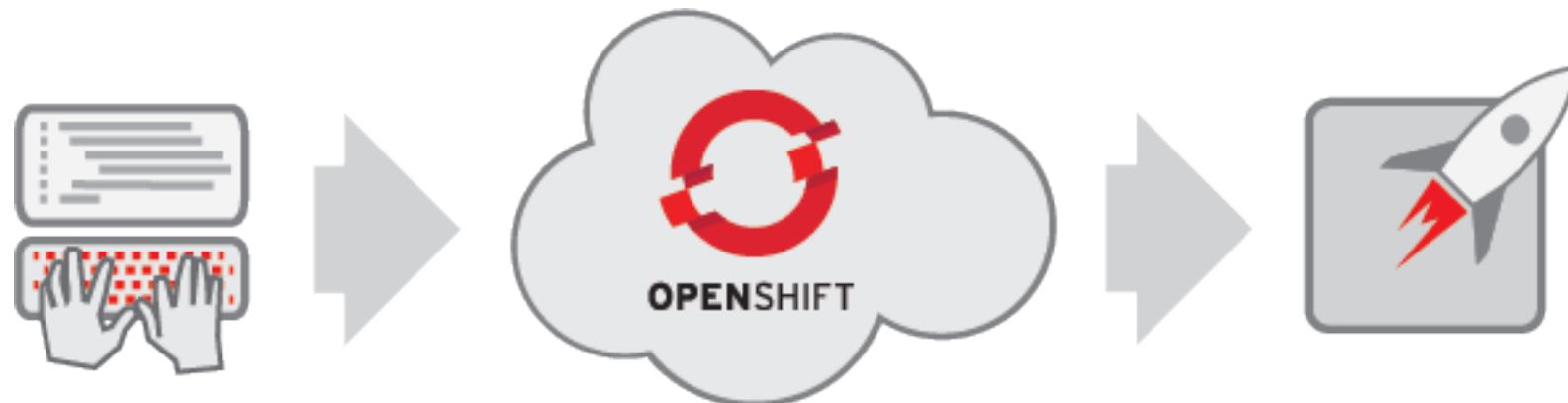


## ENTERPRISE IT MANAGED

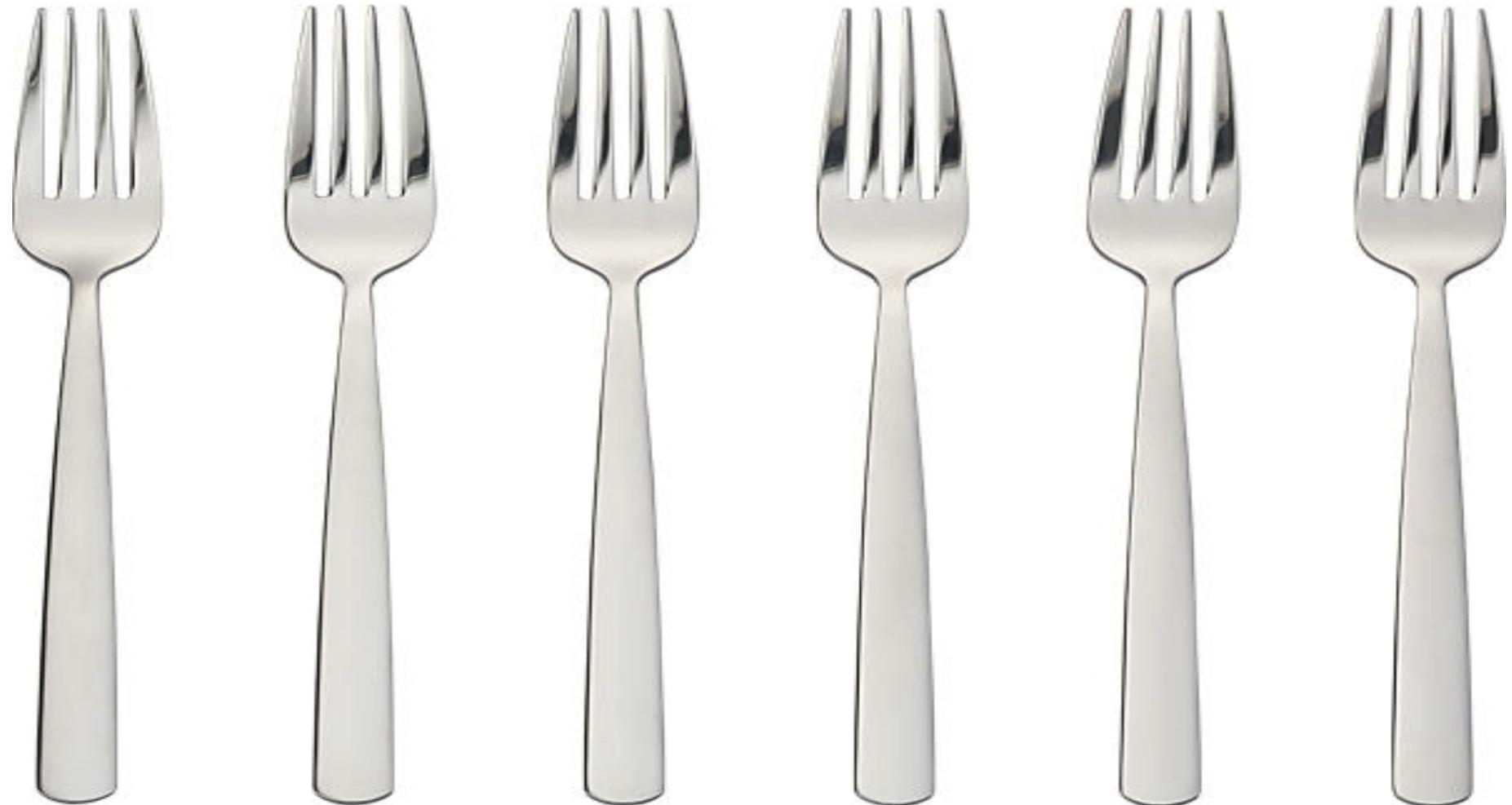
- Let developers have the benefits of self-service PaaS while IT retains control for governance and compliance in a Private or Hybrid Cloud
- OpenShift Enterprise is designed to be deployed on top of and run on Red Hat Enterprise Linux (RHEL).

# What makes OpenShift different?

- RHEL Platform Support
- SELinux-based Secure Containers for multi-tenancy
- Automatic Application Scaling
- Extensible Architecture
- System Component Redundancy for High Availability
- Configurable Deployment to Support Enterprise Requirements
- Automatic Application Stack Provisioning
- Support for Java EE 6
- Choice of Cloud Infrastructure, Bare Metal, or Desktop



DID I  
MENTION  
IT'S OPEN  
SOURCE?  
APACHE V2  
LICENSE

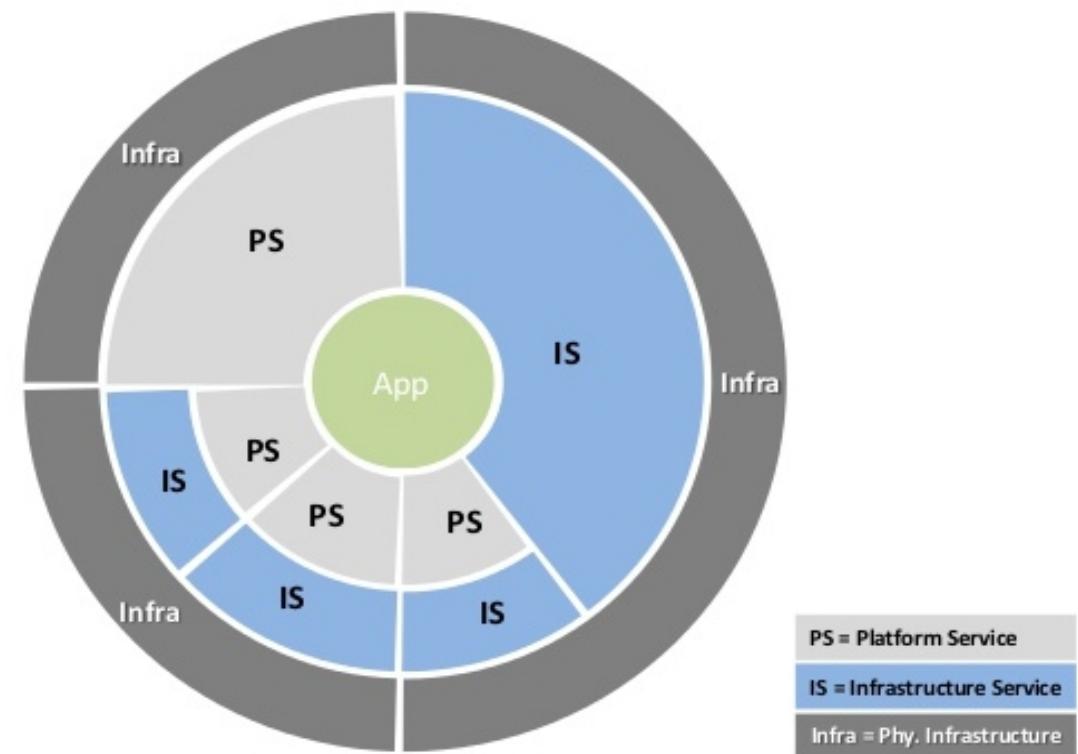
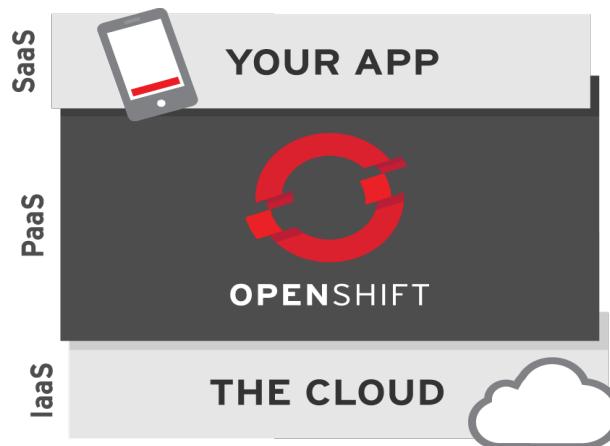


<http://openshift.github.io/>



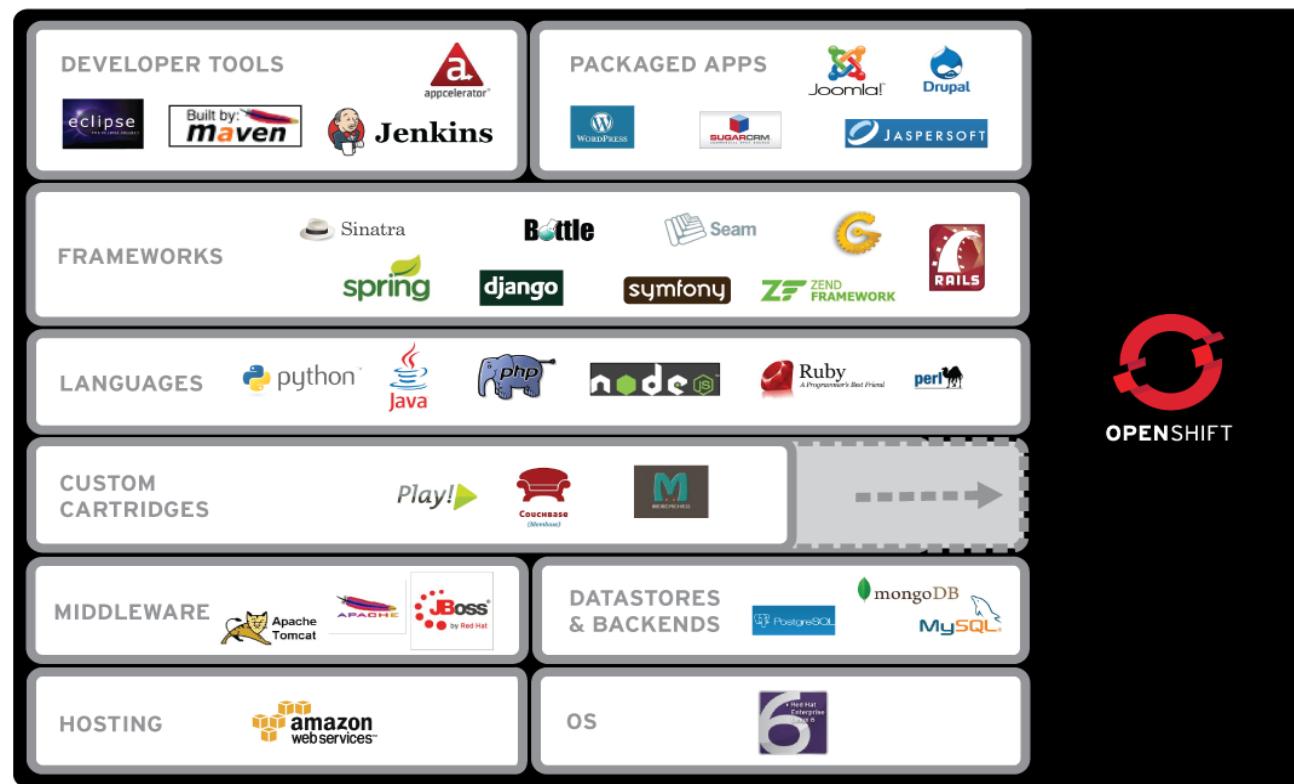
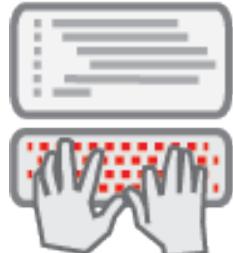
# Multiple, Diverse, Complex Application Use Cases

- Require more than just “Infrastructure”
- Run on a diverse eco-system of application stacks
- Need to be secure, compliant and well-managed
- Scale or Fail



# Platform as a Service fills out the Cloud Layer Cake

SaaS/Applications Layer

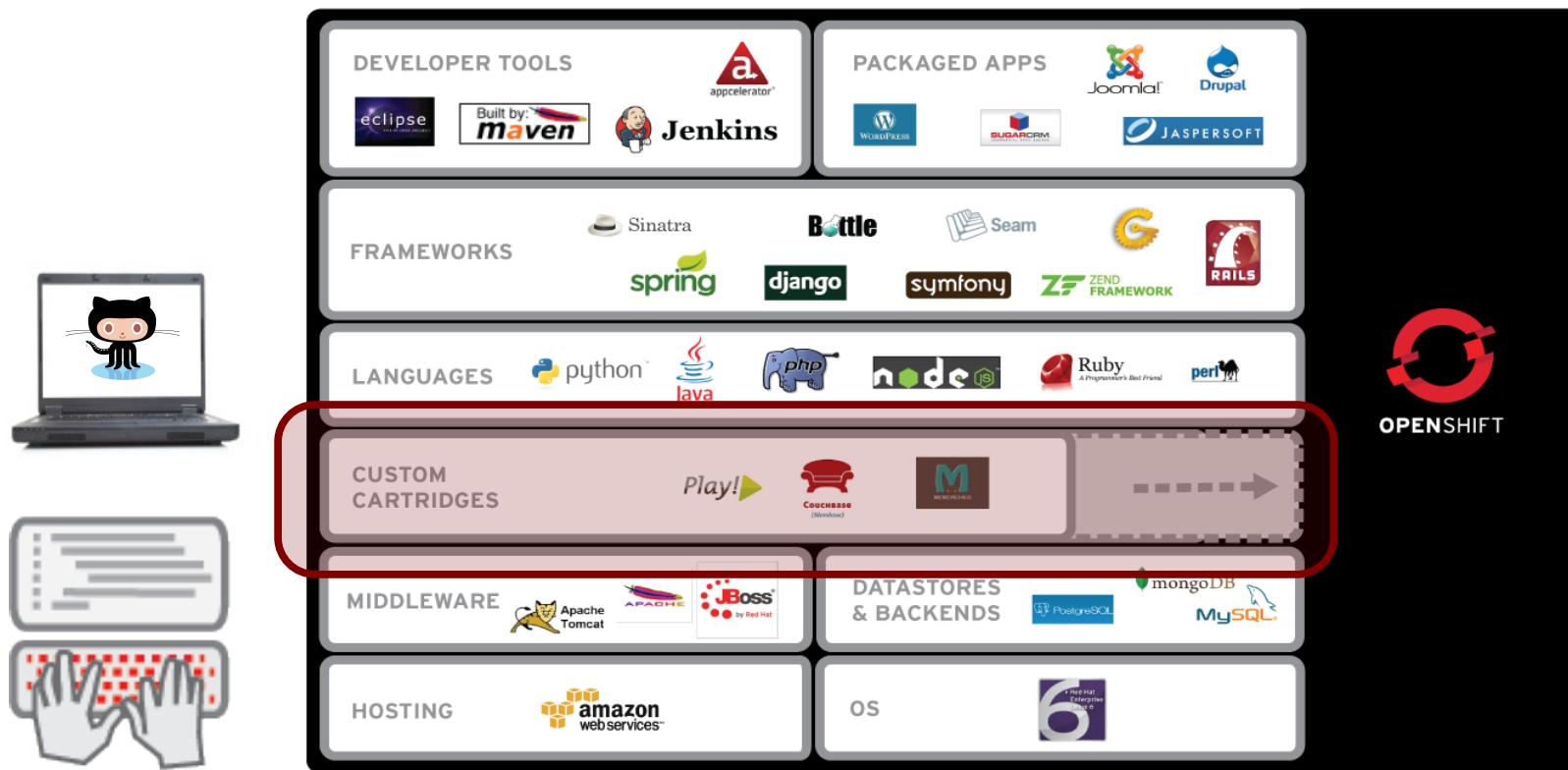


Infrastructure Layer



# Extend OpenShift with Cartridges

## SaaS/Applications Layer



## Infrastructure Layer



PAAS IS THE KEY TO ANY  
SUCCESSFUL CLOUD INITIATIVE



# OpenShift Architecture & Internals



# Summary of Key Terms

- \* Broker – Management host, orchestration of Nodes
- \* Node – Compute host containing Gears
- \* Gear – Allocation of fixed memory, compute, and storage resources for running applications
- \* Cartridge – A technology/framework (PHP, Perl, Java/JEE, Ruby, Python, MySQL, etc.) to build applications
- \* Application – Instantiation of a Cartridge

# Runs on IaaS

OpenShift Origin PaaS

Amazon EC2

Rackspace

Bare Metal

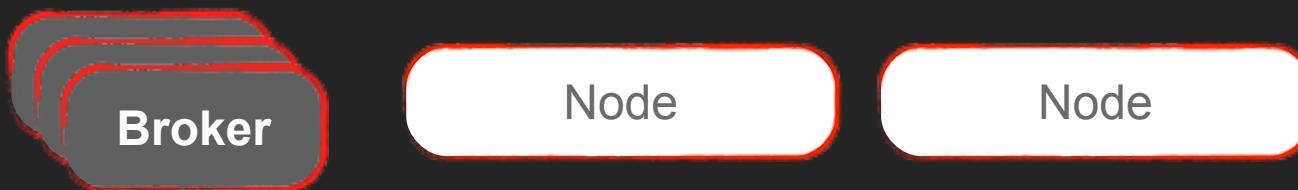
OpenStack

RHEV

CloudStack

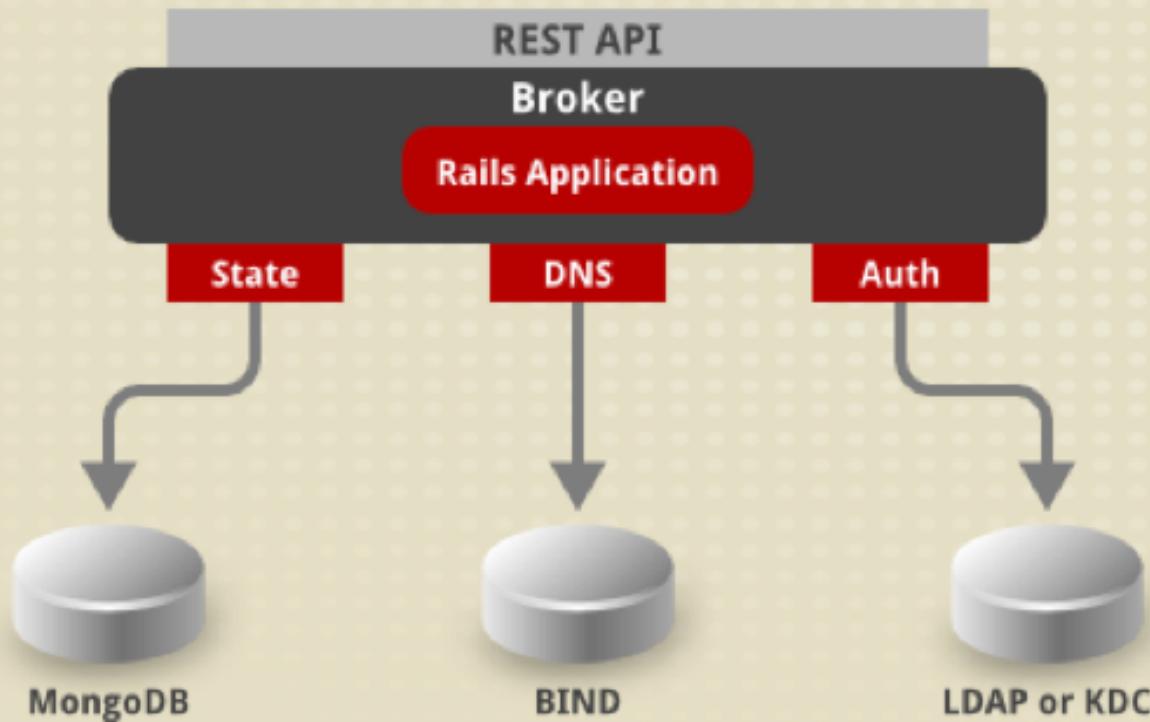
# OpenShift Origin Machines

An OpenShift Origin Broker can manage multiple nodes



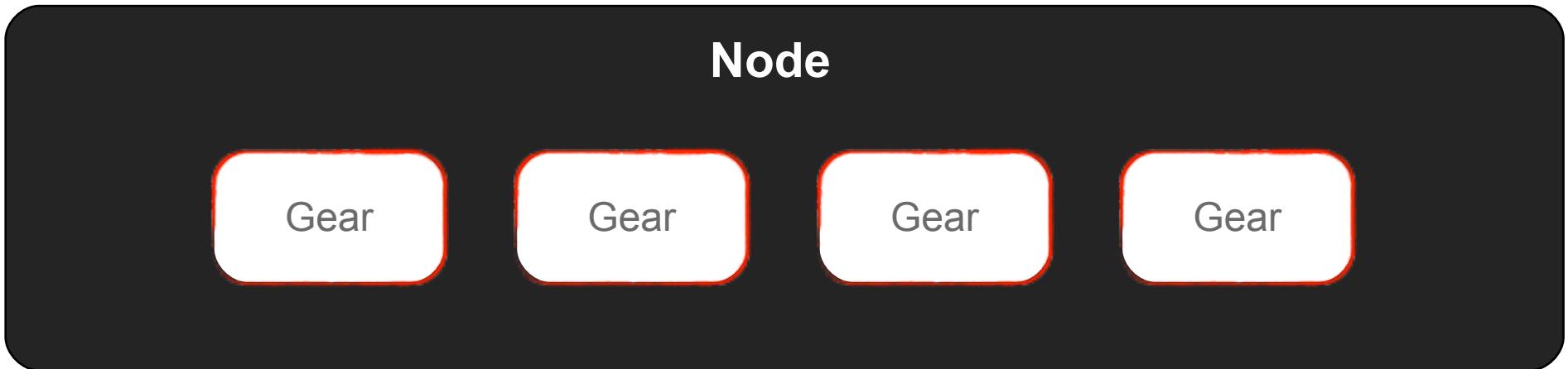
Nodes are where User applications live.

# Broker



#175089

# Container Architecture



CPU/Memory - C-Groups

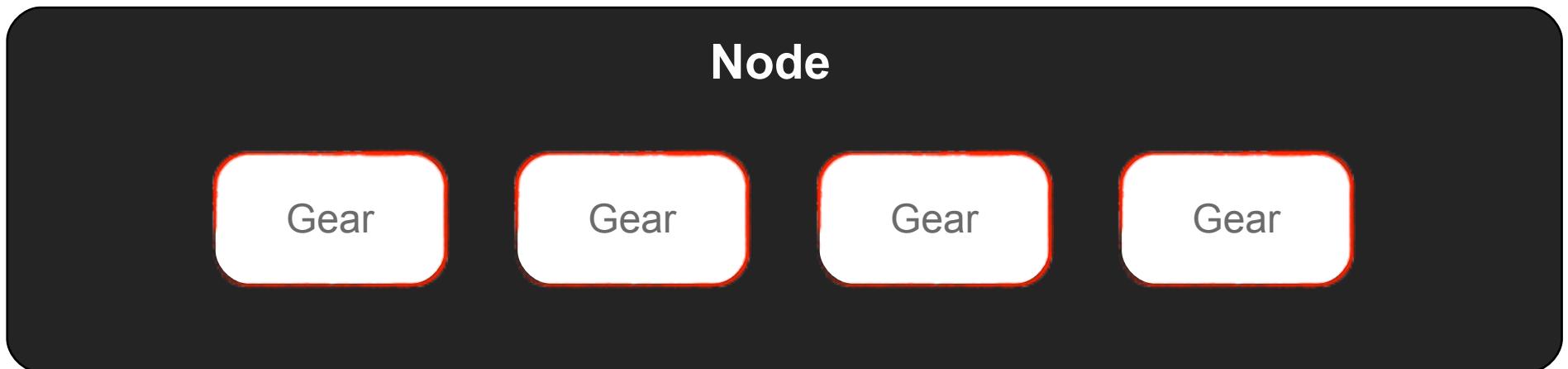
Network - IPTTables / Traffic control policies

Filesystem - Quota

Security - Unix permissions + SELinux policies

Filesystem - pam\_namespace + Bind mounts

# Container Architecture



CPU/Memory - C-Groups

Network - IPTables / Traffic control policies

Filesystem - Quota

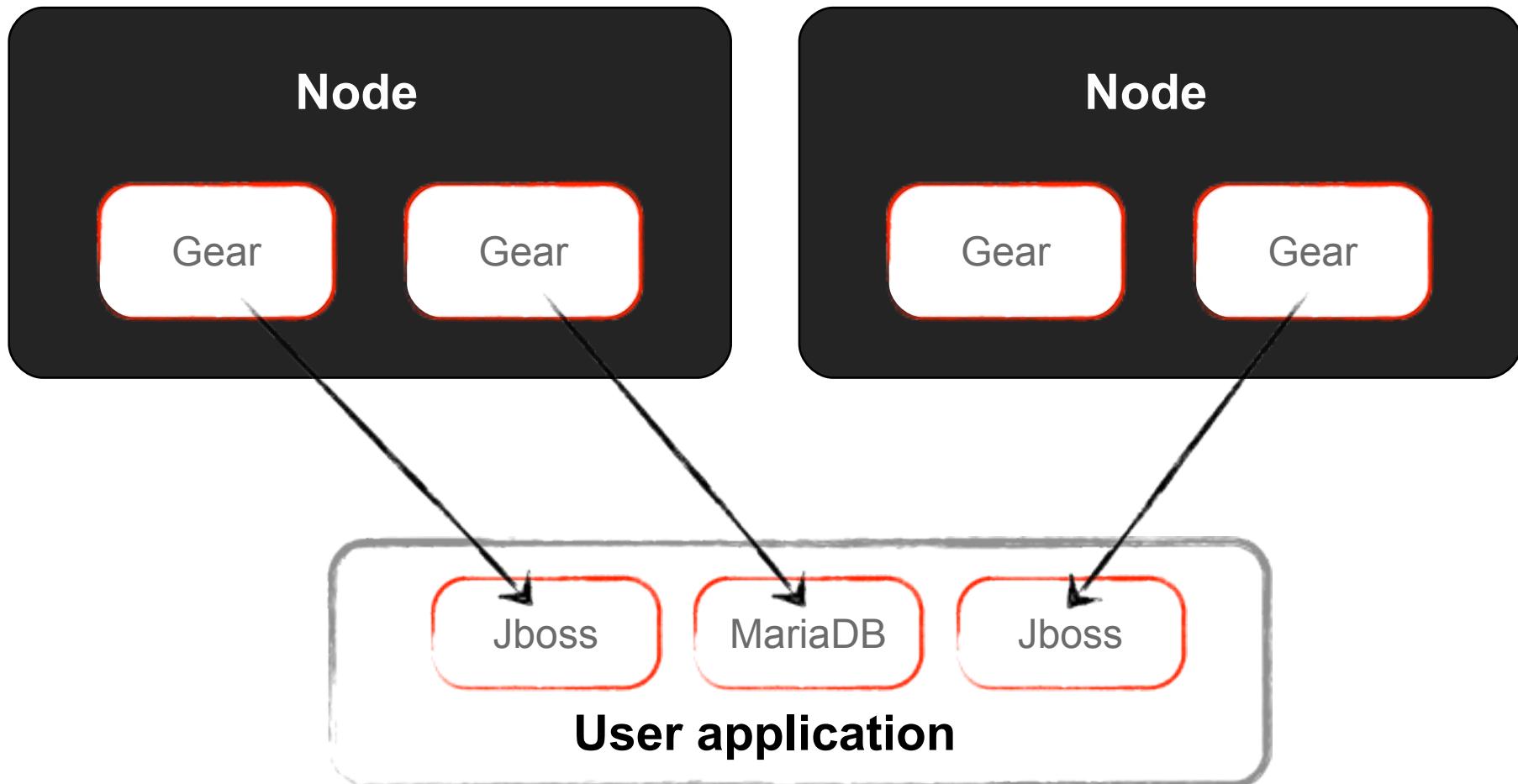
Security - Unix permissions + SELinux policies

Filesystem - pam\_namespace + Bind mounts

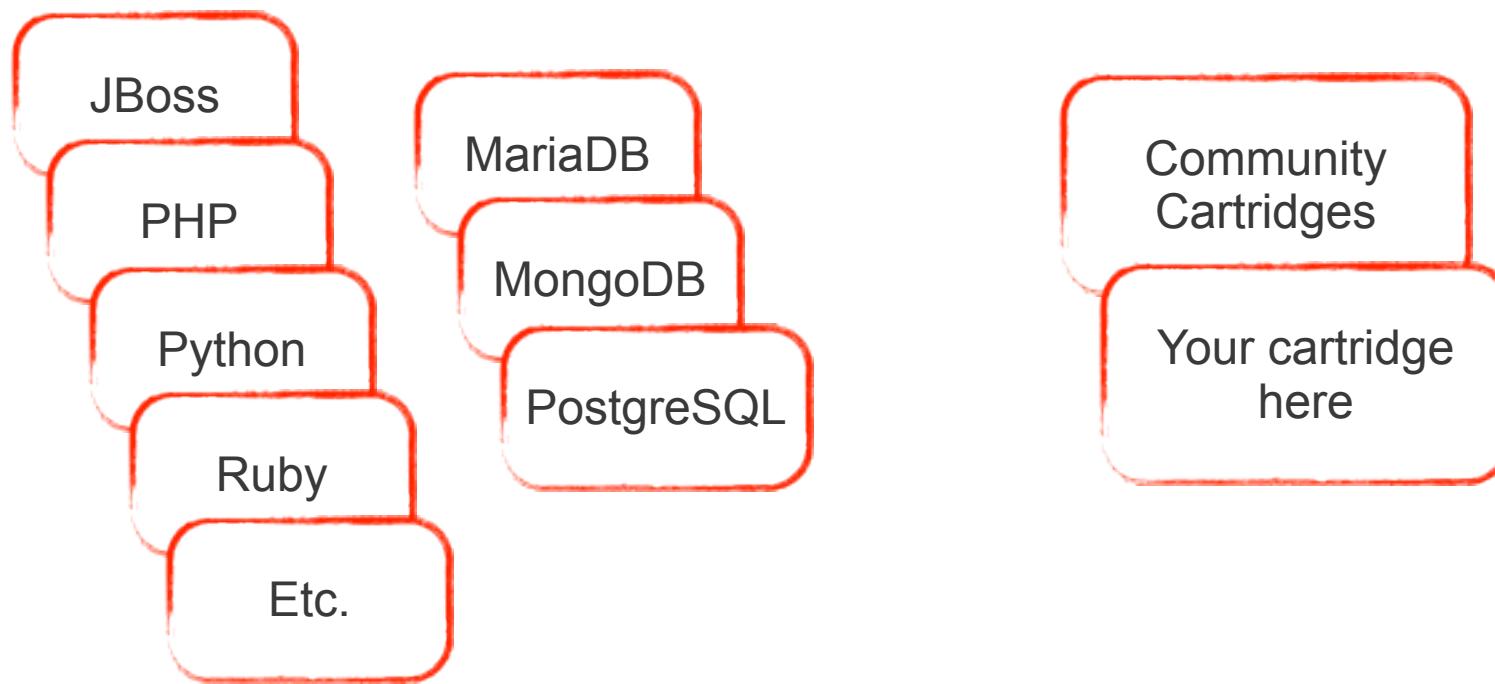


Pushed upstream:  
libvirt-lxc  
libvirt-sandbox-service

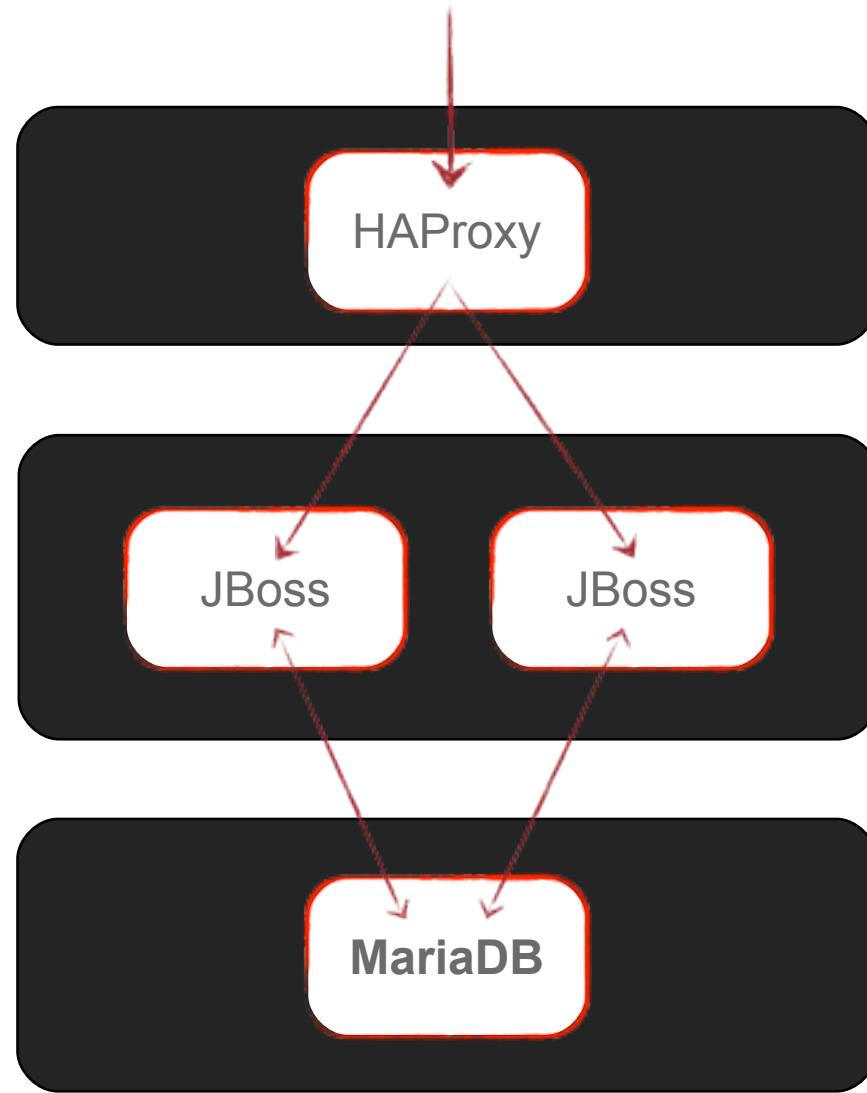
# Applications and Gears



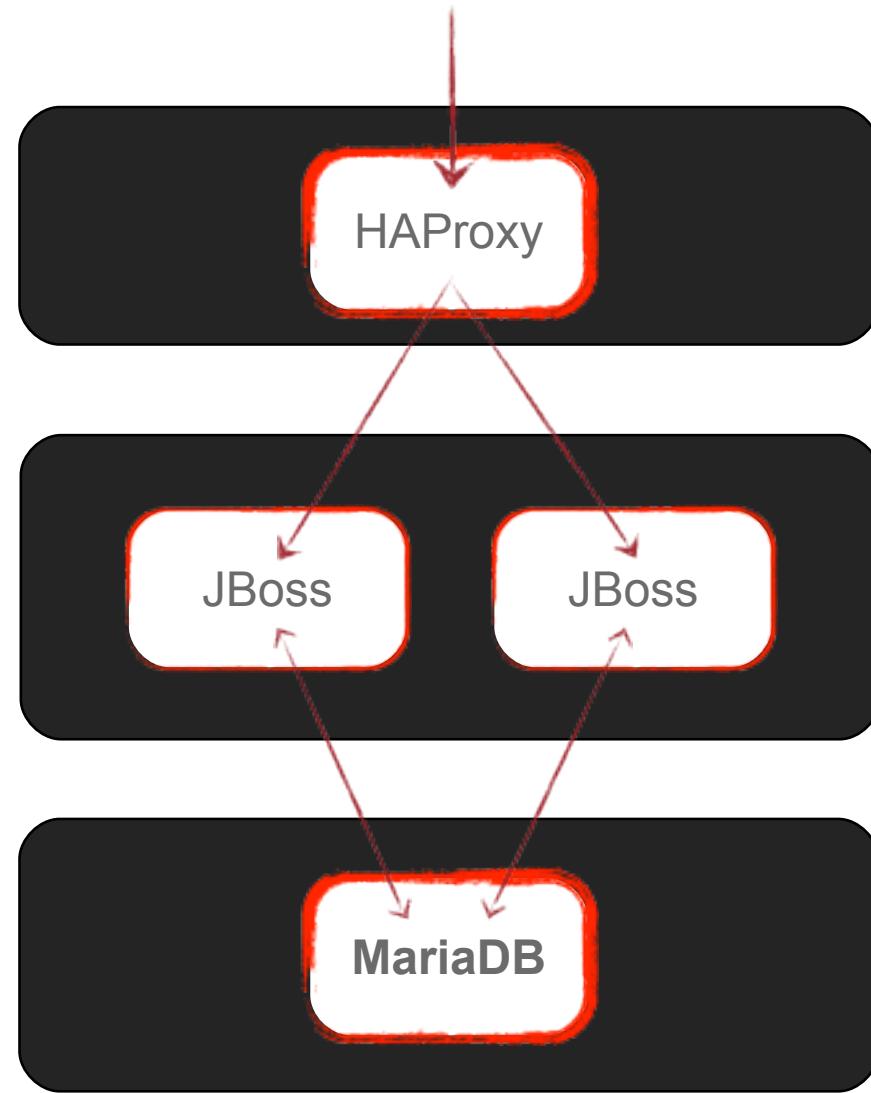
# Cartridges



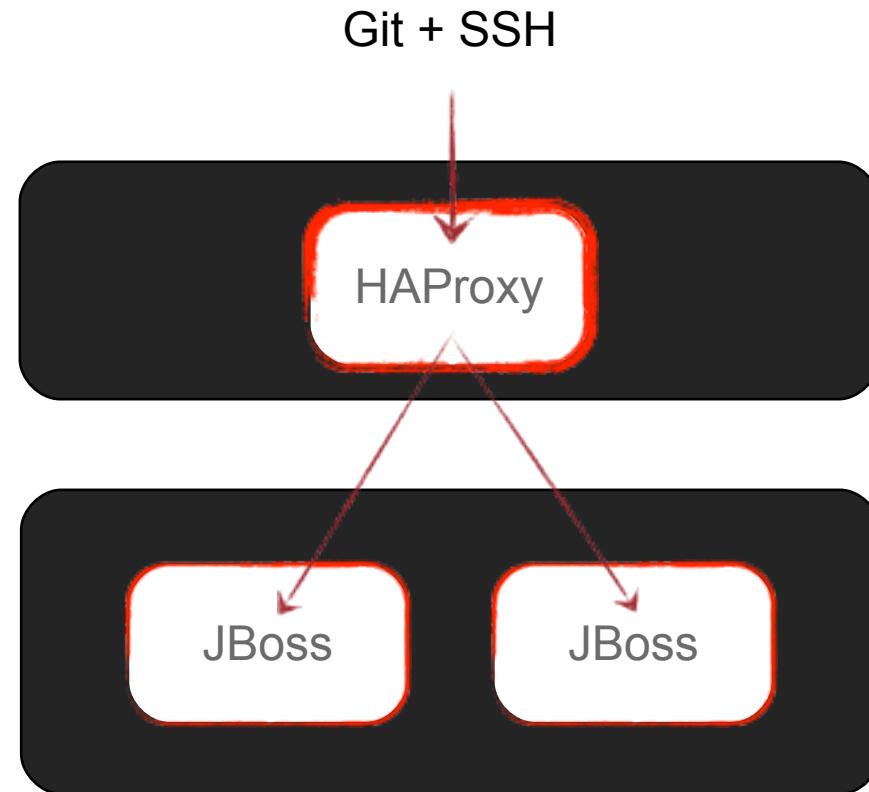
# Scaling



# Not yet HA but...



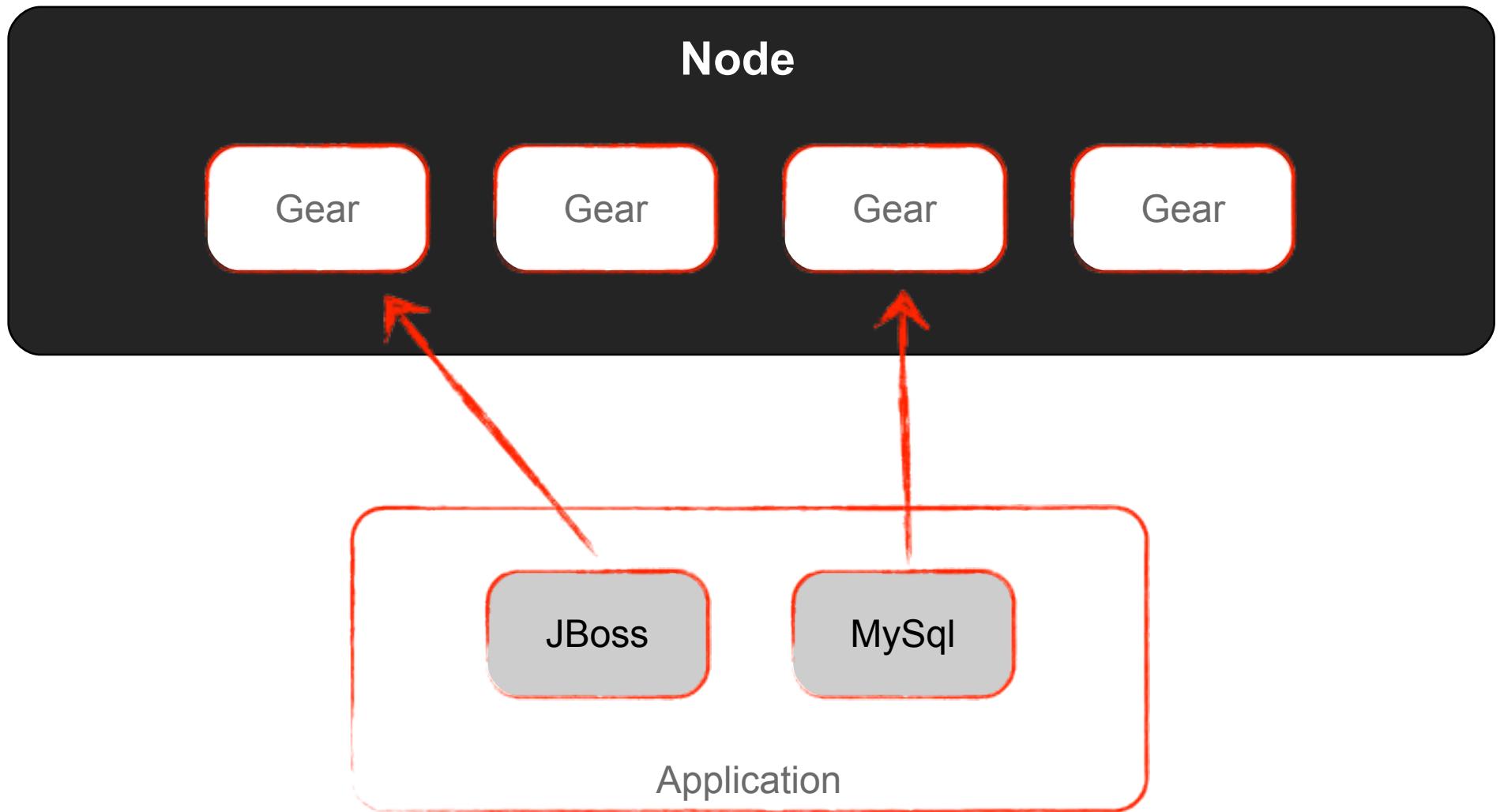
# Pushing Updates



# Origin Release 2

- \* Fedora 19 or RHEL 6.x
- \* Get up and running
  - \* Vagrant
  - \* Puppet
  - \* Comprehensive guide
  - \* Ansible
- \* <http://openshift.github.io>

# Cartridges



I want to run a ...

- Database
- Language
- Daemon
- Load-balancer
- Key-value store

... on OpenShift

## Cartridge API

- Ability to act on cartridge lifecycle events
- Expose HTTP/Web-socket ports
- Run your own binaries
- Communicate with other instances
- Create configuration files
- Access and create to environment variables
- Act on user specifies modes of operation
- Provide user a starting point

# More Complex Examples

- <http://tinyurl.com/online-cartridges>
- JBoss EWS:
  - multiple versions of packaged software
  - support for multiple java versions
- MySQL
  - pub/sub database connections
- PHP My Admin
  - one cartridge dependent on another

# Deploying your own OpenShift

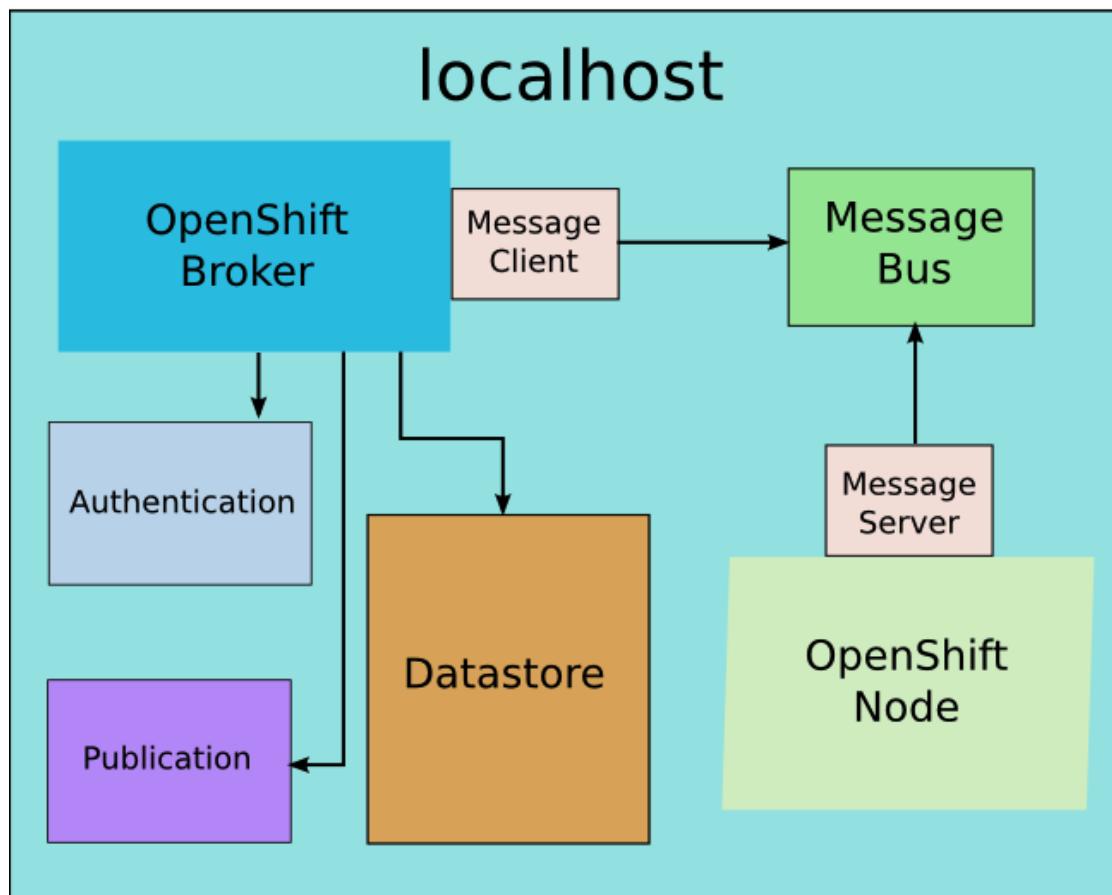
*where you want it when you want it!*



We have a pre-built VM for you to check out today, and an installer is in the works for Origin 3.0 that will enable you to install Origin on your own systems or configure multiple Origin VMs into a distributed PaaS

# How do you like your PaaS?

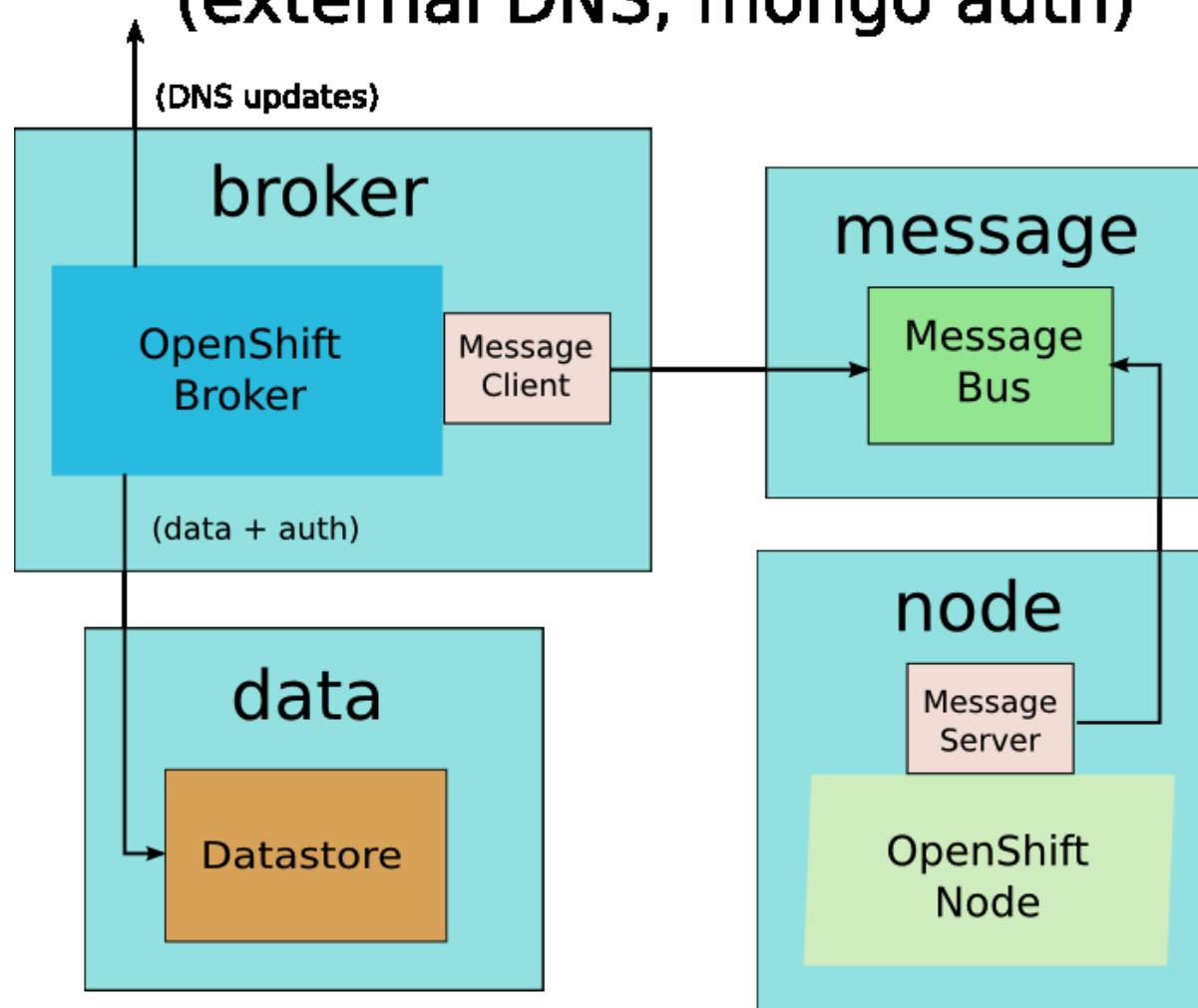
## All-In-One



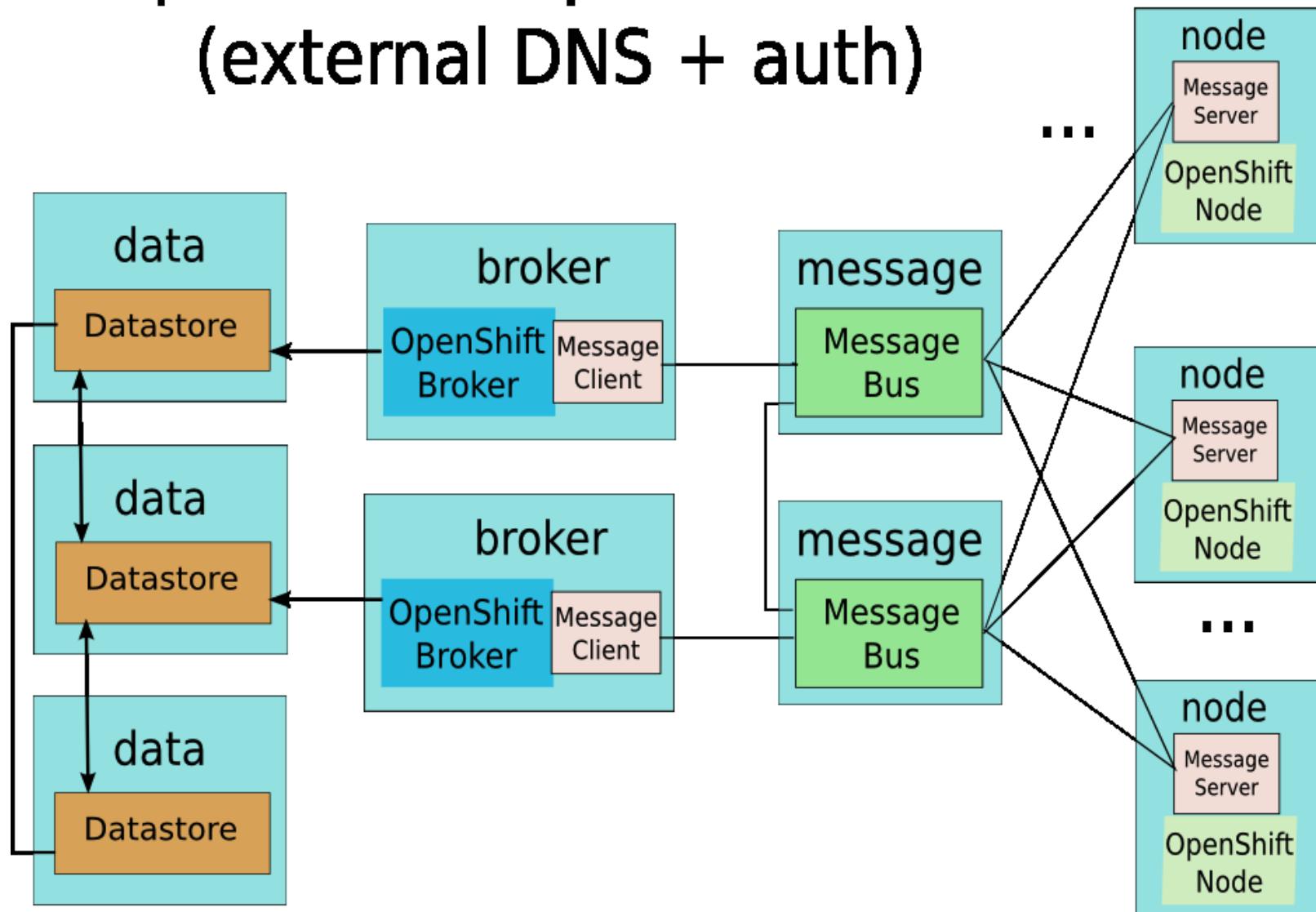
<https://mirror.openshift.com/pub/origin-server/release/2/images/openshift-origin.zip>

[http://openshift.github.io/documentation/oo\\_deployment\\_guide\\_puppet.html](http://openshift.github.io/documentation/oo_deployment_guide_puppet.html)

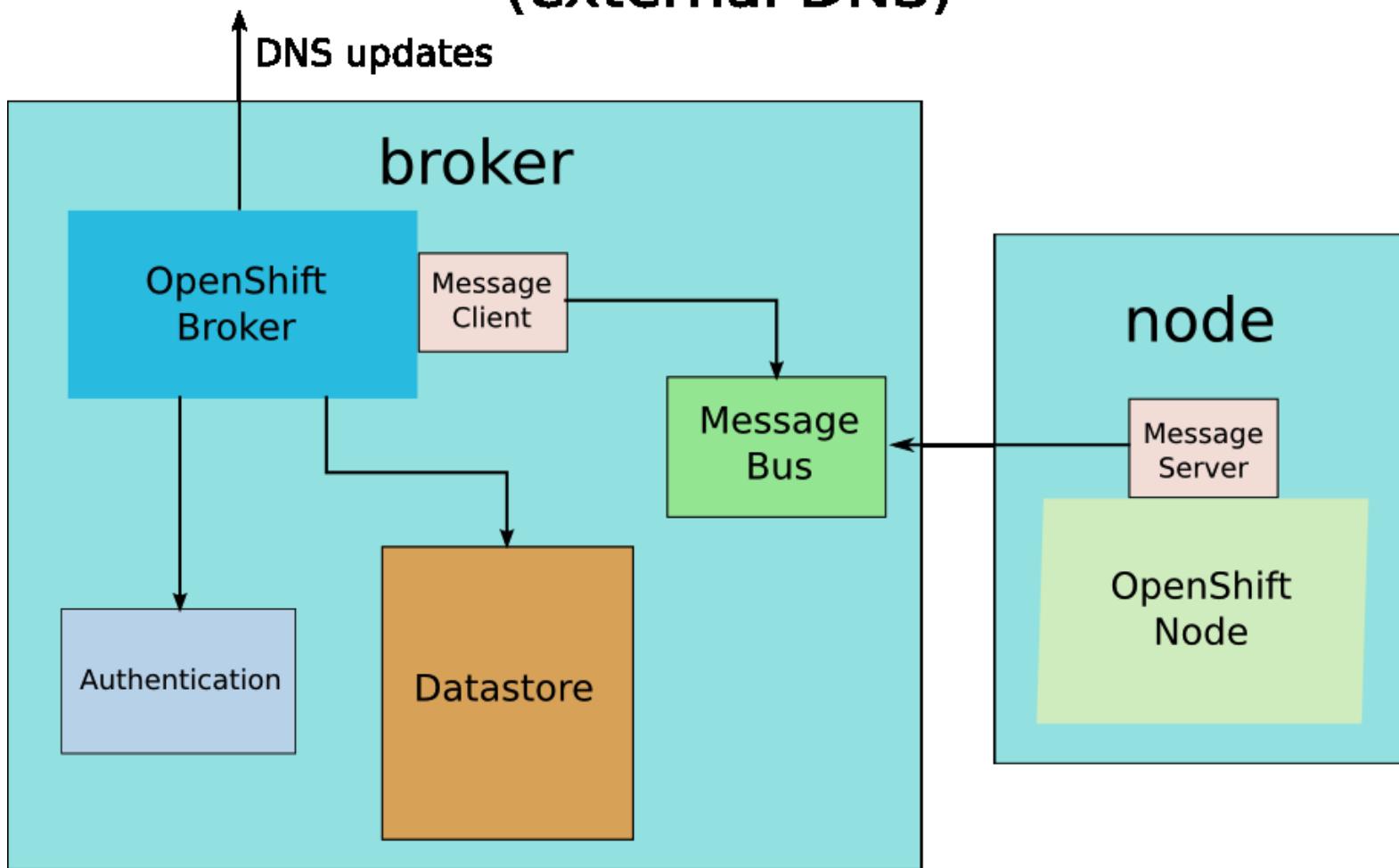
## Four Host Configuration (external DNS, mongo auth)



# Simplest "HA" OpenShift service (external DNS + auth)



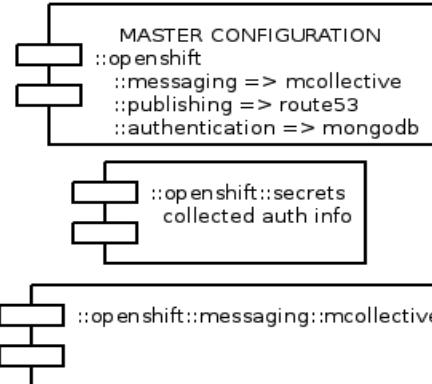
## Two Host Configuration (external DNS)



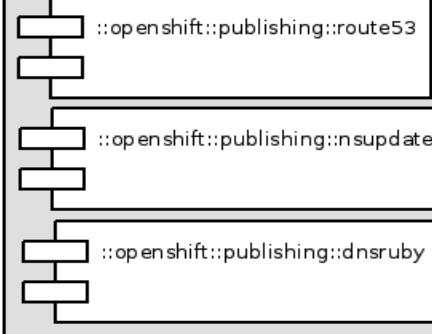
## OpenShift Puppet modules and structure (proposed)

Authors: Mark Lamourine  
 Revision: 0.4  
 Date: 20130725

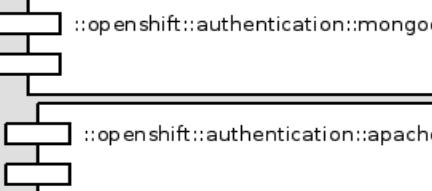
### OpenShift Service Definition Classes



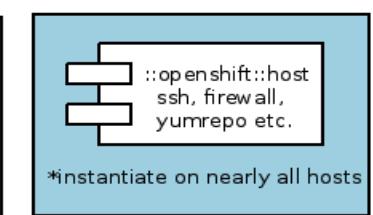
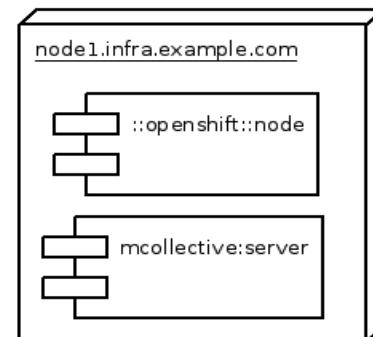
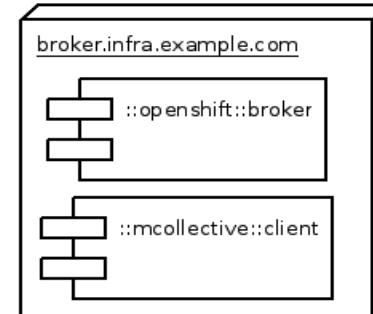
### Publishing (DNS) Plugins



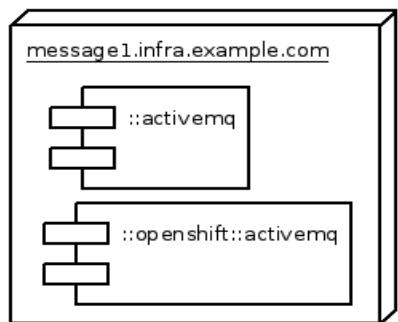
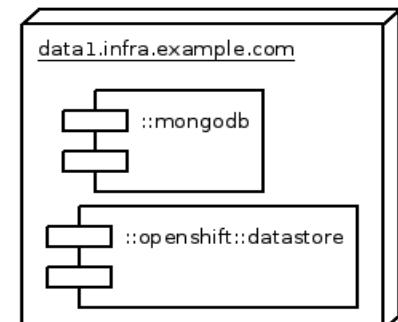
### Authentication Plugins



### OpenShift Service Host Configuration Classes



### Support Service Host Configuration Classes



(if providing name service)

"this isn't Gospel, but this is the gist"

<https://github.com/openshift/origin-install>

# OpenShift Runs on IaaS

OpenShift Origin PaaS

Amazon EC2

Rackspace

Bare Metal

OpenStack

RHEV

CloudStack

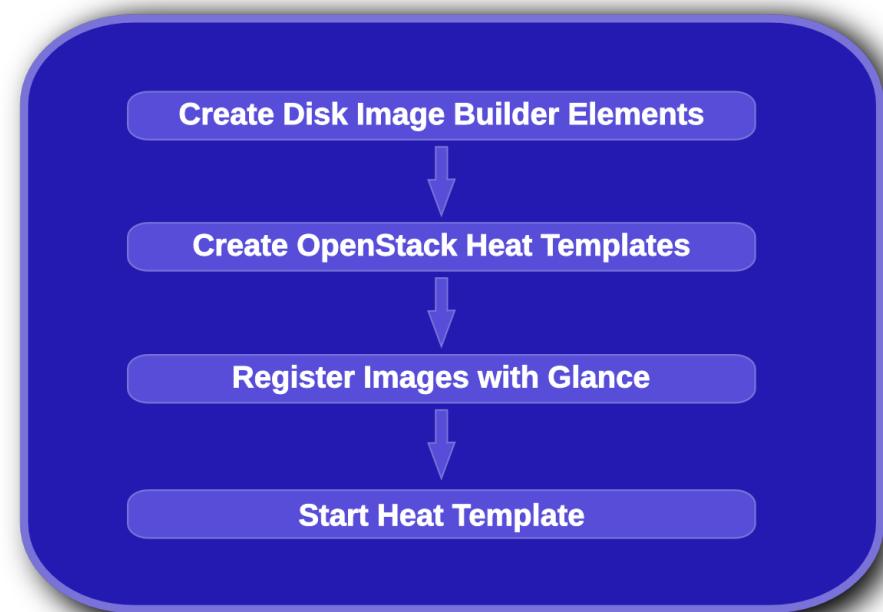
<https://github.com/openshift/origin-dev-tools>

# OpenShift on OpenStack



# OpenShift on OpenStack with Heat

- Disk Image Builder – to build the image
- Heat – to orchestrate the resources
- OpenStack – to run the infrastructure



# Disk Image Builder

- Produces images for a specific purpose
- Uses a chroot and bind mounted /proc /sys /dev
- Uses “elements” to alter how the image is built
- Supports Ubuntu, Fedora, RHEL

# Heat

- An orchestration service to build multiple composite cloud applications
- Uses AWS CloudFormation template format
- Interacts with OpenStack using native ReST API to create infrastructure resources
  - Instances, floating ips, volumes, security groups, users, etc

# Heat References

- <http://github.com/openstack/heat>
- <http://github.com/openstack/diskimage-builder>
- <http://wiki.openstack.org/wiki/Heat>

# The Road Ahead

It's all about  
Collaboration & Community



# Some of us are @RedHat



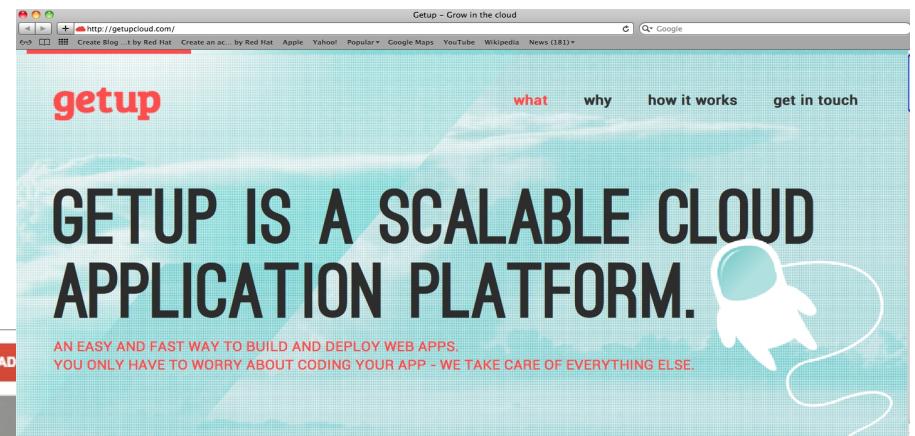
# Some are online..



The screenshot shows the OpenShift by Red Hat website homepage. The header features the OpenShift logo and navigation links for Create Blog, Create an ac..., Apple, Yahoo!, Popular, Google Maps, YouTube, Wikipedia, and News (181). A banner at the top promotes "OPENSHIFT ENTERPRISE" with the tagline "STREAMLINE APP DELIVERY". Below the banner, there are links for "LEARN MORE", "SEARCH", "MY APPS", and "SIGN UP". The main content area has a dark background with white text. It includes links for "LEARN MORE", "GET STARTED", "DEVELOPERS", and "COMMUNITY". The central feature is a large button with the text "DEVELOP AND SCALE APPS IN THE CLOUD". Below this, a subtext explains that OpenShift is a free, auto-scaling Platform as a Service (PaaS) for applications, managed by the cloud. At the bottom, two prominent red buttons offer "GET STARTED IN THE CLOUD" and "SIGN UP - IT'S FREE".

# Some are building clouds

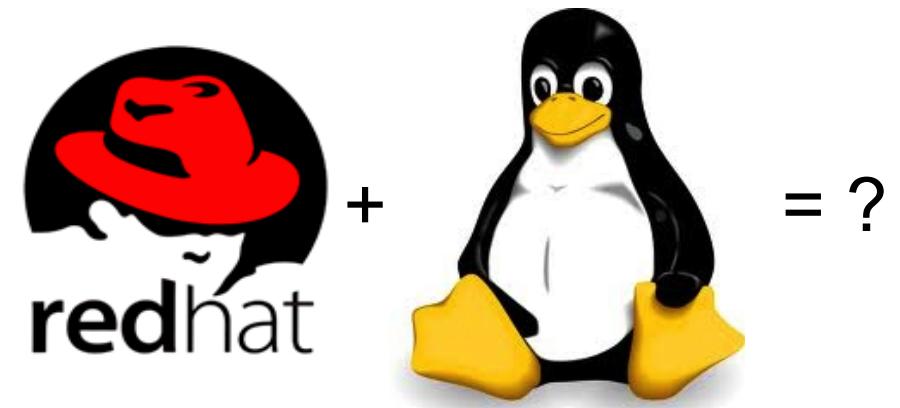
- On Premise/Private and Public Clouds
  - For Enterprises
  - For SaaS providers
  - For Developers
- Public



[Https://github.com/getupcloud/origin-server](https://github.com/getupcloud/origin-server)

# OpenShift: Community of Collaborators

- Contributors
- Developers
- Cloud Architects
- DevOps
- IT Managers
- Partners
- Solution Architects
- Fellow Evangelists



- Nex Gen PaaS
- Heat Templates
- Cartridges
- UX
- Documentation

# And all of us are in this together



# Hanging Out on Google+

(100) OpenShift Origin Developers – Discussion – Google+  
https://plus.google.com/communities/114361859072744017486/stream/56fd0f0e-70a4-47c0-b1a2-8e830e712d53

+Diane Search Images Maps Play YouTube News Gmail Drive Calendar More

Google+ dmueller2001@gmail.com

Home Profile Explore Events Communities Photos Find people More

Actions Off

All posts Discussion Development Howtos and Guides Suggestions and Ideas Blog posts Events

Share with this community

Krishna Raman Yesterday 22:33 (edited) - Discussion  
Hope my PR to add asciidoc support to Yard make it in soon (<https://github.com/lsegal/yard/pull/664>). Would like to incorporate Steve's beginners guide (<https://github.com/theSteve0/osbeginnerguide>) into origin docs.

+1 ← +4 ↗ 1

3 comments

Krishna Raman 08:25  
pull req is in. I'll work with Steve0 on incorporating the docs

Diane Mueller 09:30 Edit  
sweet!

Add a comment...

Jakub Viták 8 Apr 2013 - Discussion  
Just for fun - <https://gist.github.com/mainiak/503596248ac84002040c>

github:gist 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19. /\*.

291 MEMBERS

Invite people

All (291)

Moderators (8)

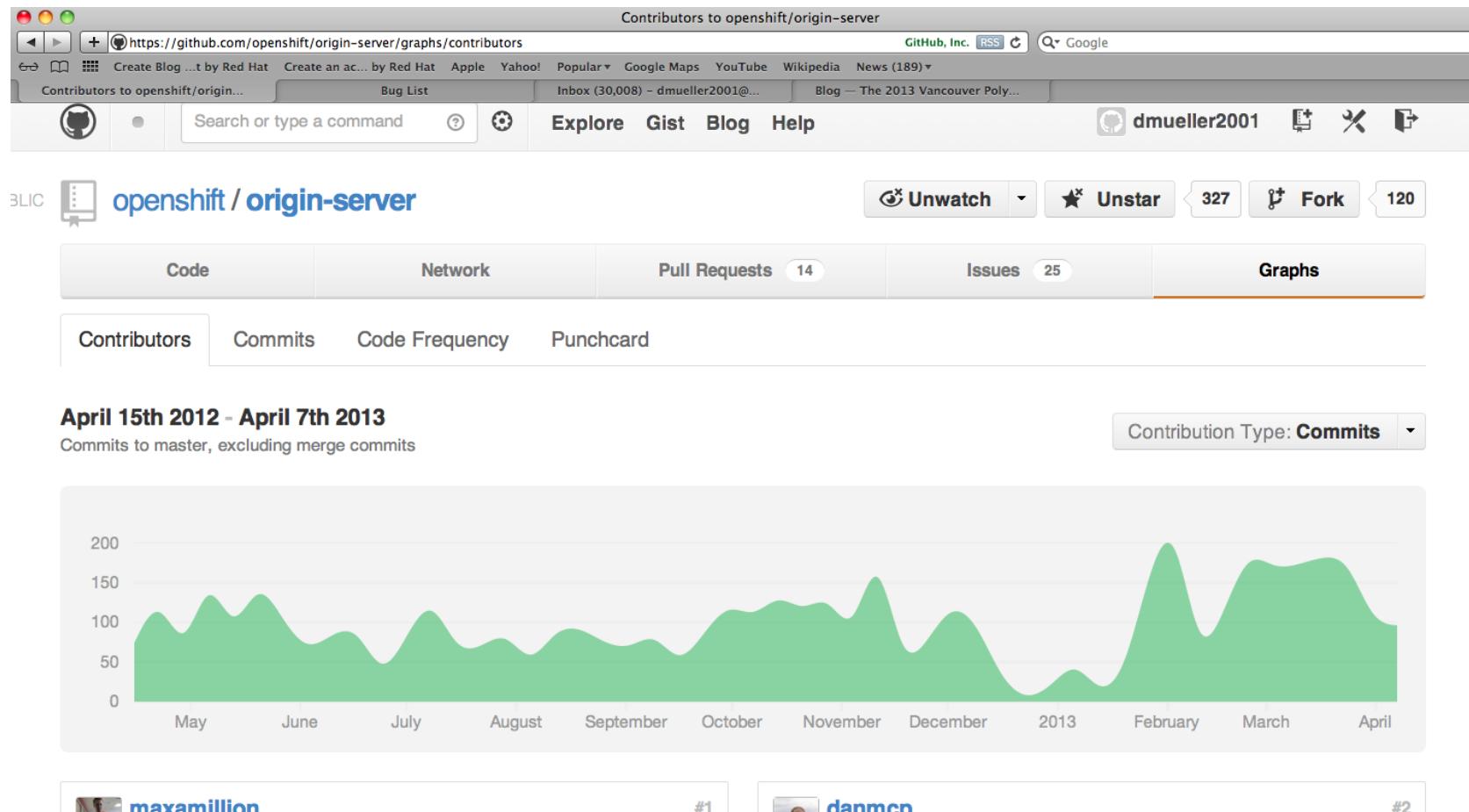
HANGOUTS

Start a new Hangout

UPCOMING EVENTS

OpenShift Origin Co... Sun, 14 April, 11:30 AM -...

# Contributing on Github



- <https://github.com/openshift/origin-server/network/members>

# OpenShift Contributor Guidelines

- <https://github.com/openshift/origin-server/blob/master/CONTRIBUTING.md>
- Apache V2 License
- It's a Meritocracy
  - Start with Bug Fixes
  - Volunteer to do Code Reviews
  - Extend the ecosystem with Cartridges & Quick Starts
  - Test!
  - Document
  - Evangelize!

# It's Open Source! Get Involved!

- \* Github:
  - \* openshift/origin-server
  - \* openshift/rhc
  - \* openshift/puppet-openshift\_origin
  - \* openshift/openshift-pep
  - \* openshift/openshift-extras
  - \* Quickstarts & Cartridges
- \* Mailing Lists: [dev@lists.openshift.redhat.com](mailto:dev@lists.openshift.redhat.com)
- \* IRC freenode.net, #openshift-dev
- \* Deploy, Extend, Contribute!



# Communication Channels

- Google+ Community

<https://plus.google.com/communities/114361859072744017486>

- E-Mail

- OpenShift Users: users@lists.openshift.redhat.com

- Origin Developers: dev@lists.openshift.redhat.com

- IRC: irc.freenode.net

- OpenShift Users: #openshift

- Origin Developers: #openshift-dev



# Questions?

## Thank you!



For more information:  
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