PaaS Market Overview

May 15, 2013

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Disclaimer

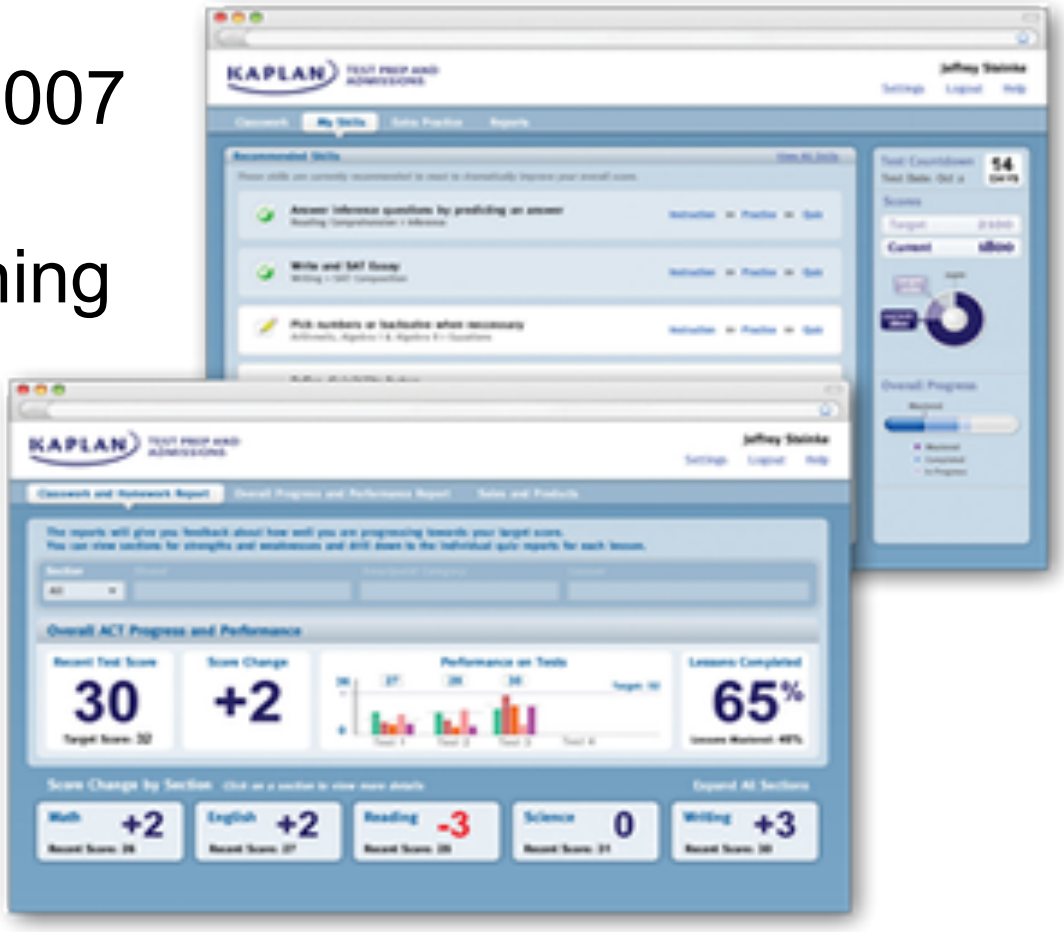
Unless expressly stated otherwise, the findings, interpretations and conclusions expressed are mine and do not necessarily represent the views of the Red Hat.

Who Am I?

Red Hat Consulting - Midwest Territory Lead
joined via Amentra acquisition

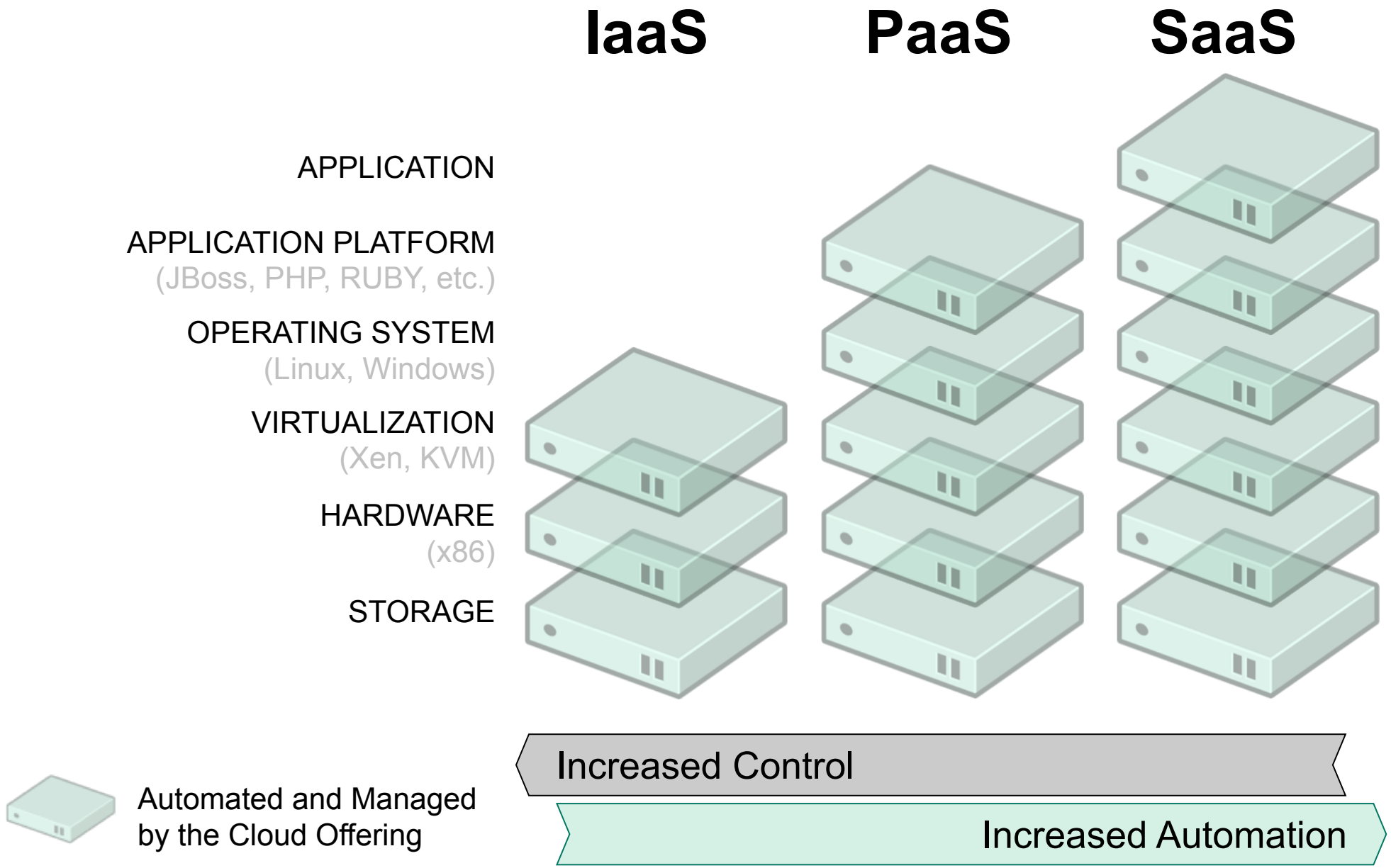
Developing enterprise apps
since 2000. On PaaS since 2007

Created Kaplan's award-winning
SaaS offering for
SAT and ACT prep



What is the Enterprise “Cloud”?

Enterprise Cloud Components



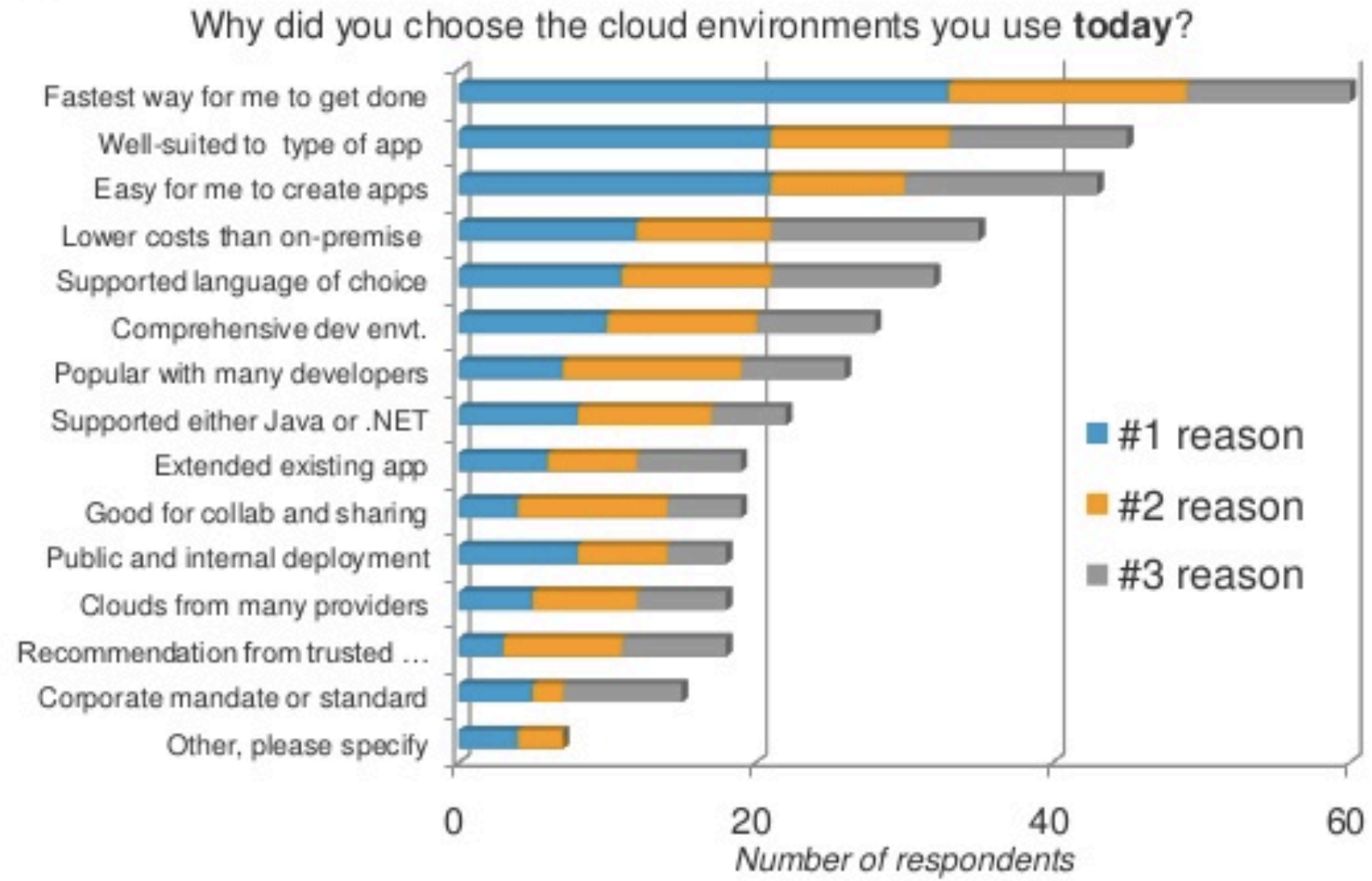
Enterprise Cloud Components

IaaS

PaaS

SaaS

Speed of delivery top selection reason



Base: 106 developers with direct experience developing applications using cloud computing environments.
Source: Forrester Global Cloud Developer Online Survey, Q3 2012

Streamlining App Dev with PaaS

Craftwork

Assembly Line

Physical

How to Build an App:

1.Have Idea
2.Get Budget
3.Submit hardware acquisition request
4.Wait
5.Get Hardware
6.Rack and Stack Hardware
7.Install Operating System
8.Install OS Patches/Fix-Packs
9.Create user Accounts
10.Deploy framework/appserver
11.Deploy testing tools
12.Code
13.Test
14.Configure Prod servers (and buy them if needed)
15.Push to Prod
16.Launch
17.Order more servers to meet demand
18.Wait…
19.Deploy new servers
20.Etc.

Virtualized

How to Build an App:

1.Have Idea
2.Get Budget
3.Submit VM Request request
4.Wait
5.Deploy framework/appserver
6.Deploy testing tools
7.Code
8.Test
9.Configure Prod VMs
10.Push to Prod
11.Launch
12.Request More Prod VMs to meet demand
13.Wait
14.Deploy app to new VMs
15.Etc.

With PaaS

How to Build an App:

1. Have Idea
2. Get Budget
3. Code
4. Test
5. Launch
6. Automatically 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**

Accelerate IT Service Delivery

PaaS leverages **automation** technologies and a **cloud** architecture…

…to drive **Velocity**, **Efficiency**, and **Scalability** in **IT**

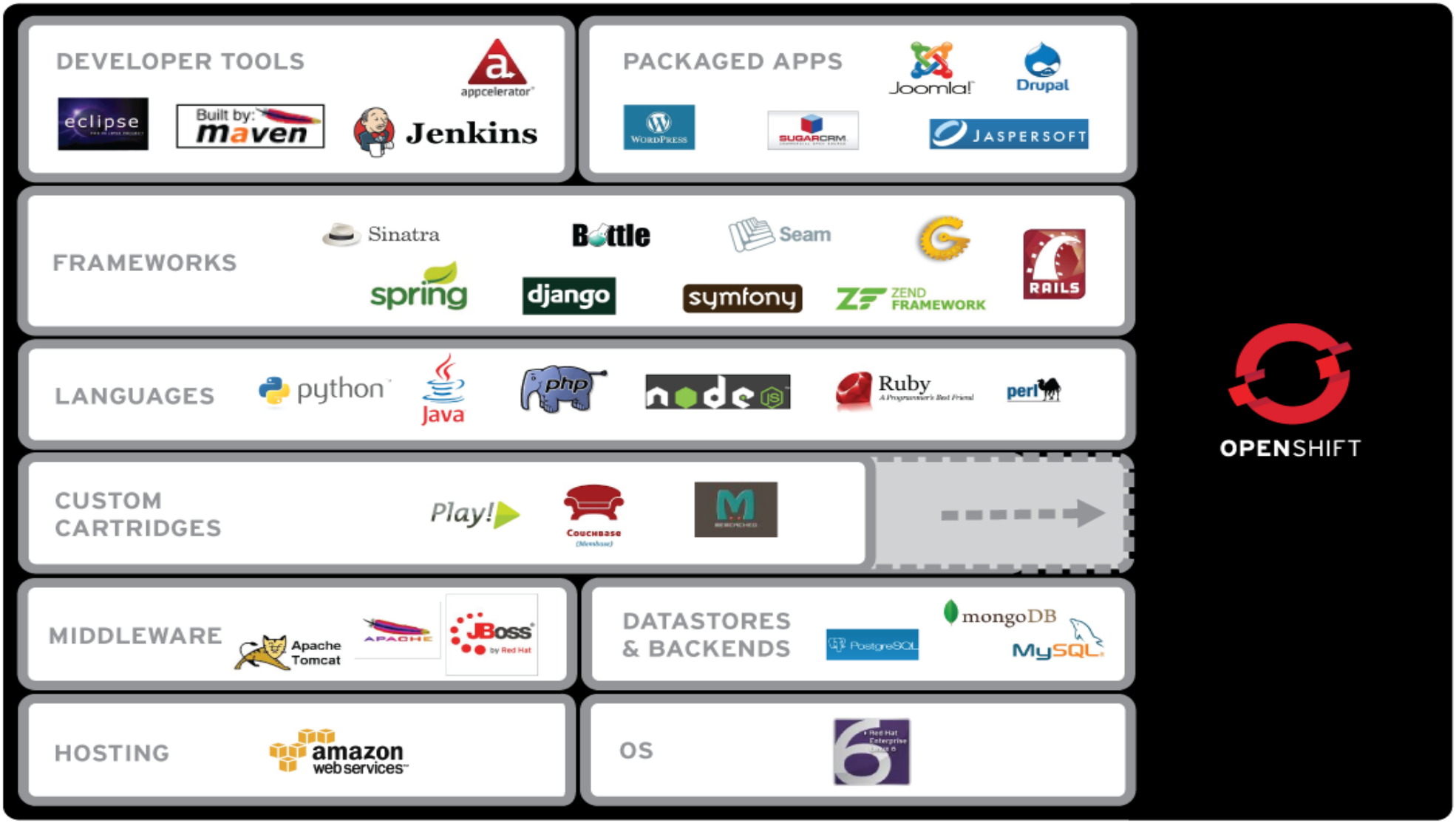
Top application scenario:

INTERNAL BUSINESS APPLICATIONS TOP THE LIST; MOBILE SITES NEXT

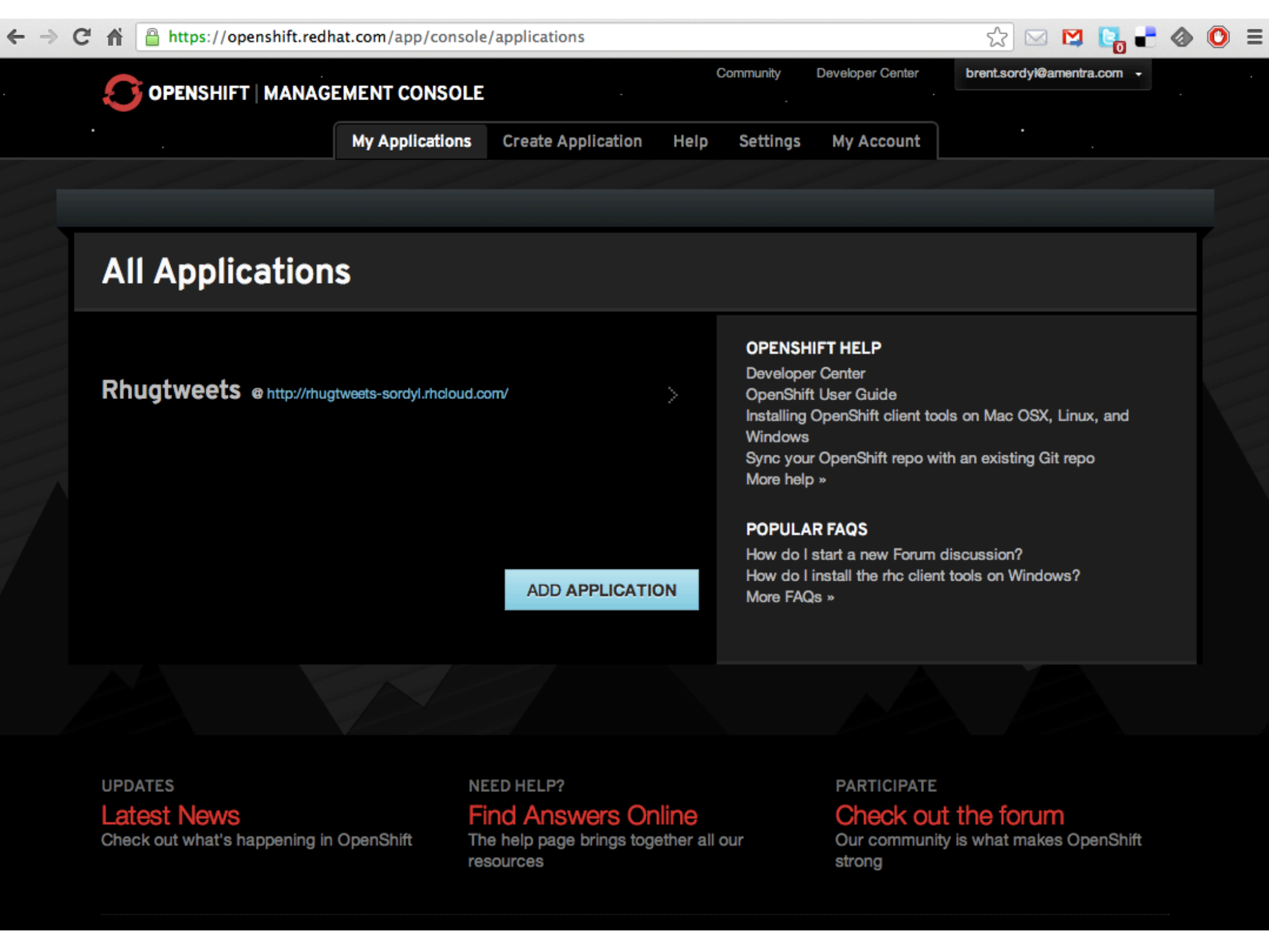
What kinds of applications have you delivered using a cloud environment? Which do you plan to deliver during the next 12 months?

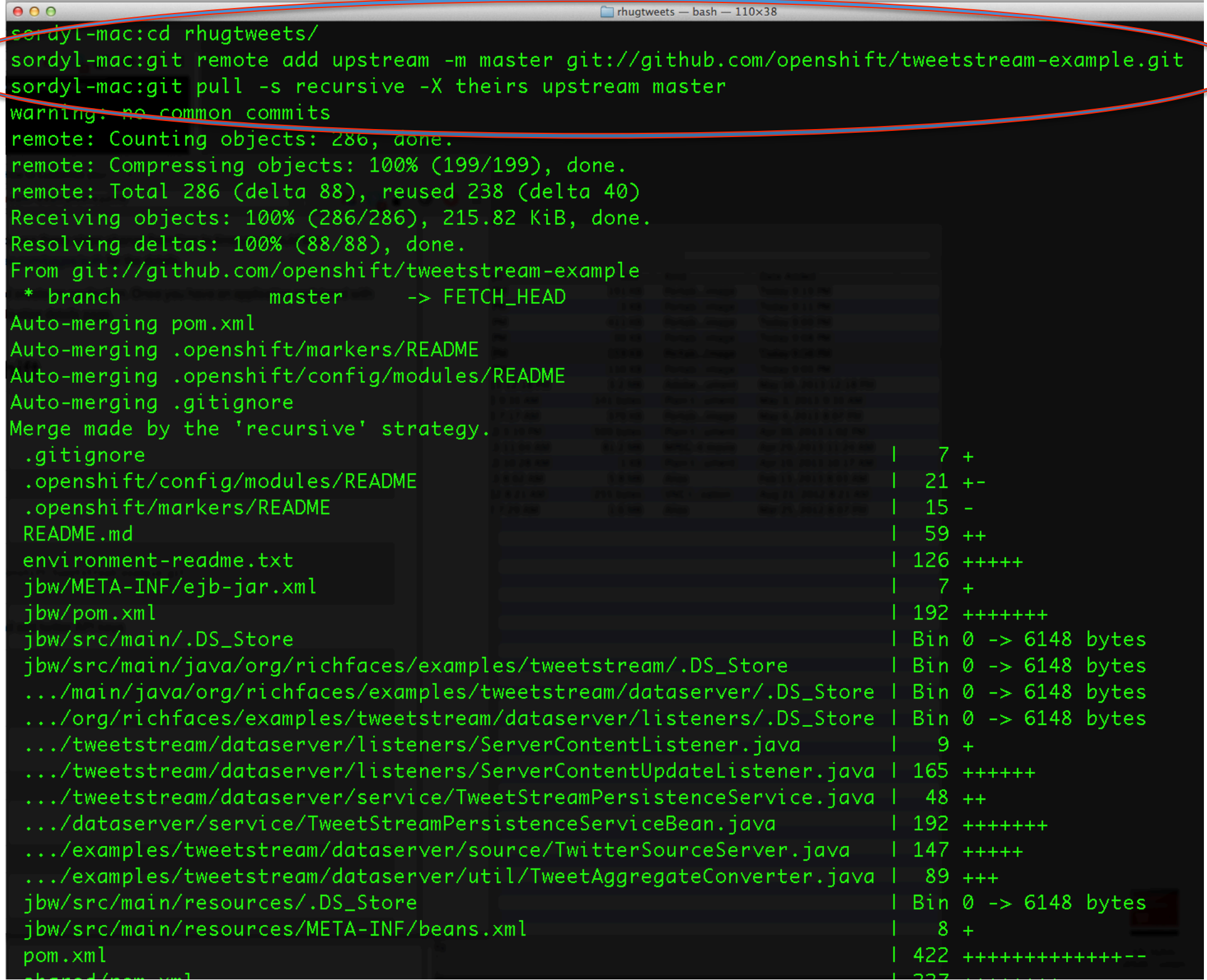
Base: 106 developers with direct experience developing applications using cloud computing environments.
Source: Forrester Global Cloud Developer Online Survey, Q3 2012

Developers Choose Languages, Frameworks and Middleware



```
sordyl-mac:rhc app create -a rhugtweets -t jbossas-7
Your authorization token has expired. Please sign in now to continue.

Application Options
-------------------
  Namespace:  sordyl
  Cartridges: jbossas-7
  Gear Size:  default
  Scaling:    no

Creating application 'rhugtweets' ... done

Waiting for your DNS name to be available ... done

Downloading the application Git repository ...
Cloning into 'rhugtweets'...
The authenticity of host 'rhugtweets-sordyl.rhcloud.com (54.234.156.130)' can't be established.
RSA key fingerprint is cf:e[redacted]8:a7.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'rhugtweets-sordyl.rhcloud.com,54.234.156.130' (RSA) to the list of known hosts.

Your application code is now in 'rhugtweets'

rhugtweets @ http://rhugtweets-sordyl.rhcloud.com/ (uuid: 5[redacted]8)
------------------------------------------------------------------------------
  Created: 9:07 PM
  Gears:   1 (defaults to small)
  Git URL: ssh://5[redacted]8@rhugtweets-sordyl.rhcloud.com/~/git/rhugtweets.git/
  SSH:     5[redacted]8@rhugtweets-sordyl.rhcloud.com

  jbossas-7 (JBoss Application Server 7.1)
  ----------------------------------------
    Gears: 1 small

RESULT:
Application rhugtweets was created.
```


https://openshift.redhat.com/app/console/applications
OPENSHIFT | MANAGEMENT CONSOLE
Community
Developer Center
brent.sordyl@amentra.com
My Applications
Create Application
Help
Settings
My Account
All Applications
Rhugtweets @ http://rhugtweets-sordyl.rhcloud.com/
ADD APPLICATION
OPENSHIFT HELP
Developer Center
OpenShift User Guide
Installing OpenShift client tools on Mac OSX, Linux, and Windows
Sync your OpenShift repo with an existing Git repo
More help »
POPULAR FAQS
How do I start a new Forum discussion?
How do I install the rhc client tools on Windows?
More FAQs »
UPDATES
Latest News
Check out what's happening in OpenShift
NEED HELP?
Find Answers Online
The help page brings together all our resources
PARTICIPATE
Check out the forum
Our community is what makes OpenShift strong


rhugtweets — bash — 110×38
sordyl-mac:cd rhugtweets/
sordyl-mac:git remote add upstream -m master git://github.com/openshift/tweetstream-example.git
sordyl-mac:git pull -s recursive -X theirs upstream master
warning: no common commits
remote: Counting objects: 286, done.
remote: Compressing objects: 100% (199/199), done.
remote: Total 286 (delta 88), reused 238 (delta 40)
Receiving objects: 100% (286/286), 215.82 KiB, done.
Resolving deltas: 100% (88/88), done.
From git://github.com/openshift/tweetstream-example
 * branch   master   -> FETCH_HEAD
Auto-merging pom.xml
Auto-merging .openshift/markers/README
Auto-merging .openshift/config/modules/README
Auto-merging .gitignore
Merge made by the 'recursive' strategy.
 .gitignore | 7 +
 .openshift/config/modules/README | 21 +-
 .openshift/markers/README | 15 -
 README.md | 59 ++
 environment-readme.txt | 126 +++++
 jbw/META-INF/ejb-jar.xml | 7 +
 jbw/pom.xml | 192 +++++++
 jbw/src/main/.DS_Store | Bin 0 -> 6148 bytes
 jbw/src/main/java/org/richfaces/examples/tweetstream/.DS_Store | Bin 0 -> 6148 bytes
 .../main/java/org/richfaces/examples/tweetstream/dataserver/.DS_Store | Bin 0 -> 6148 bytes
 .../org/richfaces/examples/tweetstream/dataserver/listeners/.DS_Store | Bin 0 -> 6148 bytes
 .../tweetstream/dataserver/listeners/ServerContentListener.java | 9 +
 .../tweetstream/dataserver/listeners/ServerContentUpdateListener.java | 165 ++++++
 .../tweetstream/dataserver/service/TweetStreamPersistenceService.java | 48 ++
 .../dataserver/service/TweetStreamPersistenceServiceBean.java | 192 +++++++
 .../examples/tweetstream/dataserver/source/TwitterSourceServer.java | 147 +++++
 .../examples/tweetstream/dataserver/util/TweetAggregateConverter.java | 89 +++
 jbw/src/main/resources/.DS_Store | Bin 0 -> 6148 bytes
 jbw/src/main/resources/META-INF/beans.xml | 8 +
 pom.xml | 422 ++++++++++++++--

edit tweetstream/src/main/resources/twitter4j.properties

twitter4j.properties

```
#Note: You must fill in these values with your open credentials, see README for details
debug=false
oauth.consumerKey=
oauth.consumerSecret=
oauth.accessToken=
oauth.accessTokenSecret=
```

rhugtweets — bash — 110×

```
sordyl-mac:git commit -a -m "add my twitter API credentials"
[master c2f3d0f] add my twitter API credentials
 1 file changed, 4 insertions(+), 4 deletions(-)
```

edit tweetstream/src/main/resources/twittertracks.properties

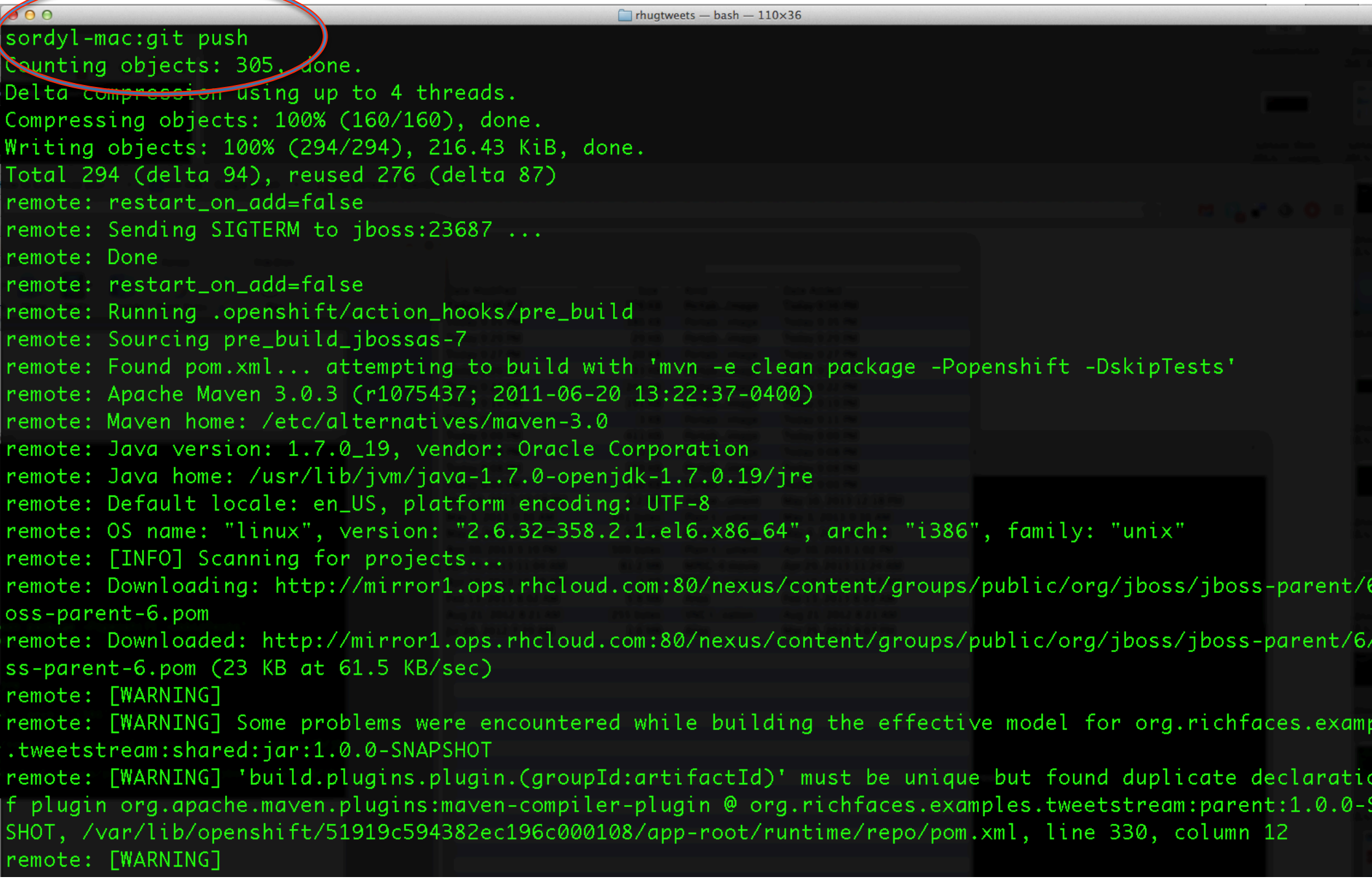
twittertracks.properties — rhugtweets

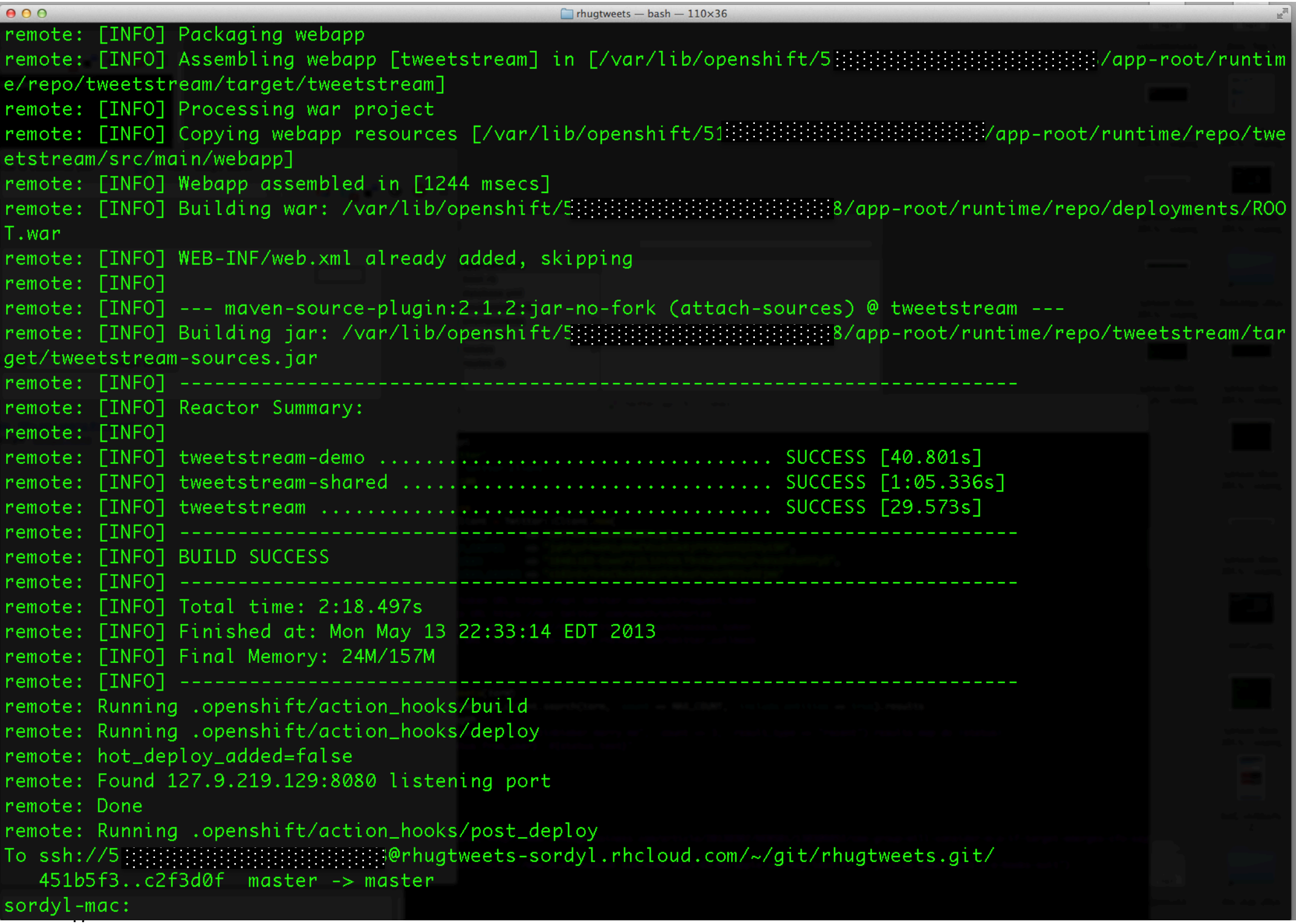
twittertracks.properties

```
rhug
happygnome
```

rhugtweets —

```
sordyl-mac:git commit -a -m "change tweet search terms"
```


rhugtweets — bash — 110×36
sordyl-mac:git push
Counting objects: 305, done.
Delta compression using up to 4 threads.
Compressing objects: 100% (160/160), done.
Writing objects: 100% (294/294), 216.43 KiB, done.
Total 294 (delta 94), reused 276 (delta 87)
remote: restart_on_add=false
remote: Sending SIGTERM to jboss:23687 ...
remote: Done
remote: restart_on_add=false
remote: Running .openshift/action_hooks/pre_build
remote: Sourcing pre_build_jbossas-7
remote: Found pom.xml... attempting to build with 'mvn -e clean package -Popenshift -DskipTests'
remote: Apache Maven 3.0.3 (r1075437; 2011-06-20 13:22:37-0400)
remote: Maven home: /etc/alternatives/maven-3.0
remote: Java version: 1.7.0_19, vendor: Oracle Corporation
remote: Java home: /usr/lib/jvm/java-1.7.0-openjdk-1.7.0.19/jre
remote: Default locale: en_US, platform encoding: UTF-8
remote: OS name: "linux", version: "2.6.32-358.2.1.el6.x86_64", arch: "i386", family: "unix"
remote: [INFO] Scanning for projects...
remote: Downloading: http://mirror1.ops.rhcloud.com:80/nexus/content/groups/public/org/jboss/jboss-parent/6
oss-parent-6.pom
remote: Downloaded: http://mirror1.ops.rhcloud.com:80/nexus/content/groups/public/org/jboss/jboss-parent/6/
ss-parent-6.pom (23 KB at 61.5 KB/sec)
remote: [WARNING]
remote: [WARNING] Some problems were encountered while building the effective model for org.richfaces.examp
.tweetstream:shared:jar:1.0.0-SNAPSHOT
remote: [WARNING] 'build.plugins.plugin.(groupId:artifactId)' must be unique but found duplicate declaratio
f plugin org.apache.maven.plugins:maven-compiler-plugin @ org.richfaces.examples.tweetstream:parent:1.0.0-S
SHOT, /var/lib/openshift/51919c594382ec196c000108/app-root/runtime/repo/pom.xml, line 330, column 12
remote: [WARNING]


rhugtweets — bash — 110×36
remote: [INFO] Packaging webapp
remote: [INFO] Assembling webapp [tweetstream] in [/var/lib/openshift/5[redacted]/app-root/runtime/repo/tweetstream/target/tweetstream]
remote: [INFO] Processing war project
remote: [INFO] Copying webapp resources [/var/lib/openshift/51[redacted]/app-root/runtime/repo/tweetstream/src/main/webapp]
remote: [INFO] Webapp assembled in [1244 msecs]
remote: [INFO] Building war: /var/lib/openshift/5[redacted]8/app-root/runtime/repo/deployments/ROOT.war
remote: [INFO] WEB-INF/web.xml already added, skipping
remote: [INFO]
remote: [INFO] --- maven-source-plugin:2.1.2:jar-no-fork (attach-sources) @ tweetstream ---
remote: [INFO] Building jar: /var/lib/openshift/5[redacted]8/app-root/runtime/repo/tweetstream/target/tweetstream-sources.jar
remote: [INFO] --
remote: [INFO] Reactor Summary:
remote: [INFO]
remote: [INFO] tweetstream-demo ..... SUCCESS [40.801s]
remote: [INFO] tweetstream-shared ..... SUCCESS [1:05.336s]
remote: [INFO] tweetstream ..... SUCCESS [29.573s]
remote: [INFO] --
remote: [INFO] BUILD SUCCESS
remote: [INFO] --
remote: [INFO] Total time: 2:18.497s
remote: [INFO] Finished at: Mon May 13 22:33:14 EDT 2013
remote: [INFO] Final Memory: 24M/157M
remote: [INFO] --
remote: Running .openshift/action_hooks/build
remote: Running .openshift/action_hooks/deploy
remote: hot_deploy_added=false
remote: Found 127.9.219.129:8080 listening port
remote: Done
remote: Running .openshift/action_hooks/post_deploy
To ssh://5[redacted]@rhugtweets-sordyl.rhcloud.com/~/git/rhugtweets.git/
   451b5f3..c2f3d0f master -> master
sordyl-mac:

http://rhugtweets-sordyl.rhcloud.com/

Keywords:

rhug
happygnome

PaaS Options: RYO, Public, Private

Who owns the
The Twelve –ilities?

1. Suitability
2. Cost Effectiveness
3. Performance
4. Resilience
5. Interoperability
6. Operability
7. Availability
8. Security
9. Portability
10. Scalability
11. Flexibility
12. Maintainability

APPLICATION

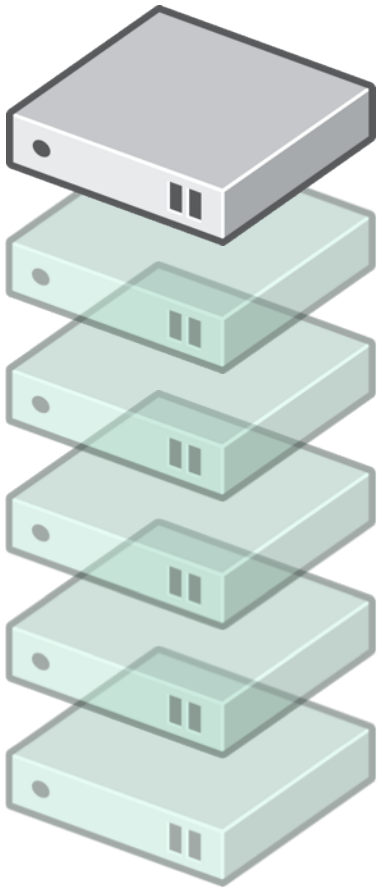
APPLICATION PLATFORM
(JBoss, Apache, RUBY, etc.)

OPERATING SYSTEM
(Linux, Windows)

VIRTUALIZATION
(Xen, KVM)

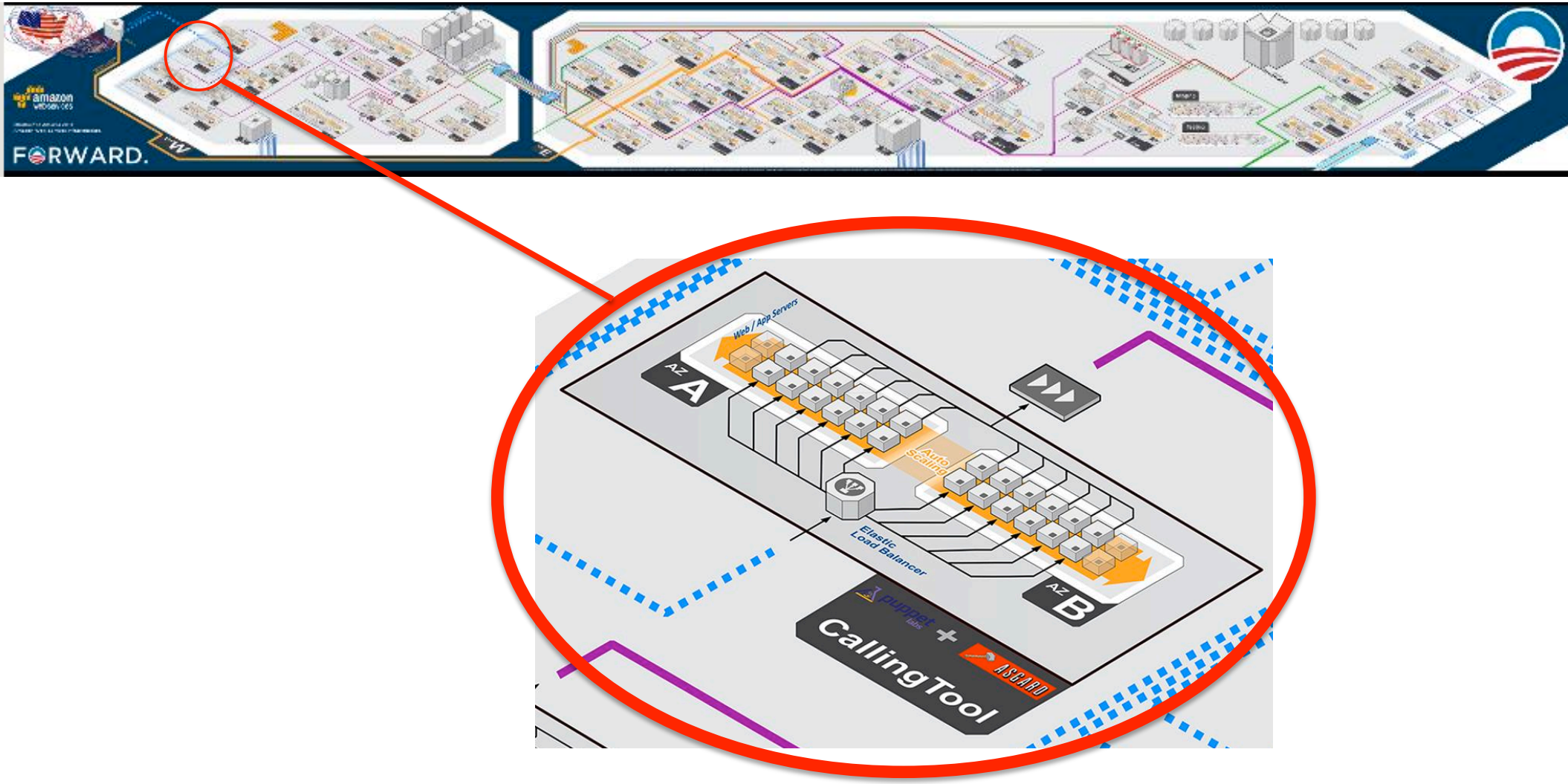
HARDWARE
(x86)

STORAGE



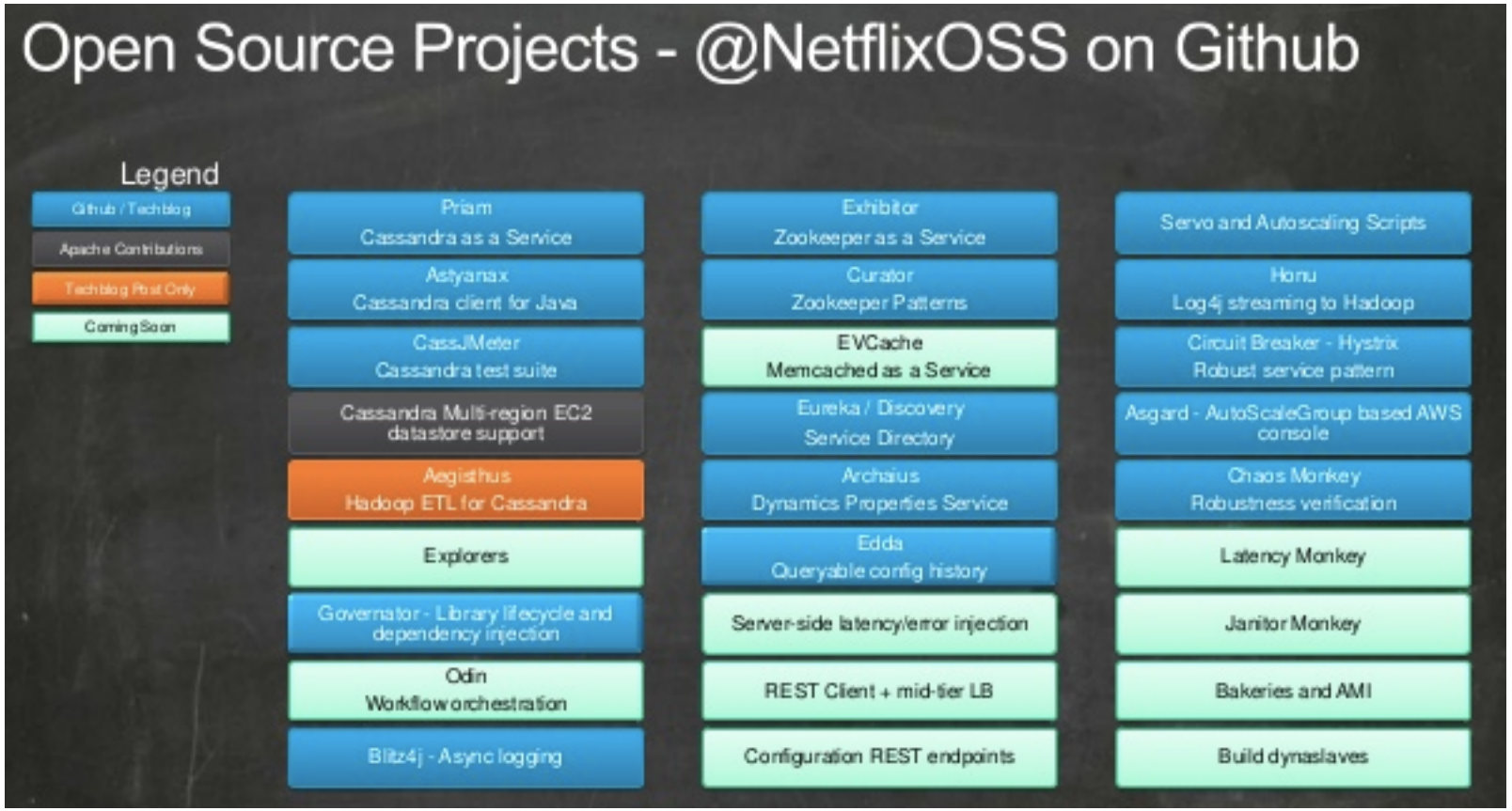
Controlled by the PaaS Provider

Roll Your Own



See: http://awsofa.info
http://gigaom.com/2012/11/12/how-obamas-tech-team-helped-deliver-the-2012-election/

Roll Your Own



"We're using Amazon more efficiently than the retail arm of Amazon is," says Adrian Cockcroft, Netflix's cloud architect.

Public: Pay-by-the-drink

Resource	Unit	Unit cost
Outgoing Bandwidth	Gigabytes	$0.12
Frontend Instances (F1 class)	Instance hours	$0.08
Frontend Instances (F2 class)	Instance hours	$0.16
Frontend Instances (F4 class)	Instance hours	$0.32

API Call	Datastore Operations
Entity Get (per entity)	1 read
New Entity Put (per entity, regardless of entity size)	2 writes + 2 writes per indexed property value + 1 write per composite index value
Existing Entity Put (per entity)	1 write + 4 writes per modified indexed property value + 2 writes per modified composite index value
Entity Delete (p	
Query	
Query (projectio	
Query (keys onl	
Key allocation (	

Operation	Cost
Write	$0.10 per 100k operations
Read	$0.07 per 100k operations
Small	$0.01 per 100k operations

Channe		
Recipie		
XMPP	XMPP stanzas	$0.000001 ($0.10/100,000 stanzas)
Logs API	Gigabytes	$0.12
SNI SSL certificates	Sets of five SNI certificate slots per month	$9.00
SSL Virtual IPs (VIPs)	Virtual IP per month	$39.00
PageSpeed bandwidth	Gigabytes (in addition to outgoing bandwidth charges)	$0.39

Public PaaS Example 1: Google App Engine

1. Began in preview in 2008 (beta)
2. Dramatically raised price in 2011
3. Supports Java and Python
4. Java limited:
    1. Servers not configurable
    2. Java Class Whitelist
    3. Focus on NoSQL; CloudSQL RDBMS
5. Limits to startup and response times
6. Auto-scaling instances
7. Service credits for uptime below 99.95

Public PaaS Example 2: Amazon Elastic Beanstalk

1. Java, PHP, .NET, Ruby, Python, Node.js
2. Wrapper around AWS IaaS Offerings
    1. EC2
    2. SimpleDB, DynamoDB, RDS
    3. Simple Email Service
    4. Simple Storage Service (S3)
    5. Elastic Block Storage (EBS)
    6. SNS, ELB, Auto Scaling
3. Pay only for components
4. Service credits for uptime below 99.95

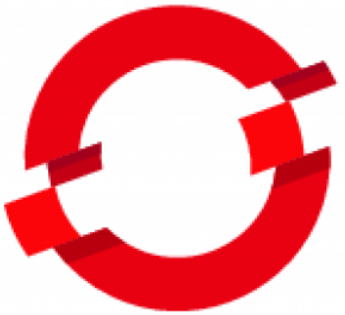
The following table list the specifications for each Amazon EC2 Instance Type:

Instance Family	Instance Type	Architecture	vCPU	ECU	Memory (GiB)	Instance Storage (GB)	EBS-optimized Bandwidth	# IP	Network Performance
General purpose	m1.small	32-bit or 64-bit	1	1	1.7	1 x 160	-	8	Low
General purpose	m1.medium	32-bit or 64-bit	1	2	3.75	1 x 410	-	12	Moderate
General purpose	m1.large	64-bit	2	4	7.5	2 x 420	500 Mbps	30	Moderate
General purpose	m1.xlarge	64-bit	4	8	15	2 x 840	1000 Mbps	60	High
General purpose	m3.xlarge	64-bit	4	13	15	0 - EBS only	500 Mbps	60	Moderate
General purpose	m3.2xlarge	64-bit	8	26	30	0 - EBS only	1000 Mbps	120	High
Compute optimized	c1.medium	32-bit or 64-bit	2	5	1.7	1 x 350	-	12	Moderate
Compute optimized	c1.xlarge	64-bit	8	20	7	4 x 420	1000 Mbps	60	High
Compute optimized	cc1.4xlarge	64-bit	16	33.5	22.5	2 x 840	-	1	10 Gigabit [5]
Compute optimized	cc2.8xlarge	64-bit	32 [1]	88	60.5	4 x 840	-	240	10 Gigabit [5]
Memory optimized	m2.xlarge	64-bit	2	6.5	17.1	1 x 420	-	60	Moderate
Memory optimized	m2.2xlarge	64-bit	4	13	34.2	1 x 850	500 Mbps	120	Moderate
Memory optimized	m2.4xlarge	64-bit	8	26	68.4	2 x 840	1000 Mbps	240	High
Memory optimized	cr1.8xlarge	64-bit	32 [1]	88	244	2 x 120 SSD	-	1	10 Gigabit [5]
Storage optimized	hi1.4xlarge	64-bit	16	35	60.5	2 x 1,024 SSD [3]	-	1	10 Gigabit [5]
Storage optimized	hs1.8xlarge	64-bit	16	35	117	24 x 2,048 [4]	-	1	10 Gigabit [5]
Micro instances	t1.micro	32-bit or 64-bit	1	Variable[6]	0.615	0 - EBS only	-	1	Very Low
GPU instances	cg1.4xlarge	64-bit	16 [2]	33.5	22.5	2 x 840	-	1	10 Gigabit [5]

[1] CC2 and CR1 Instances are backed by 2 x Intel Xeon E5-2670 processors, eight-cores with hyperthreading

More Public PaaS's

Windows Azure



OPENSHIFT

TIER 3

Built on Open Source

Windows Azure

OPENSHIFT

TIER 3

CloudBees
The Java™ PaaS Company

Public PaaS

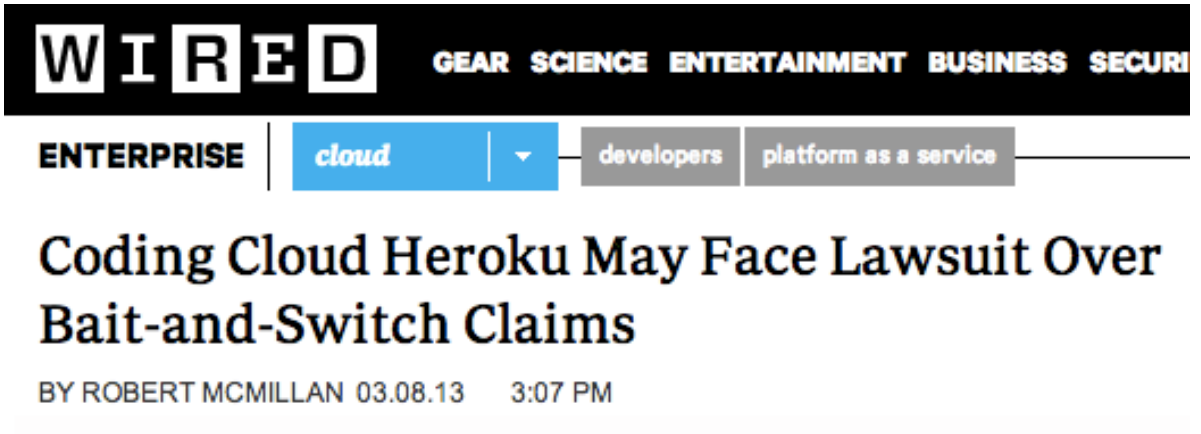
	OpenShift	Heroku	App Engine	Beanstalk	Azure	EngineYard	AppHarbor	CumuLogic	CloudBees	Tier 3	
JAVA	✓	✓	≠	✓	✓	≠		✓	✓	✓	9
.NET				✓	✓		✓			✓	4
RDBMS	✓	✓	≠	✓	✓	✓	✓	✓	✓	✓	10
NOSQL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10
CLI & IDE INTEGRATION	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10
WEB-BASED ADMIN UI		✓	✓	✓	✓			✓	✓	✓	7
AUTO-SCALING	✓	✓	✓	✓	✓				✓	✓	7
IS OPEN SOURCE	✓										1
BUILT ON OPEN SOURCE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10
LIVES ON EC2 IAAS	✓	✓		✓		✓	✓	✓	✓		7

* Features as of late 2012

Why Private PaaS?

1. No Proprietary Lock-in
2. Achieve Benefits of Public with Hybrid Model
3. Compliance and Data Protection, i.e. HIPAA, PCI, COPPA, GLBA
4. Existing IT assets: data centers, software & people
5. Infrastructure as a competitive advantage

   High-frequency trading, retailers competing with Amazon
6. Access to internal APIs
7. Own the SLA
8. Choose your IaaS
9. No Magic Black Boxes

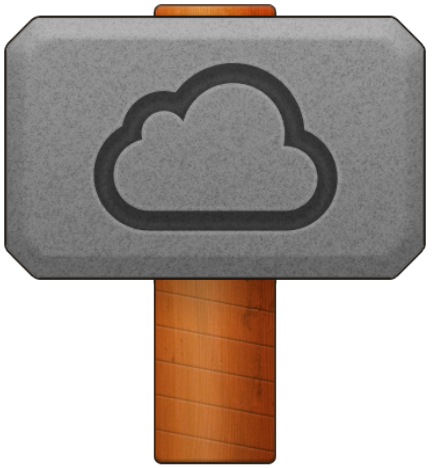


CLOUD FOUNDRY™

software Uhuru

af appfog

stackato™

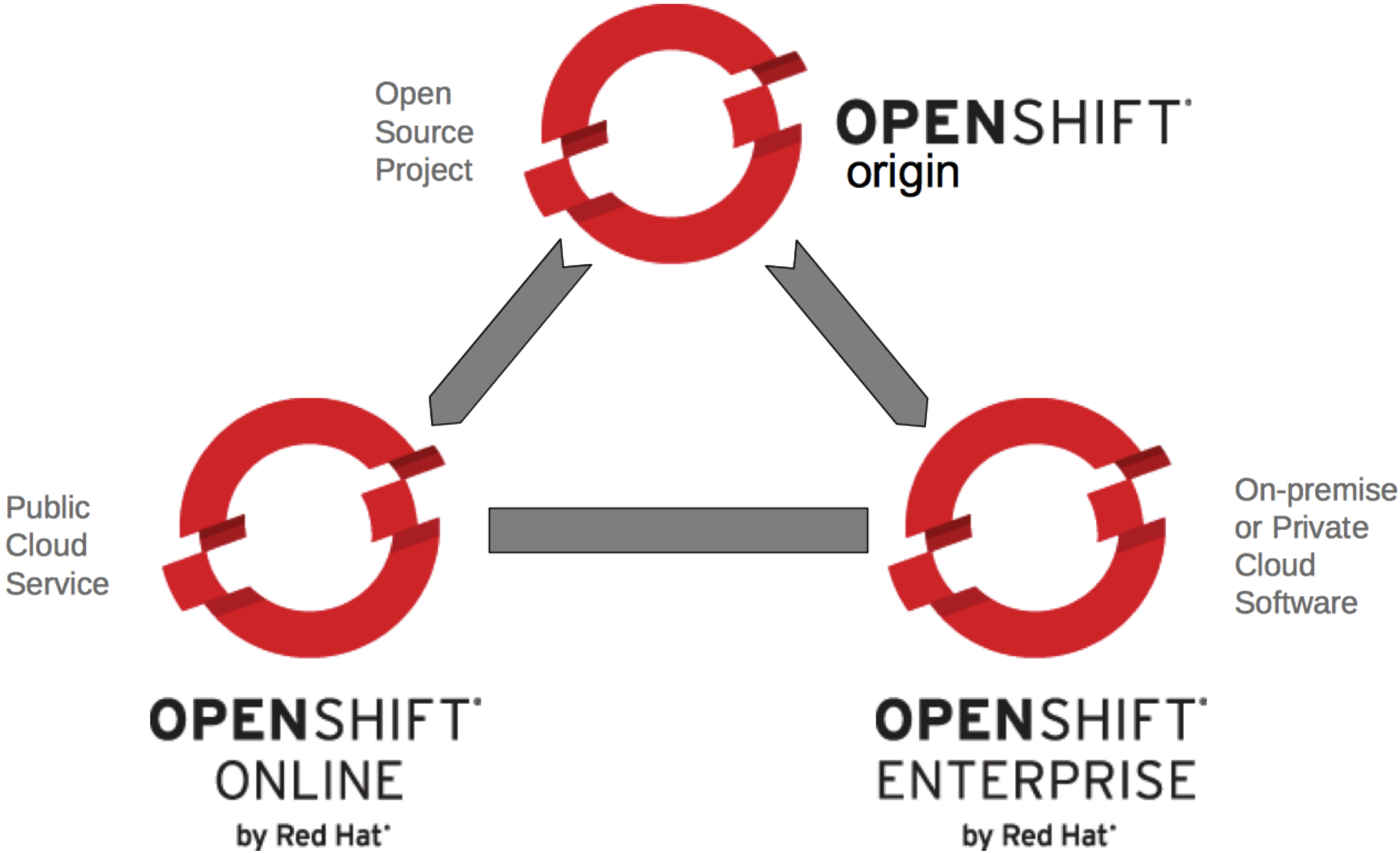



CLOUD FOUNDRY™
CORE
Preserving Cloud Application Portability
Enter API endpoint to check for Cloud Foundry Core compatibility
Ex: "api.cloudfoundry.com"
TEST ENDPOINT

Stackato Private PaaS

1. Commercial CloudFoundry + Phenona
2. Not open source. Lock in risk.
3. Java, Node.js, Ruby, Perl, PHP, .NET
4. Runs on EC2, HP Cloud Services, vSphere, OpenStack, KVM
5. Web Admin UI, REST API
6. Auto-scaling (vSphere, EC2, OpenStack)
7. Multi-tenant security via LXC

Red Hat's OpenShift PaaS Strategy



OpenShift Enterprise Private PaaS

1. Open source!
2. Java, Ruby, PHP, Perl, Python, DIY
3. Add Frameworks via Open Cartridge Format
4. Scale-out to Hosted OpenShift Online
5. Runs on RHEL anywhere (EC2, vSphere, HP Cloud, OpenStack, RHEV, Bare, etc…)
6. Auto-scaling
7. Multi-tenant security via SELinux
8. REST Management API
9. Auto application idling

Get Started Today for Free!

- Deploy Apps to the **OpenShift OnLine** Developer Preview
- Request an Evaluation of **OpenShift Enterprise**
- Join the **OpenShift Origin** Open Source Project community