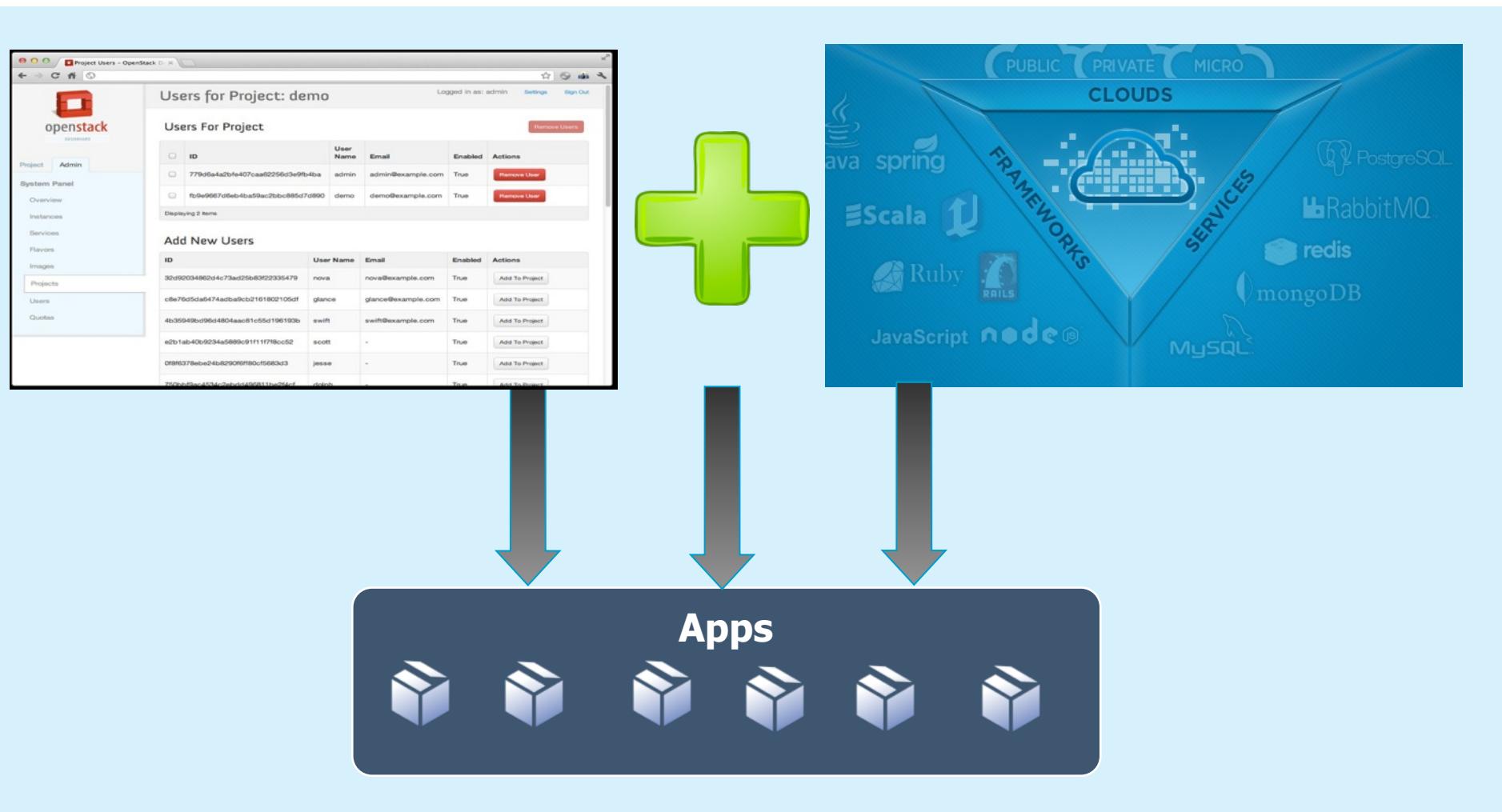


Cloud Foundry and OpenStack - How They Fit



Jason Anderson, Animesh Singh
@andersonjason, @animeshsingh

Cloud Expo, Santa Clara
Nov 4, 2014



What Is OpenStack?

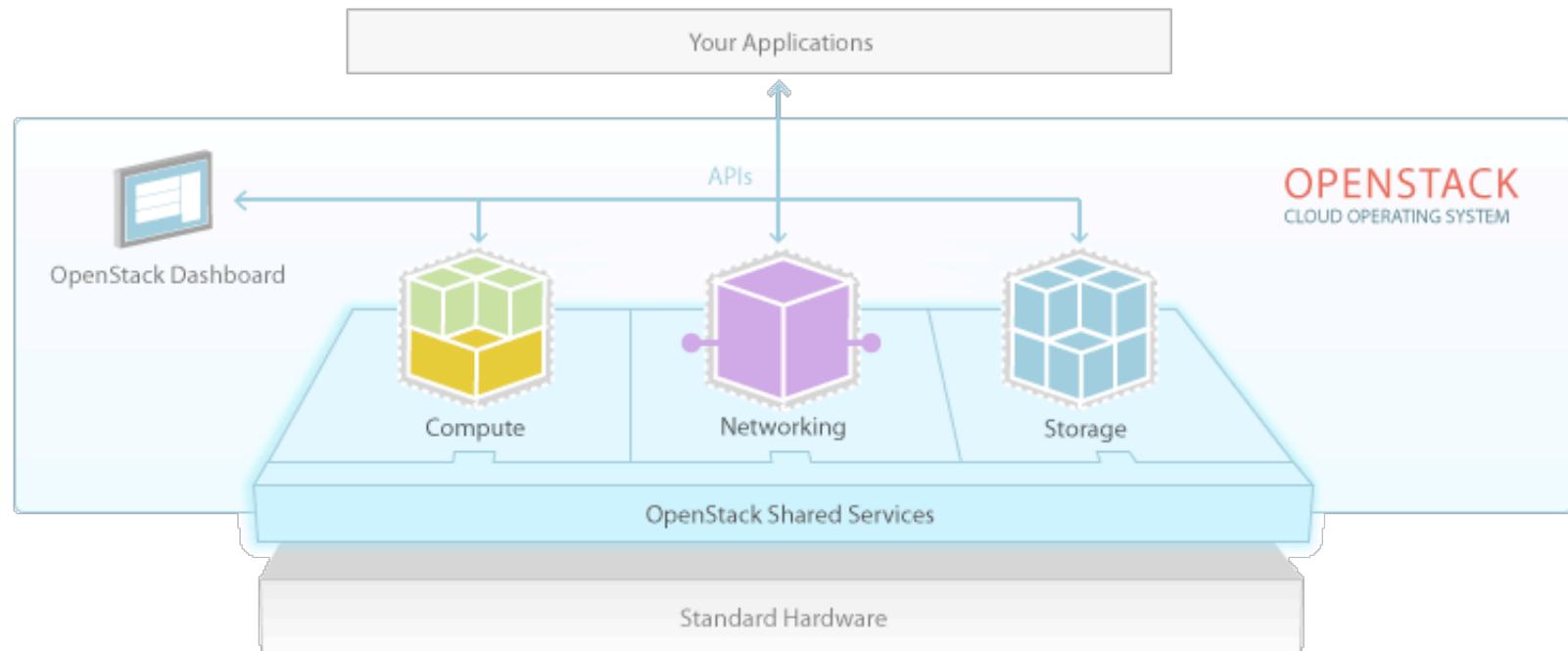
- An open source cloud computing platform for public & private clouds
- IaaS for managing compute, storage, and networking resource
- Standard and massively scalable cloud operating system
- Largest open source Cloud project (76K commits, 2K contributors)

OpenStack Worldwide Meetup Groups



OpenStack Architecture

- A collection of well integrated projects (github.com/openstack):
 - Compute (Nova)
 - Networking (Neutron)
 - Block Storage (Cinder)
 - Object Storage (Swift)
 - Identity (Keystone)
 - Image Service (Glance)
 - Dashboard (Horizon)
 - ...and others





What is Cloud Foundry?

- An open cloud platform which suffices the increasing appetite for cloud-based mobile, social and analytics applications from line-of-business executives
- Provides developers easy access to services (e.g. databases, messaging services, caching) and facilitates agile development
- Cloud Foundry has a compelling community and emerging ecosystem as well as a mature set of capabilities and robustness

TOTAL CONTRIBUTORS 1.3K

LINES OF CODE 711K

PULL REQUESTS 3K

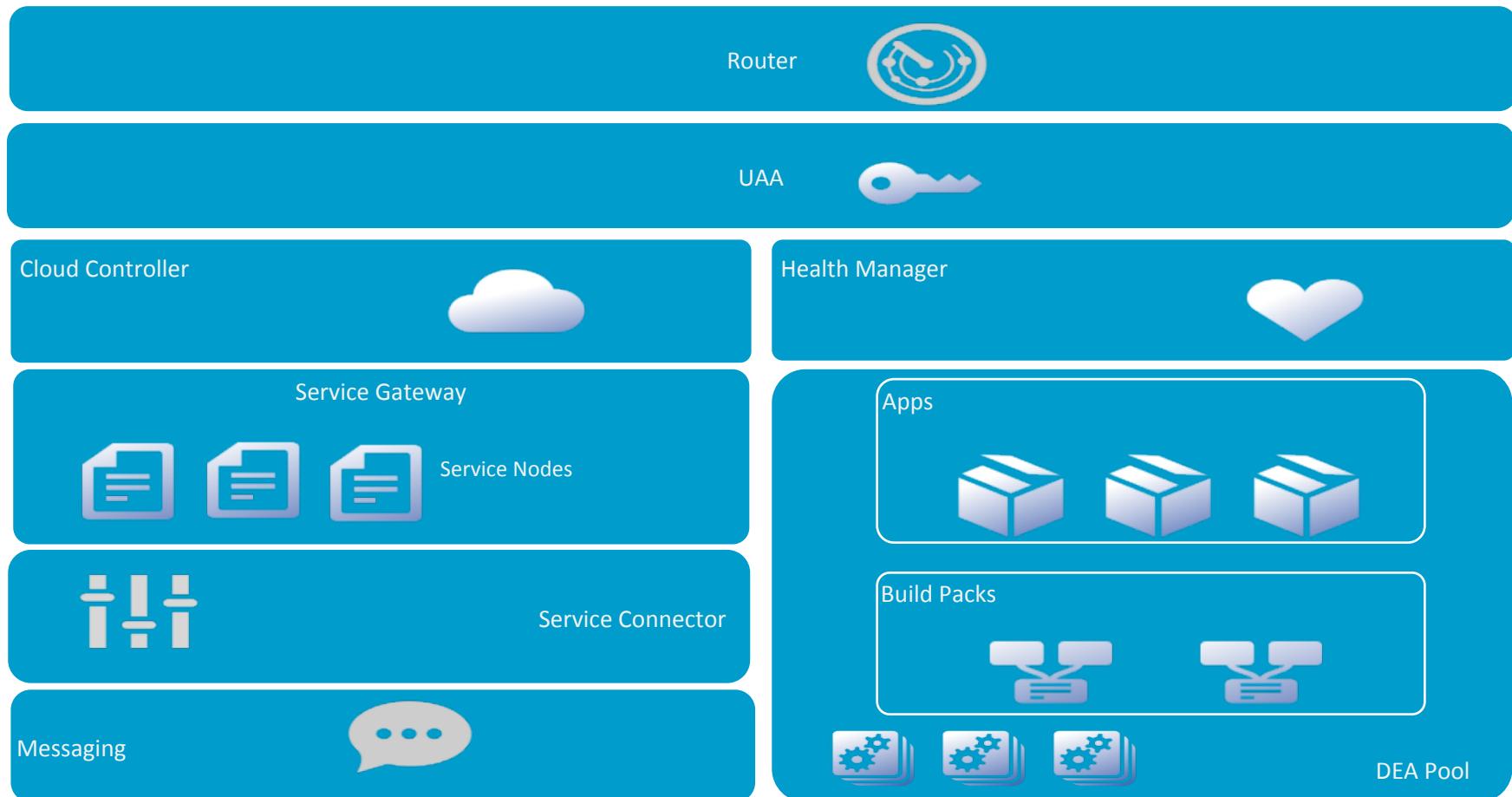
Platinum Founding Sponsors



Cloud Foundry Architecture



- Another collection of integrated projects (github.com/cloudfoundry)
- Each component can be scaled independently
- Robust architecture with fault tolerant properties



IBM Bluemix (powered by Cloud Foundry)



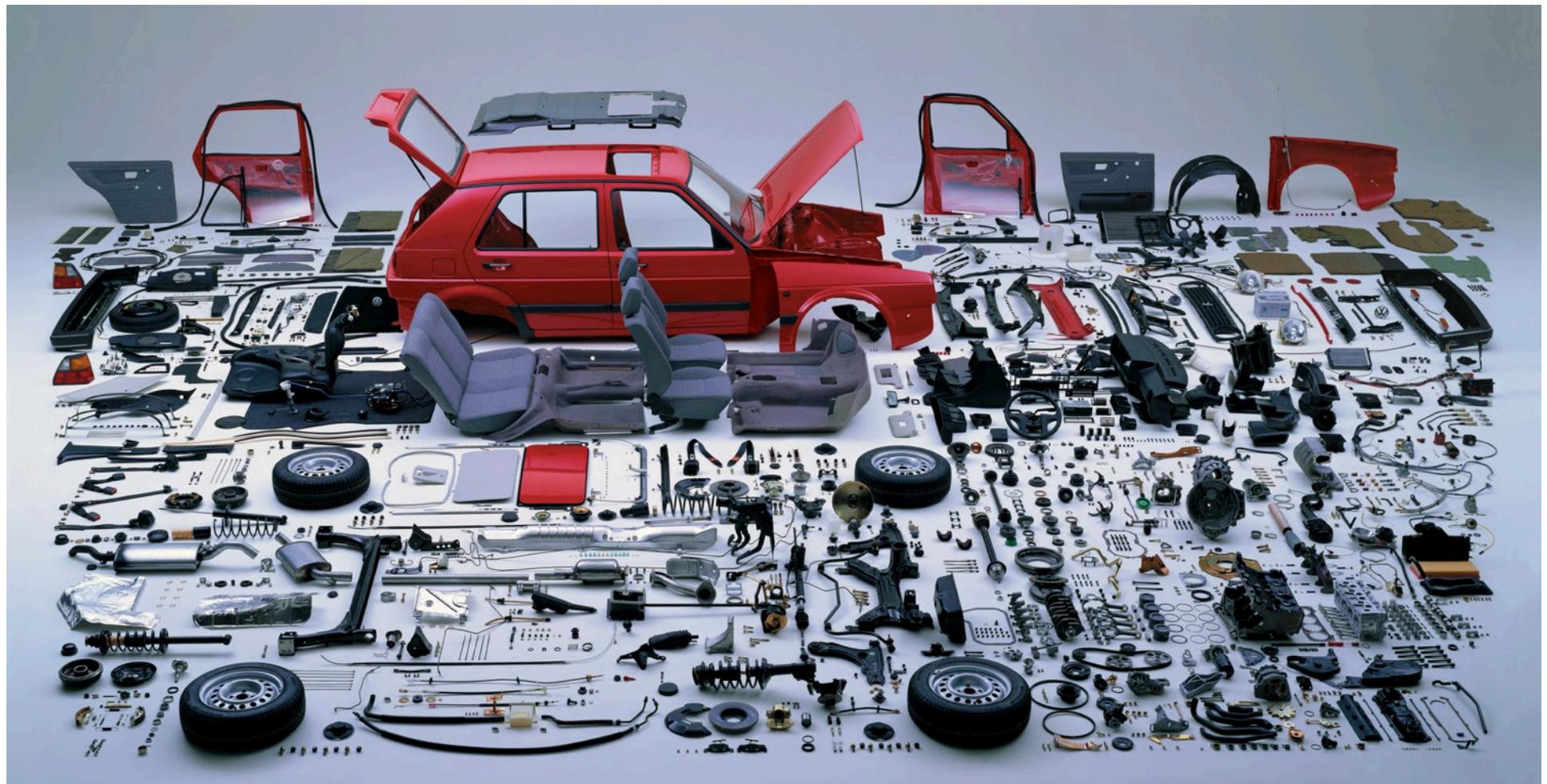
- IBM's hosted Platform as a Services offering
- IBM and partner cloud services (e.g. Cloudant, New Relic, Twilio)
- Integrated DevOps with both Browser and Eclipse-based tools

The screenshot shows the IBM Bluemix Catalog page. At the top, there are navigation links: SOLUTIONS, CATALOG (which is underlined), PRICING, DOCS, COMMUNITY, SIGN UP, and LOG IN. On the left, there is a sidebar with 'REFINE LISTINGS:' dropdowns for Category (Watson, Mobile, DevOps, etc.) and Support (IBM, Third Party, Experimental, Beta). A search bar says 'Type here to begin'. The main content area is titled 'Services // The building blocks of any great app'. It features three sections: Watson, Mobile, and DevOps, each with a list of services and their status (e.g., IBM BETA).

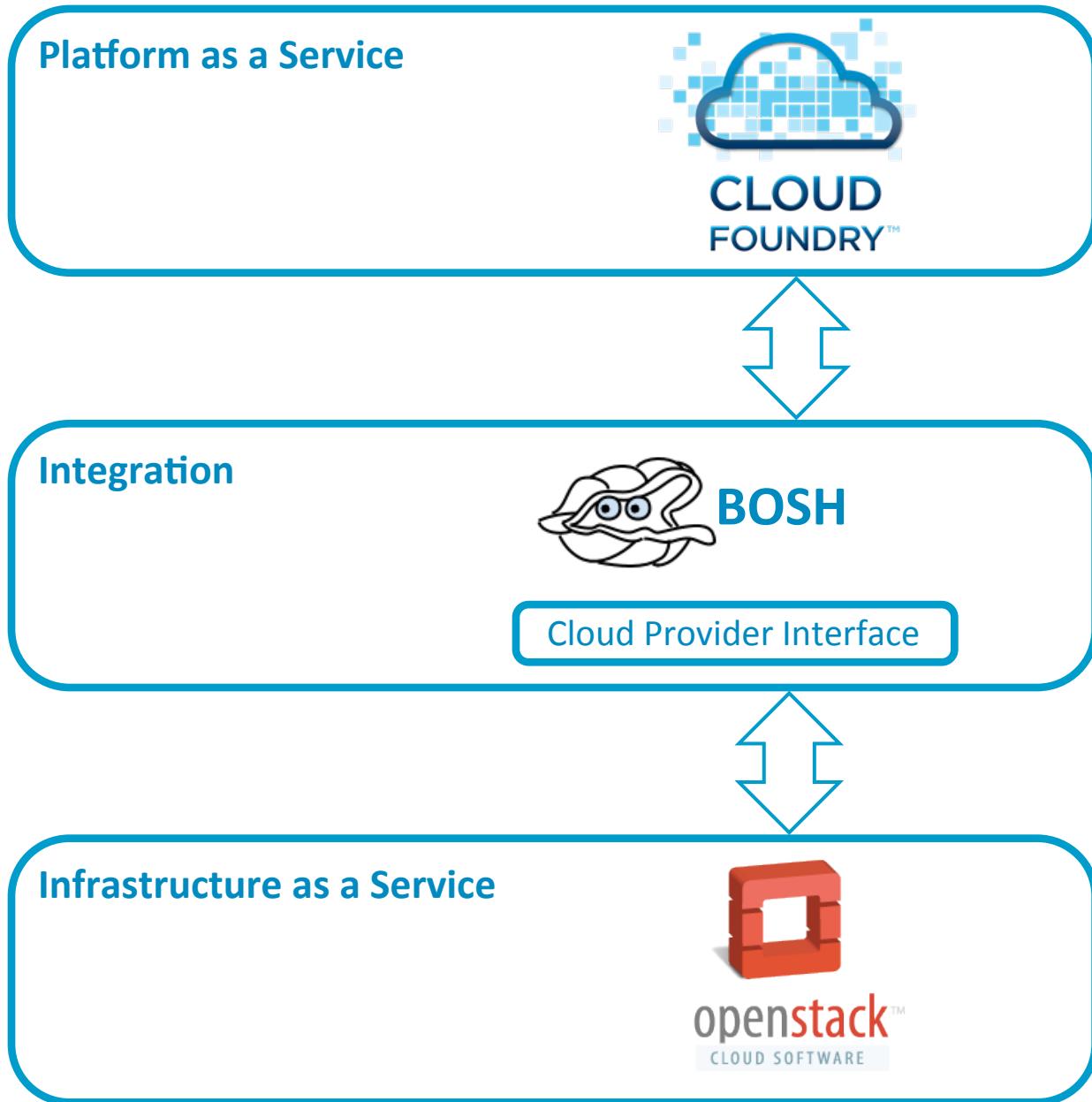
- Watson**: Build cognitive apps that help enhance, scale, and accelerate human expertise.
 - Concept Expansion (IBM BETA)
 - Language Identification (IBM BETA)
 - Machine Translation (IBM BETA)
 - Message Resonance (IBM BETA)
 - Question and Answer (IBM BETA)
 - Relationship Extraction (IBM BETA)
 - User Modeling (IBM BETA)
- Mobile**: Quickly get started with your next app.
 - Mobile Application S... (IBM)
 - Mobile Data (IBM)
 - MobileQualityAssura... (IBM)
 - Push (IBM)
 - Twilio (Third Party)
- DevOps**: From development to deployment.
 - App User Registry (IBM BETA)
 - Auto-Scaling (IBM)
 - Delivery Pipeline (IBM)
 - Monitoring and Anal... (IBM)
 - Track & Plan (IBM)

Come experiment at <http://bluemix.net>

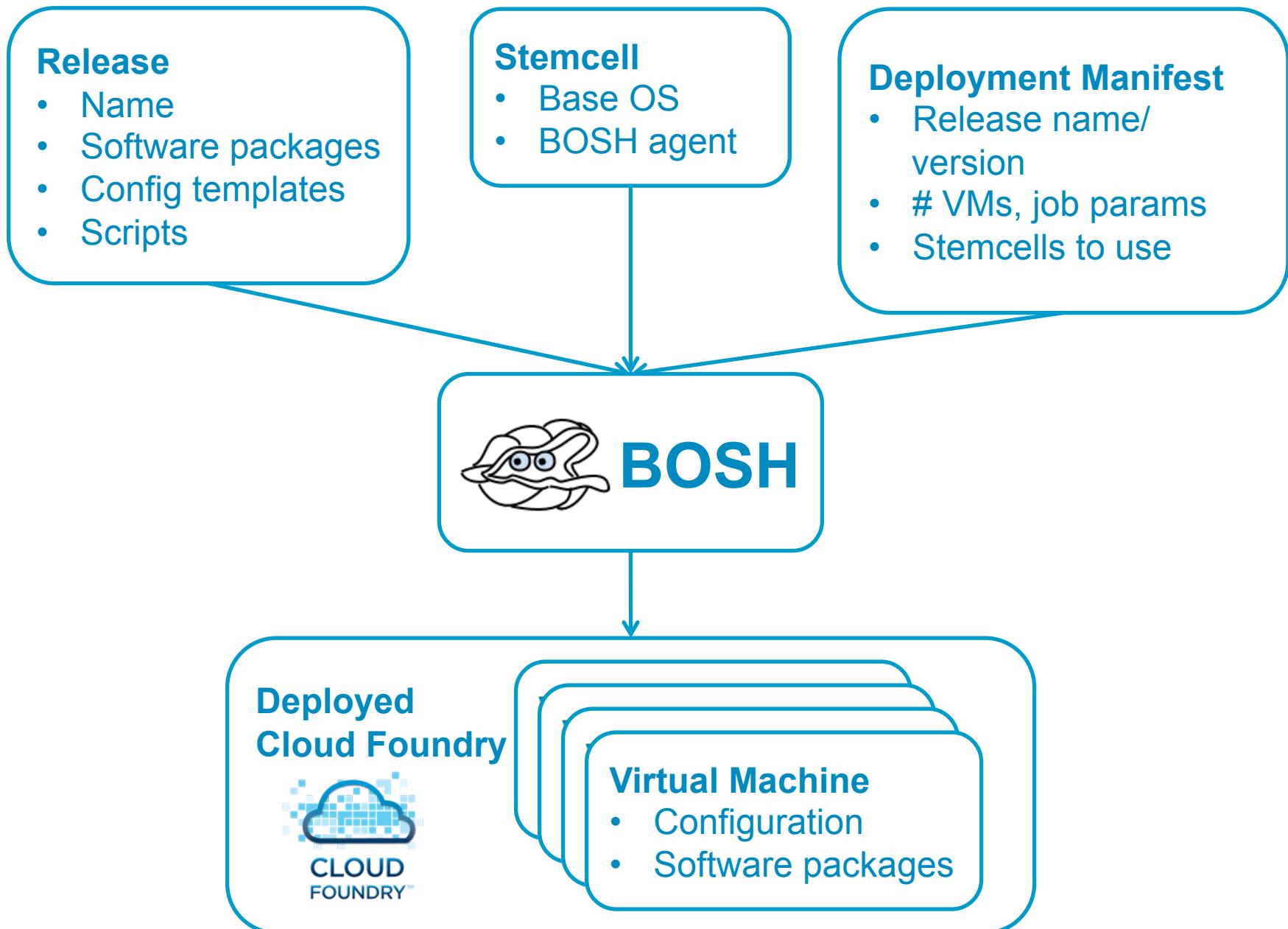
Integrate!



Cloud Foundry – OpenStack Integration



BOSH Deployment Process



Automate (Leverage the Power of Community)!

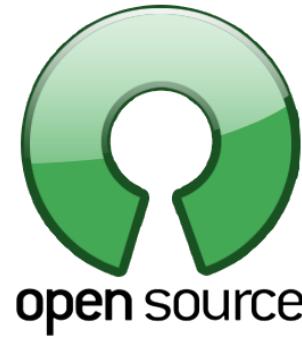


Leverage the Open Source Community for Automation!



Deploy Cloud Foundry and OpenStack using Open Source

- Open technologies provides the power and flexibility to seamlessly integrate them together
- Lets see some examples of the power of open technologies to go from bare metal hardware to a deployed Cloud Foundry ready to push apps



Cloud Foundry Deployed

Deployment: 'cf'

Director task 9

Task 9 done

Job/Index	State	Resource Pool	IPs
admin.ui/0	running	corenode	10.3.2.40, 9.30.211.236
api_worker/0	running	corenode	10.3.2.40, 9.30.211.236
cdb_ng/0	running	coreNode	10.3.2.5
dcos_dhcp/0	running	corenode	10.3.2.36
cloud_controller_ng/0	running	corenode	10.3.2.35
deu_neutron/0	running	deu	10.3.2.43
debian_rfiserver/0	running	corenode	10.3.2.28
esxi/0	running	corenode	10.3.2.29
esxi_leader/0	running	corenode	10.3.2.14
hm9000/0	running	corenode	10.3.2.39
loggregator/0	running	corenode	10.3.2.2
loggregator_juju/0	running	corenode	10.3.2.12
nats/0	running	corenode	10.3.2.4
rfl_WLM_server/0	running	corenode	10.3.2.39
postgresql_generator/0	running	serviceNode	10.3.2.42
postgresql_generator/1000	running	serviceNode	10.3.2.41
router/0	running	router	10.3.2.38, 9.30.211.235
services_rfis/0	running	corenode	10.3.2.10
uaa/0	running	corenode	10.3.2.34
uaadb/0	running	corenode	10.3.2.6

VMS total: 20

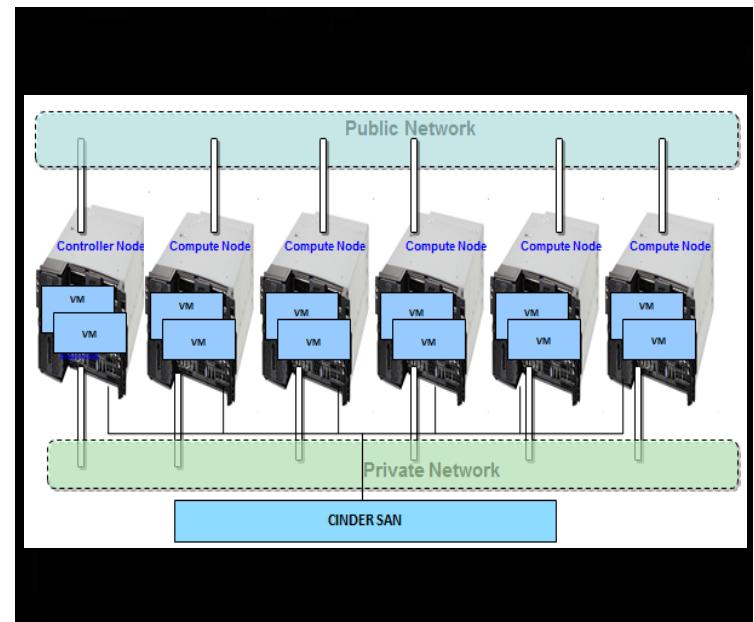
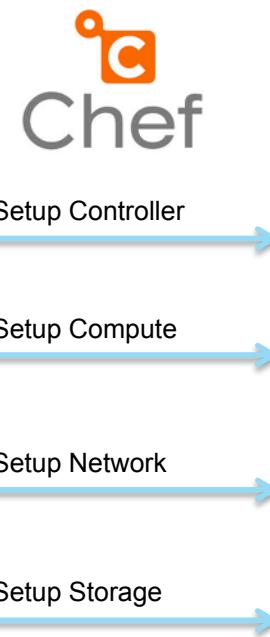
Powered by

Chef for OpenStack Install Automation



OpenStack Installation

- Leverage the open source Chef cloud infrastructure automation framework
- Requires information about hardware, network environment and software repositories



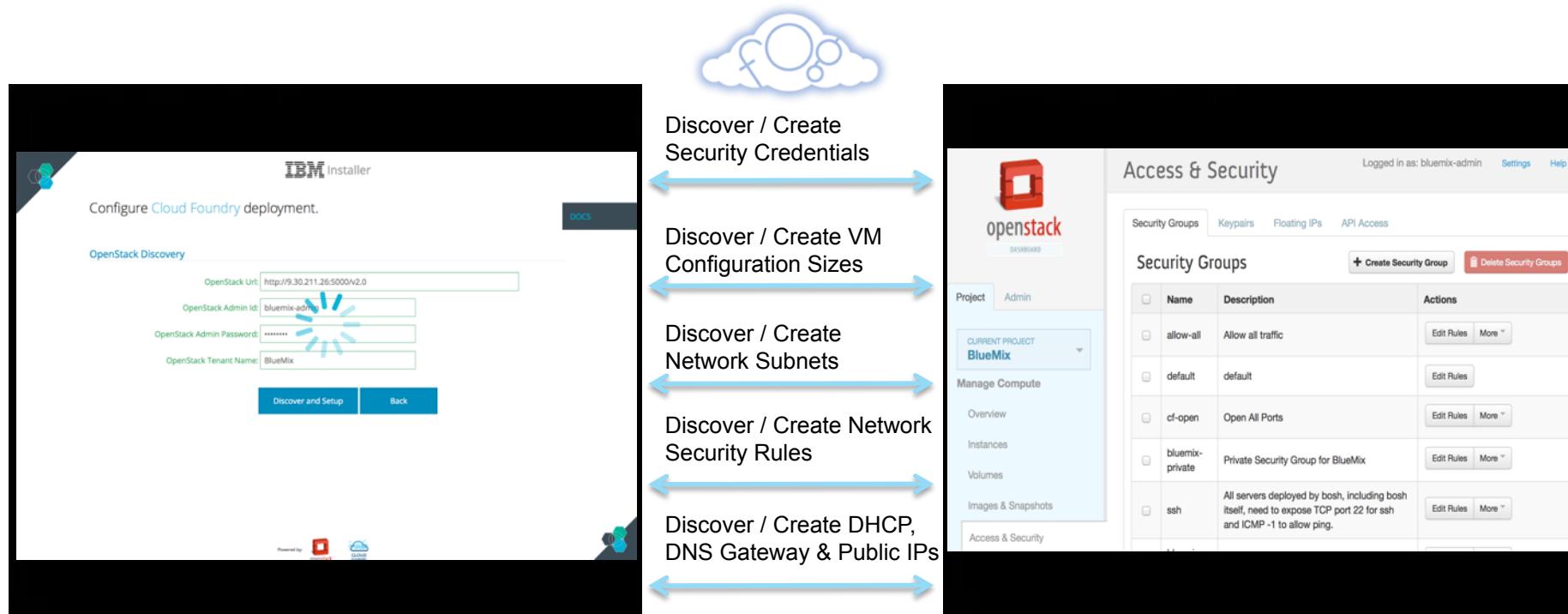
From 1 week down to 20 minutes

Fog for OpenStack Discovery / Setup Automation



OpenStack Discovery / Cloud Foundry Pre-Req Setup

- Leverage the open source Fog gem to discover / setup OpenStack artifacts in an automated manner (requires OpenStack credentials)
- Setup according to best practices and guidelines – still giving users the flexibility to change if desired



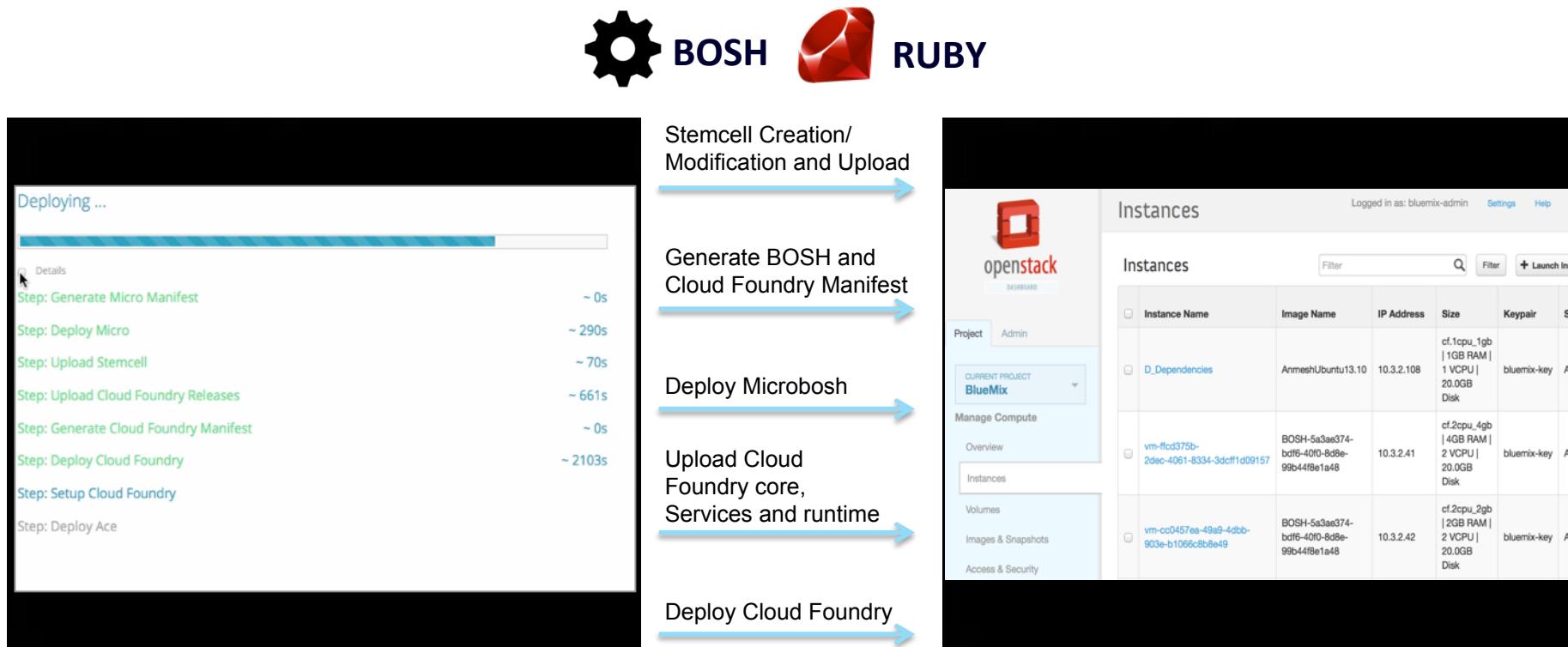
From 1 hour down to milliseconds

BOSH / Ruby for Cloud Foundry Automation



Cloud Foundry Deployment Automation

- Automate base OS image or Stemcell modification
- Automate manifest file generation using Ruby ERB templates
- Automate upload of Cloud Foundry core release, services and runtime frameworks, followed by Cloud Foundry deployment

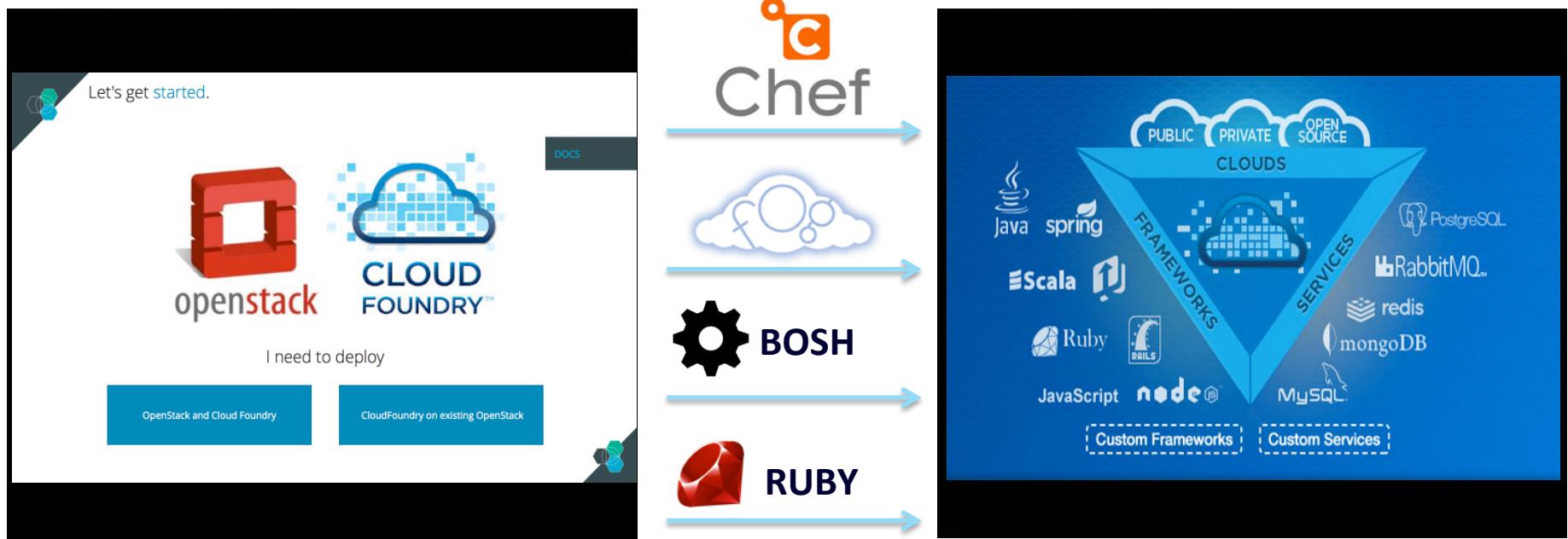


From 1 week down to 40 minutes

Open is the Only Way!

Automate end to end deployments in under an hour!

- Previous example signify the power of Open source community
- Leveraging tools like Chef, Fog, BOSH, Ruby ERB from the community can help create powerful automation which can be repeatedly and consistently replicated in under an hour!



From 2 week down to 1 hour

Maintain the Deployment!



Deployment Maintenance

- After Cloud Foundry and OpenStack are deployed, maintenance and updates activities are required
- BOSH not only handles deployment but also the instance's lifecycle operations going forward
- Example updates:
 - Cloud Foundry release
 - Stemcell (with customization)
 - VM configuration size
 - Number of DEAs
 - Domain name
 - Router floating IP

VM Config

Cloud Management Flavor:	cf.2cpu_2gb
DEA Flavor:	cf.2cpu_4gb
Service Gateway Flavor:	cf.1cpu_1gb
Router Flavor:	cf.2cpu_2gb

Config

Number of DEAs:	1
Domain Name:	9.30.210.44.xip.io
Router Floating IP:	9.30.210.44
Admin UI Floating IP:	9.30.210.45
Stemcell File:	bosh-stemcell-1858-openstack-kvm-ut
Cloud Foundry Version:	ibm-v166.1

Maintenance Automation



- Updates can be automated using code from the initial automated deployment (e.g. bosh deploy)
- To ensure application availability throughout the update, leverage JMeter to test application responsiveness (100 user agents making requests twice a second)

A screenshot of the Apache JMeter 2.3.2 interface. The window title is "Test Plan.jmx (C:\dev\tools\jakarta-jmeter-2.3.2\bin\Test Plan.jmx) - Apache JMeter (2.3.2 r665936)". The left sidebar shows a tree structure with "Test Plan" expanded, containing "Thread Group", "HTTP Root", "HTTP Request", "View Result", "Graph Result", "View Results", and "Monitor Results". The main panel is titled "HTTP Request" and contains the following fields:

- Name: HTTP Request
- Comments:
- Web Server:
 - Server Name or IP: localhost
 - Port Number: 8080
- HTTP Request:
 - Protocol (default http):
 - Method: POST
 - Content encoding:
 - Path: /yourapplication/service/amf
 - Redirect Automatically
 - Follow Redirects
 - Use KeepAlive
 - Use multipart/form-data for HTTP POST
- Send Parameters With the Request:

Name	Value	Encode?	Include Equ...

Add Delete
- Send Files With the Request:

File Path	Parameter Name	MIME Type
/yourpath/to/login.amf		application/x-amf

Add Browse... Delete
- Optional Tasks:
 - Retrieve All Embedded Resources from HTML Files
 - Use as Monitor
 - Save response as MD5 hash?
- Embedded URLs must match: [text input field]

Scale!





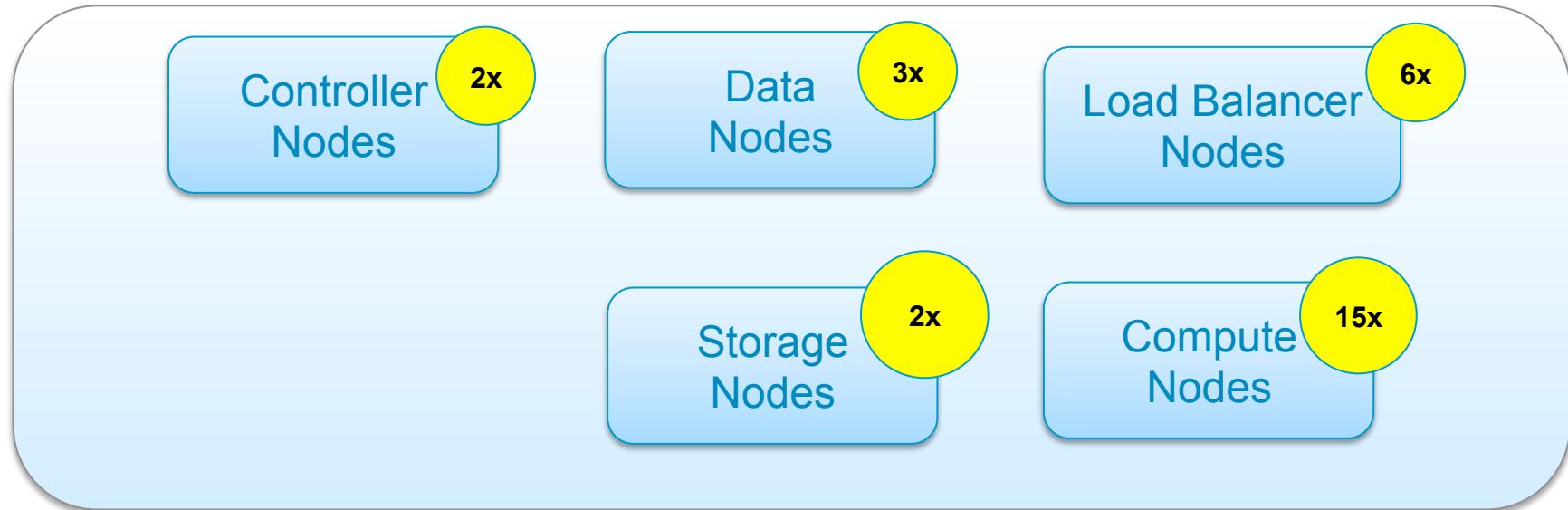
Scaling Number of Apps on Cloud Foundry

- Sample sizing for 1000 small applications
- Total Resources: 160 VCPU, 500GB Memory, 1.5TB of VM disk

Jobs	# Instances	VCPU	Memory	Root Disk	Ephemeral Disk	Persistent Volume
DEAs	20	4	16	20	35	0
Cloud Controller	2	2	4	20	20	0
Cloud Controller DB	1	2	4	20	20	10
Router	3	4	8	20	20	0
Debian NFS	1	2	4	20	20	80
NATS	1	2	4	20	20	0
UAA	2	2	4	20	20	0
UAA DB	1	2	4	20	20	10
services_nfs	1	2	4	20	20	10
MySQL Gateway	2	2	2	20	20	0
MySQL Nodes	3	2	4	20	20	10
Rabbit Gateway	2	2	2	20	20	0
Rabbit Nodes	3	2	4	20	20	10
Postgres Gateway	2	2	2	20	20	0
Postgres Nodes	3	2	4	20	20	32
Mongo Gateway	2	2	2	20	20	0
Mongo Nodes	3	2	4	20	20	32
Redis Gateway	2	2	2	20	20	0
Redis Nodes	3	2	4	20	20	10
Total	57	160	460	1140	395	204
	VM Instances	VCPU	GB	GB	GB	GB

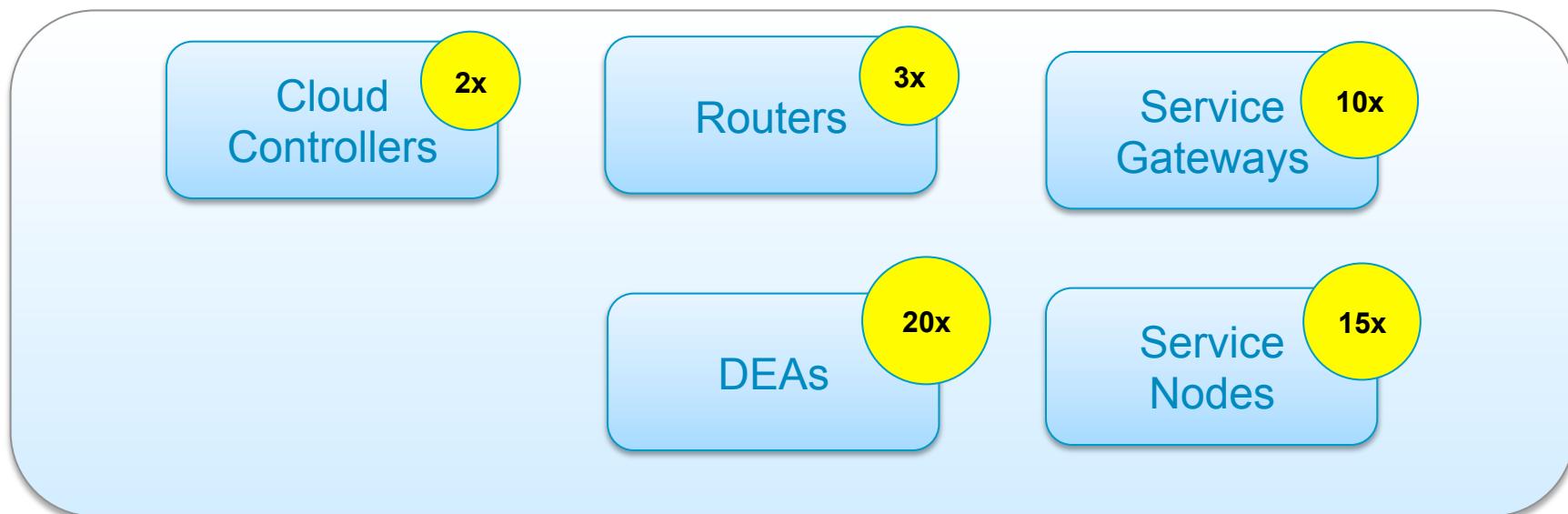
Scaling OpenStack

- Optimize Internal Communication
 - Configure OpenStack for scaled concurrency
- Optimize Performance
 - Configure OpenStack scheduler to evenly distribute load
- Setup Highly Available Architecture for PaaS workloads



Scaling Cloud Foundry / BOSH

- Optimize Internal Communication
 - Configure messaging bus for VM communication
- Optimized routing and bandwidth allocation
 - Isolate Cloud Foundry components using multiple networks
- Maintain Cloud Foundry's Highly Available Architecture

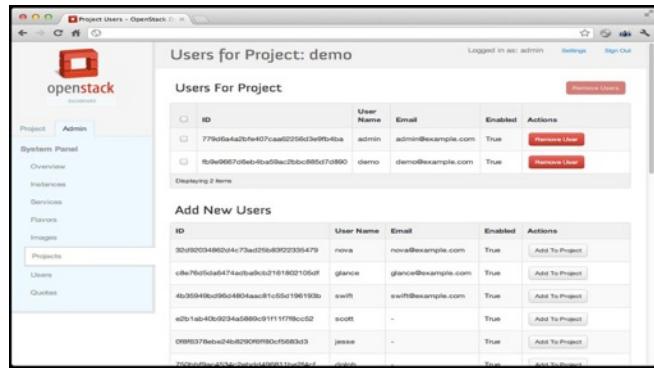


Summary

Why Cloud Foundry and OpenStack are a great fit?

- 100% Open PaaS and IaaS solutions (no vendor lock-ins) with a growing community of contributors and sponsors on both sides
- Power of Open Source community can be leveraged to automate the deployment and lifecycle management of Cloud Foundry on OpenStack
- OpenStack meets Cloud Foundry integration requirements, and is totally configurable and adaptable to handle the scale of a PaaS solution like Cloud Foundry

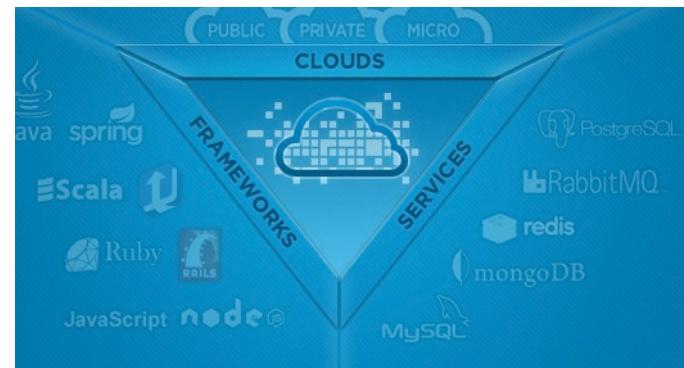
Bottom Line: Cloud Foundry and OpenStack are a great match!



ID	User Name	Email	Enabled	Actions
779d0fa4a2fbfe407caaf0256d3e9fb4ba	admin	admin@example.com	True	<button>Remove User</button>
bf29e9657c54b4fc59ac2bcb885d7cd90	demo	demotest@example.com	True	<button>Remove User</button>

Add New Users

ID	User Name	Email	Enabled	Actions
30ff02034868d4c73ad278b8922335479	nova	nova@example.com	True	<button>Add To Project</button>
cbe7bd5daff74a9cabc0218182105ef	glance	glance@example.com	True	<button>Add To Project</button>
4b26540b0f9d4804aac81c55d196190b	swift	swift@example.com	True	<button>Add To Project</button>
e071ab-4b50294a5d89c91f11778cc02	scott	-	True	<button>Add To Project</button>
09ff0378be7d824b29009f9b0f5683d3	jessee	-	True	<button>Add To Project</button>
750f449a-4129-4201-92f1-4150f31e264f	dash	-	True	<button>Add To Project</button>



What's next? Join us at our Silicon Valley Meetups



<http://www.meetup.com/CloudFoundry/>


**CLOUD
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Santa Clara, CA
Founded Oct 20, 2011

Cloud Founders 494
Group reviews 2
Upcoming Meetups 1
Past Meetups 14
Our calendar

Organizers:
Dave Nielsen, Animesh Singh

[Contact](#)

The purpose of this Cloud Foundry meetup is to discuss opportunities related to Cloud Foundry & Open PaaS with a focus on building services that run on top of Cloud Foundry.

We're 494 Cloud Founders


Also in... [Join us!](#)

<http://www.meetup.com/Bluemix/>

Silicon Valley Cloud Foundry Group!

Bay Area PaaS, Cloud Foundry & BlueMix Meetup

Building scalable IoT apps using Bluemix & Cloudant

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Join us to talk about how to build scalable Internet of Things Applications using Cloud Foundry, Bluemix, Containers and Cloudant.
Agenda: 6:00 - 6:30 PM Refreshments...

[Santa Clara, CA](#)

Building scalable Internet of Things (IoT) apps using Bluemix & Cloudant

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 **Tuesday, November 18, 2014**

Are you going?

Yes

No

30 going



Animesh Singh
CO-ORGANIZER
EVENT HOST

For more technical details, refer to the slides and video here

<http://www.slideshare.net/AnimeshSingh/optimizing-cloud-foundry-and-openstack-for-large-scale-deployments>

<https://www.openstack.org/assets/presentation-media/A-Practical-Approach-to-HA-Final.pdf>

https://www.youtube.com/watch?v=jCwtV9n_ak4

<https://www.youtube.com/watch?v=FsrCGkBo4Vg>