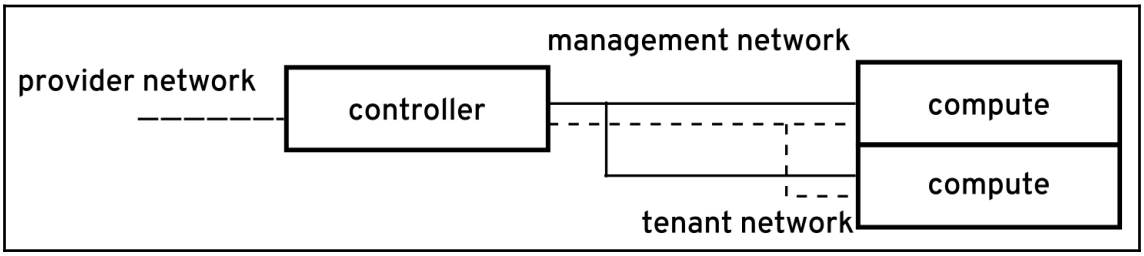
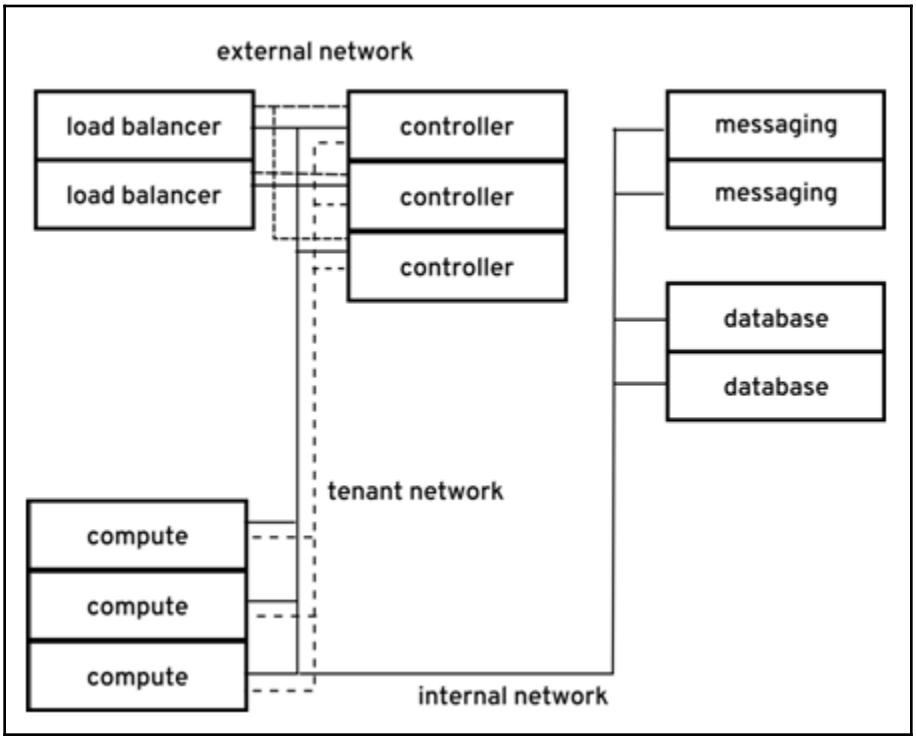
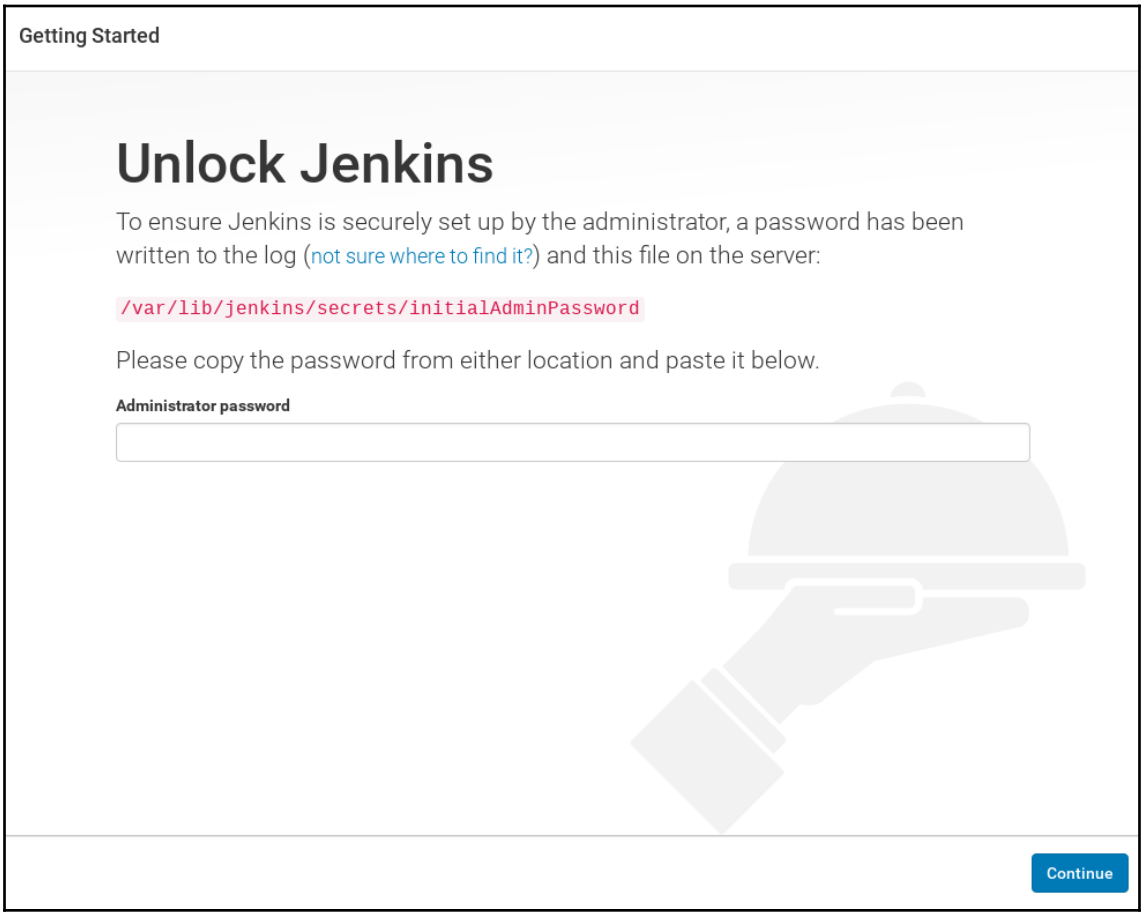
Chapter 2: Architecting the Cloud

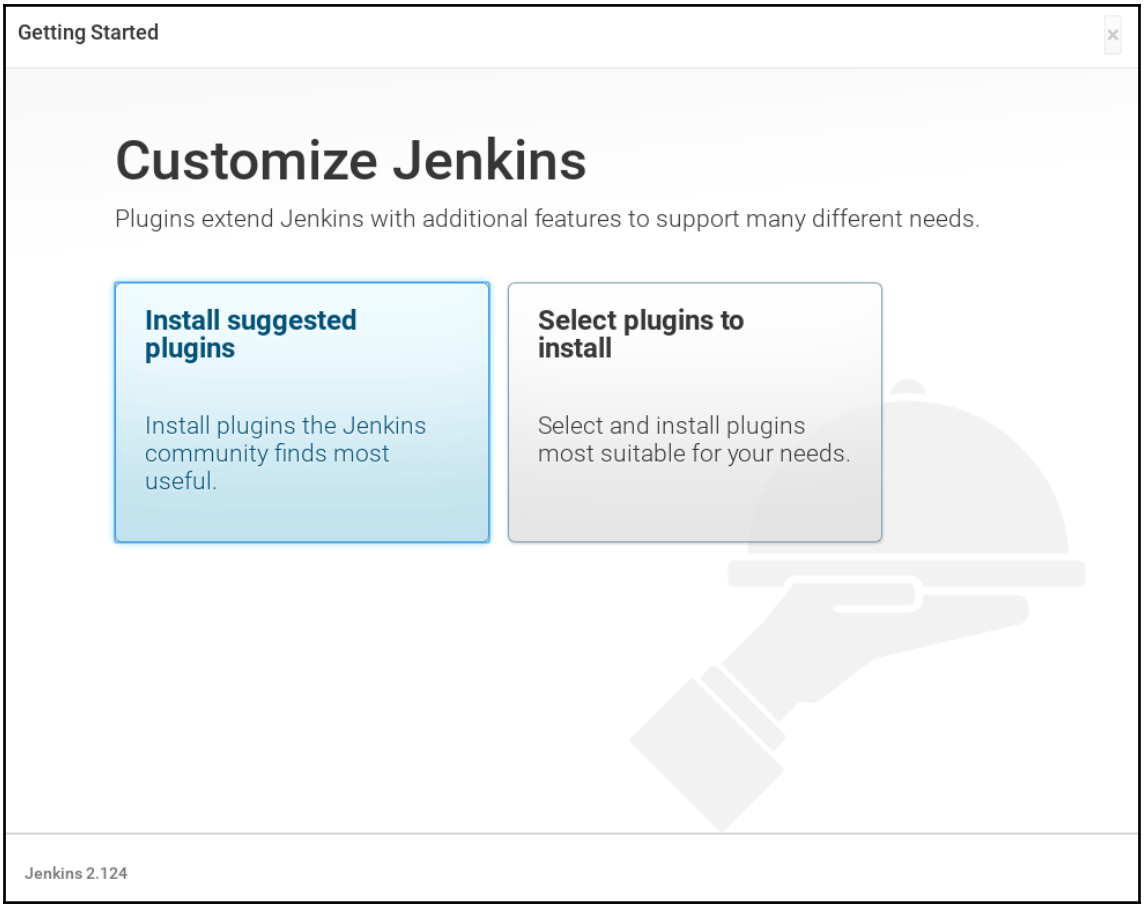


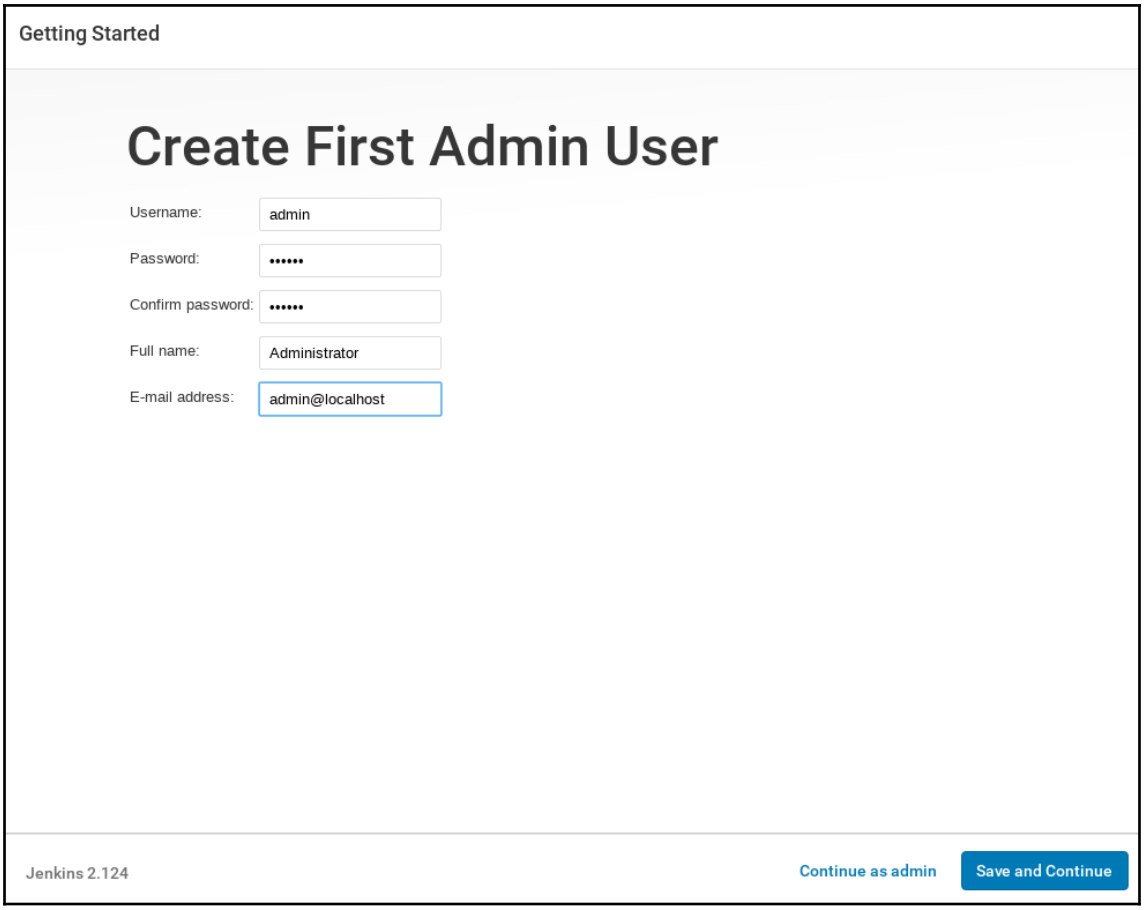
Chapter 3: Planning for Failure and Success

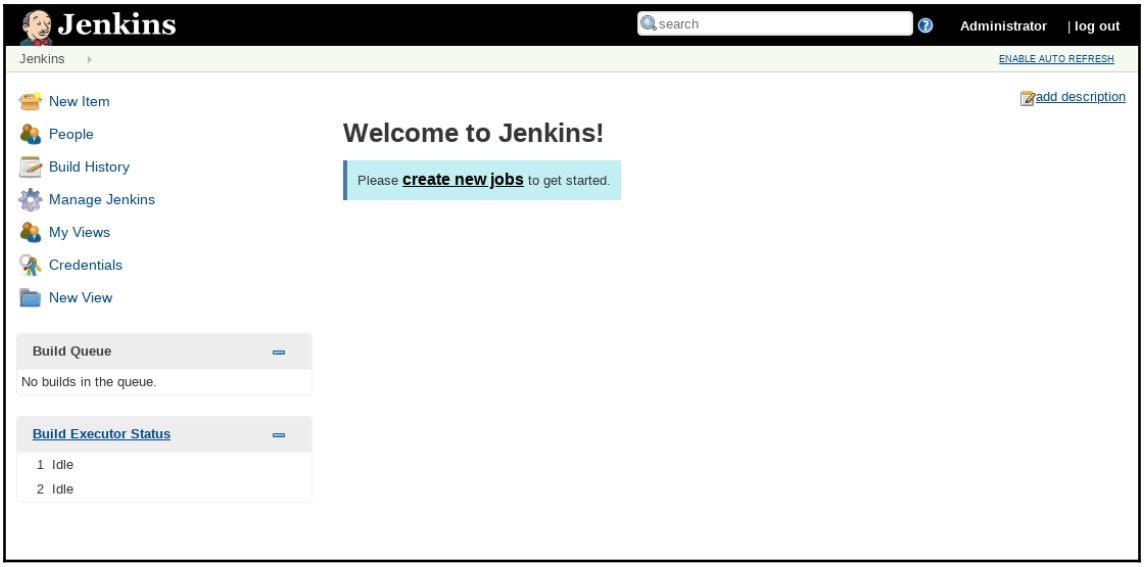


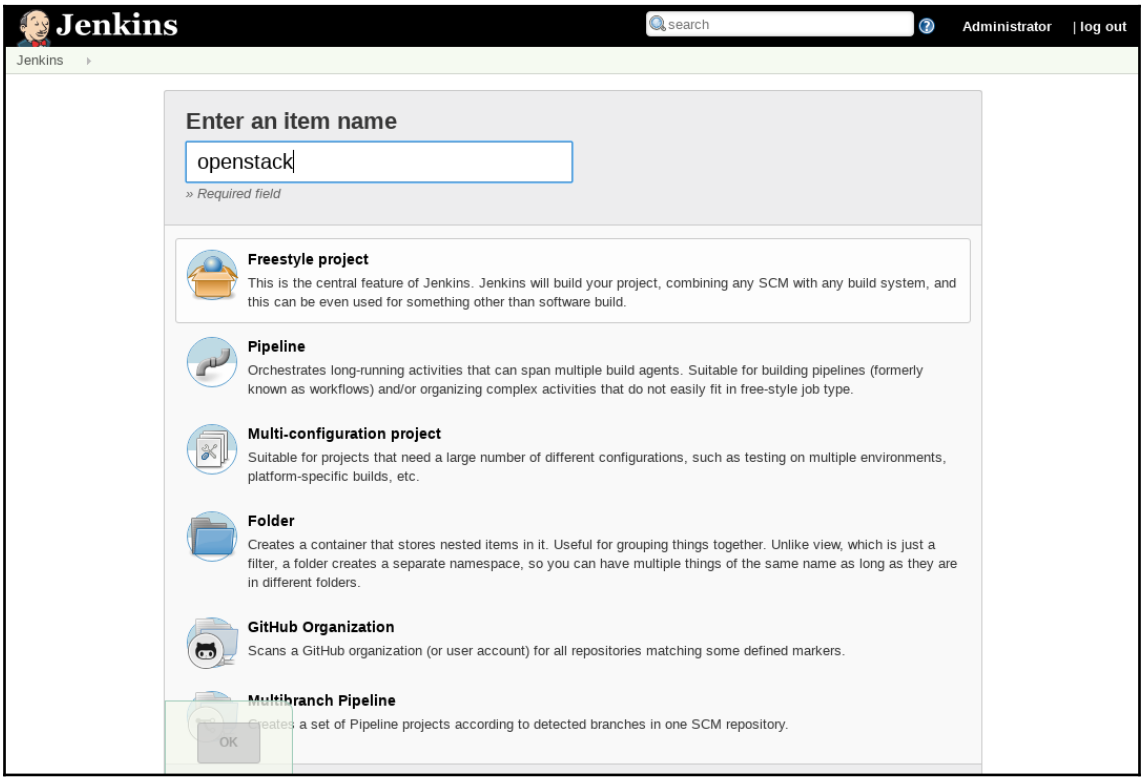
Chapter 4: Building the Deployment Pipeline

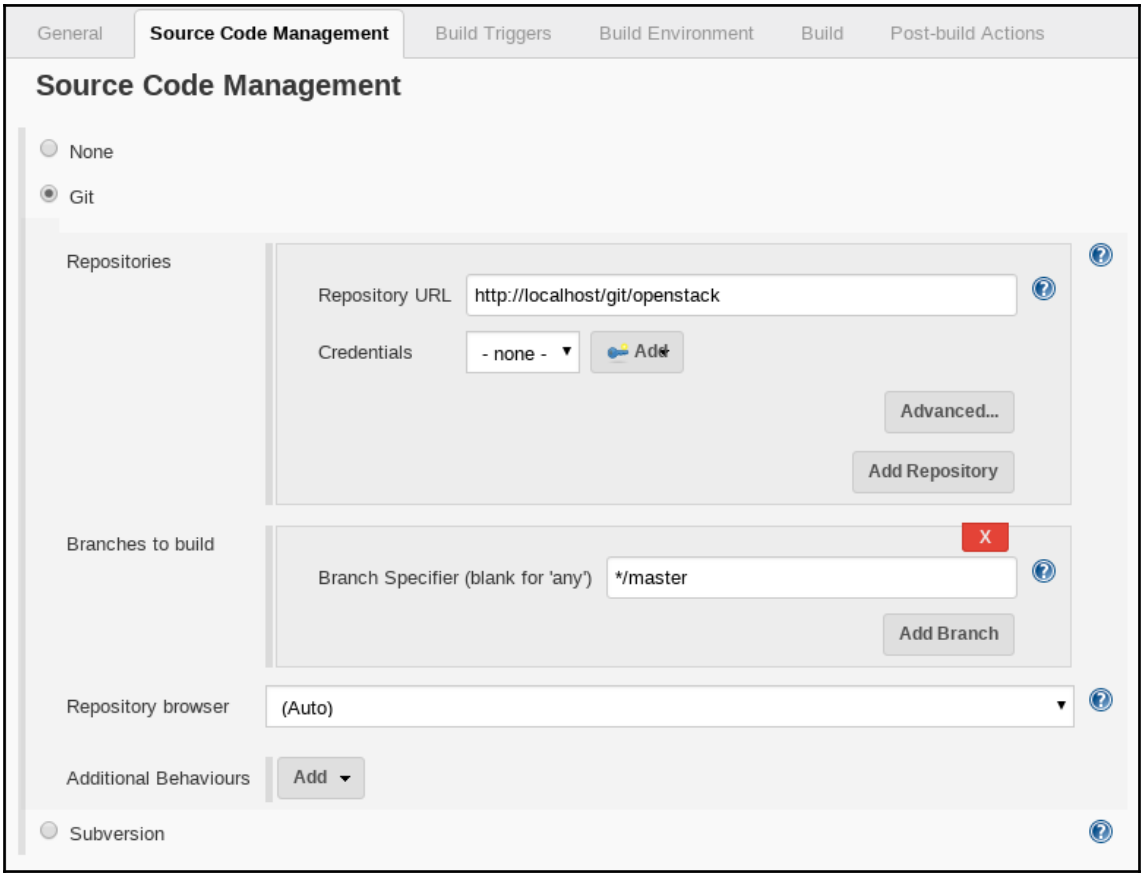


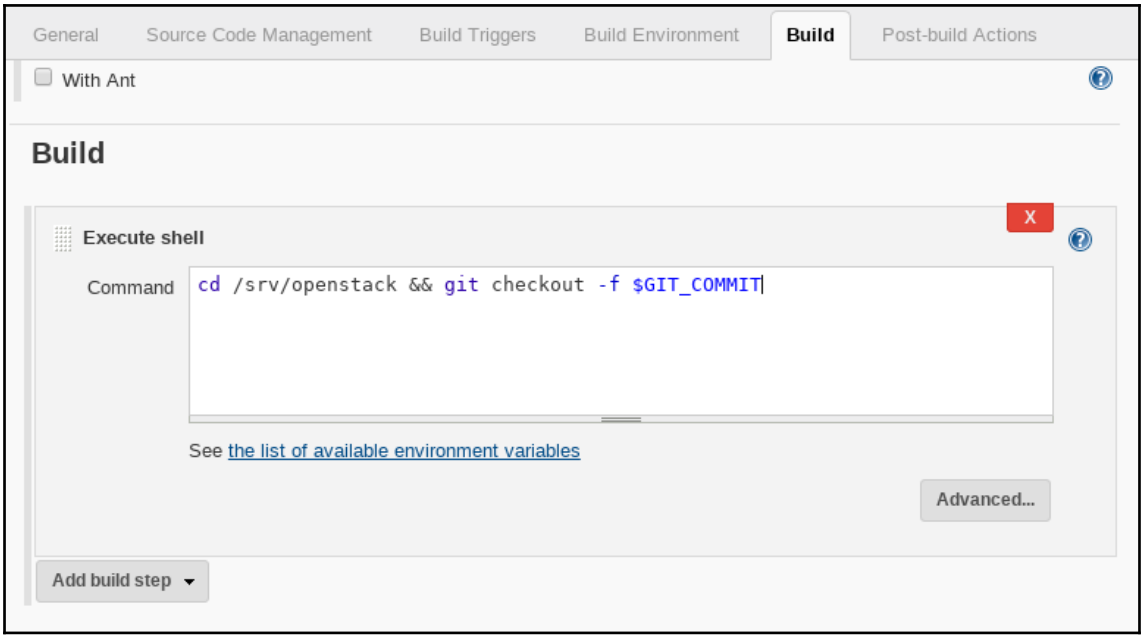

Getting Started
Customize Jenkins
Plugins extend Jenkins with additional features to support many different needs.
Install suggested plugins
Install plugins the Jenkins community finds most useful.
Select plugins to install
Select and install plugins most suitable for your needs.
Jenkins 2.124

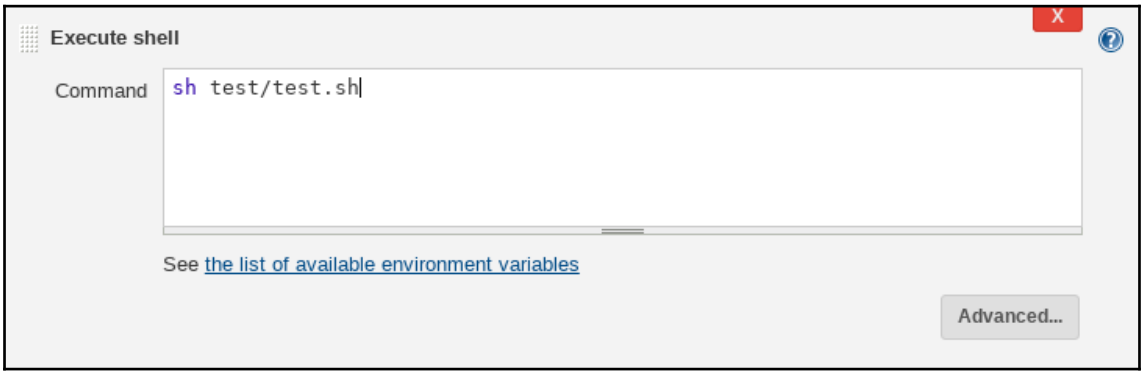

Getting Started
Create First Admin User
Username:
admin
Password:
Confirm password:
Full name:
Administrator
E-mail address:
admin@localhost
Jenkins 2.124
Continue as admin
Save and Continue


Jenkins
search
Administrator
| log out
Jenkins
ENABLE AUTO REFRESH
New Item
People
Build History
Manage Jenkins
My Views
Credentials
New View
add description
Welcome to Jenkins!
Please create new jobs to get started.
Build Queue
No builds in the queue.
Build Executor Status
1 Idle
2 Idle

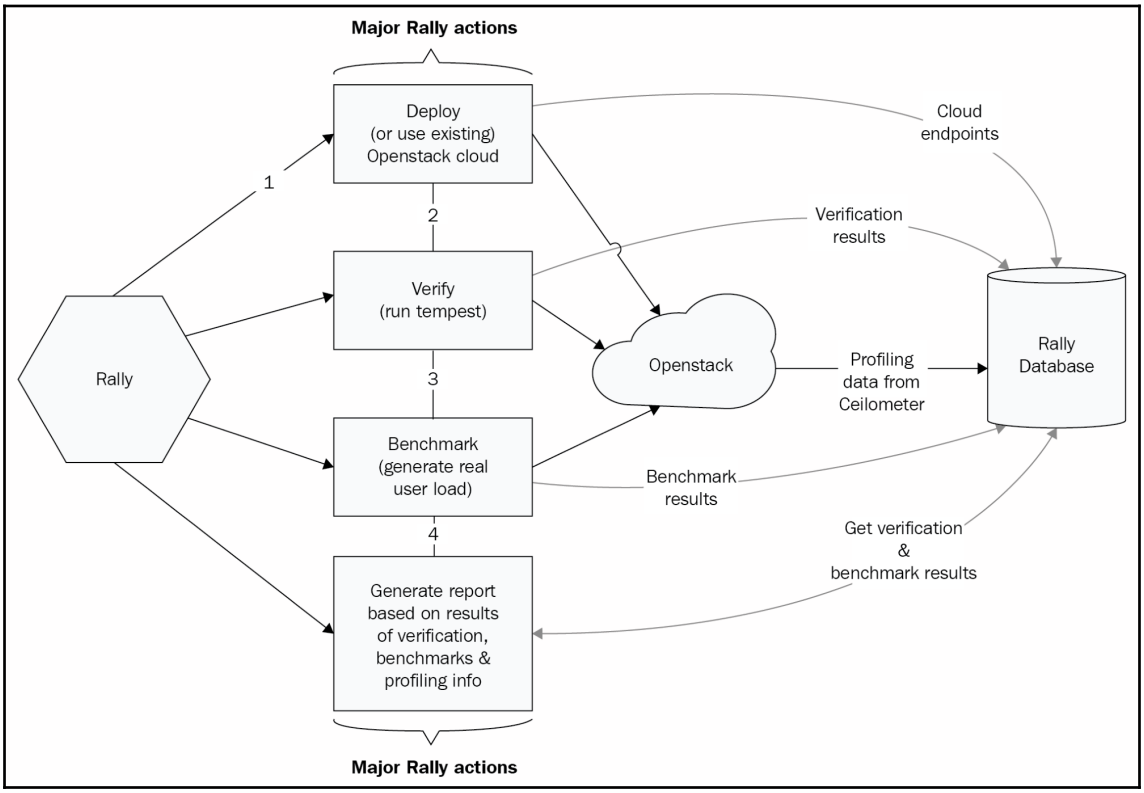

Jenkins
search
Administrator
| log out
Jenkins
Enter an item name
openstack
» Required field
Freestyle project
This is the central feature of Jenkins. Jenkins will build your project, combining any SCM with any build system, and this can be even used for something other than software build.
Pipeline
Orchestrates long-running activities that can span multiple build agents. Suitable for building pipelines (formerly known as workflows) and/or organizing complex activities that do not easily fit in free-style job type.
Multi-configuration project
Suitable for projects that need a large number of different configurations, such as testing on multiple environments, platform-specific builds, etc.
Folder
Creates a container that stores nested items in it. Useful for grouping things together. Unlike view, which is just a filter, a folder creates a separate namespace, so you can have multiple things of the same name as long as they are in different folders.
GitHub Organization
Scans a GitHub organization (or user account) for all repositories matching some defined markers.
Multibranch Pipeline
Creates a set of Pipeline projects according to detected branches in one SCM repository.
OK

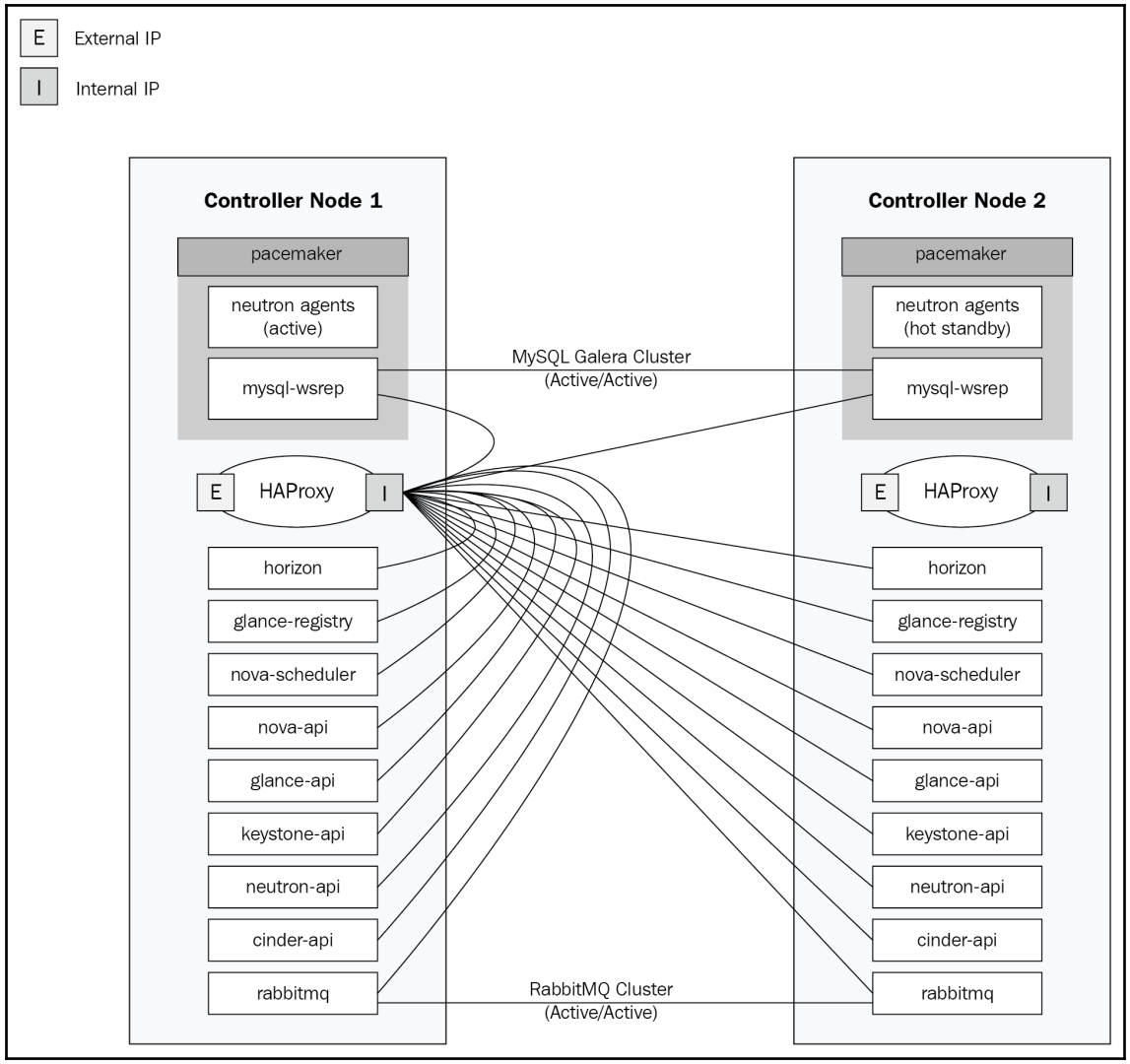

General
Source Code Management
Build Triggers
Build Environment
Build
Post-build Actions
Source Code Management
None
Git
Repositories
Repository URL
http://localhost/git/openstack
Credentials
- none -
Add
Advanced...
Add Repository
Branches to build
X
Branch Specifier (blank for 'any')
*/master
Add Branch
Repository browser
(Auto)
Additional Behaviours
Add
Subversion

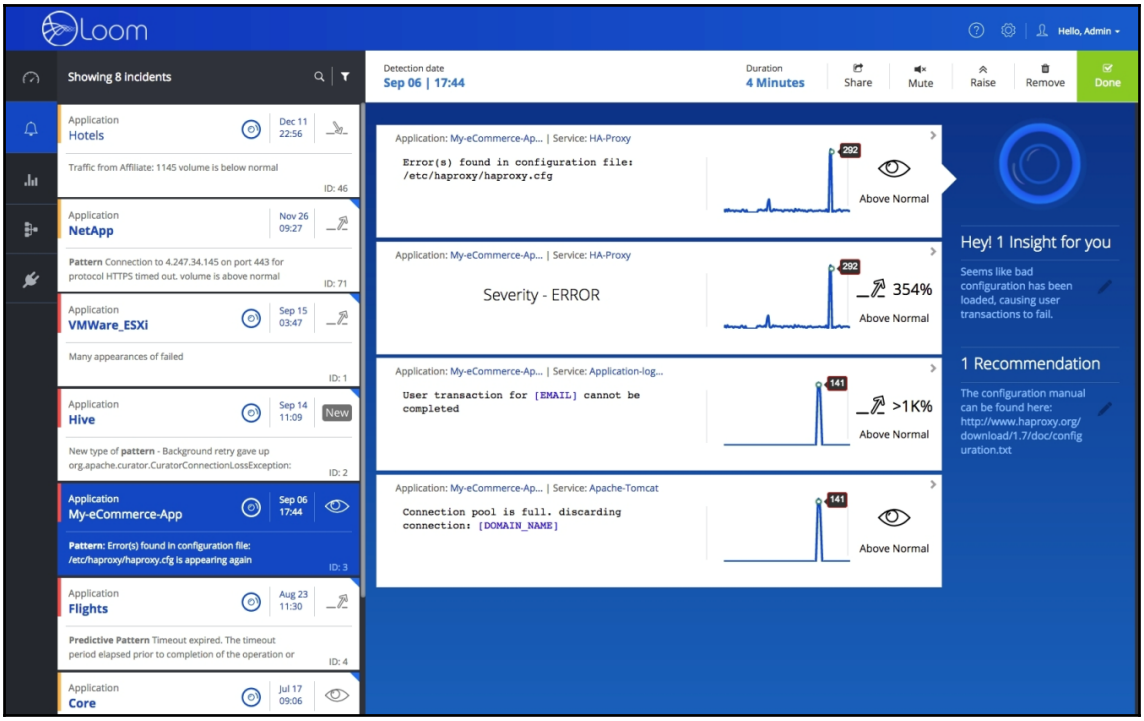

General
Source Code Management
Build Triggers
Build Environment
Build
Post-build Actions
With Ant
Build
Execute shell
Command
cd /srv/openstack && git checkout -f $GIT_COMMIT
See the list of available environment variables
Advanced...
Add build step

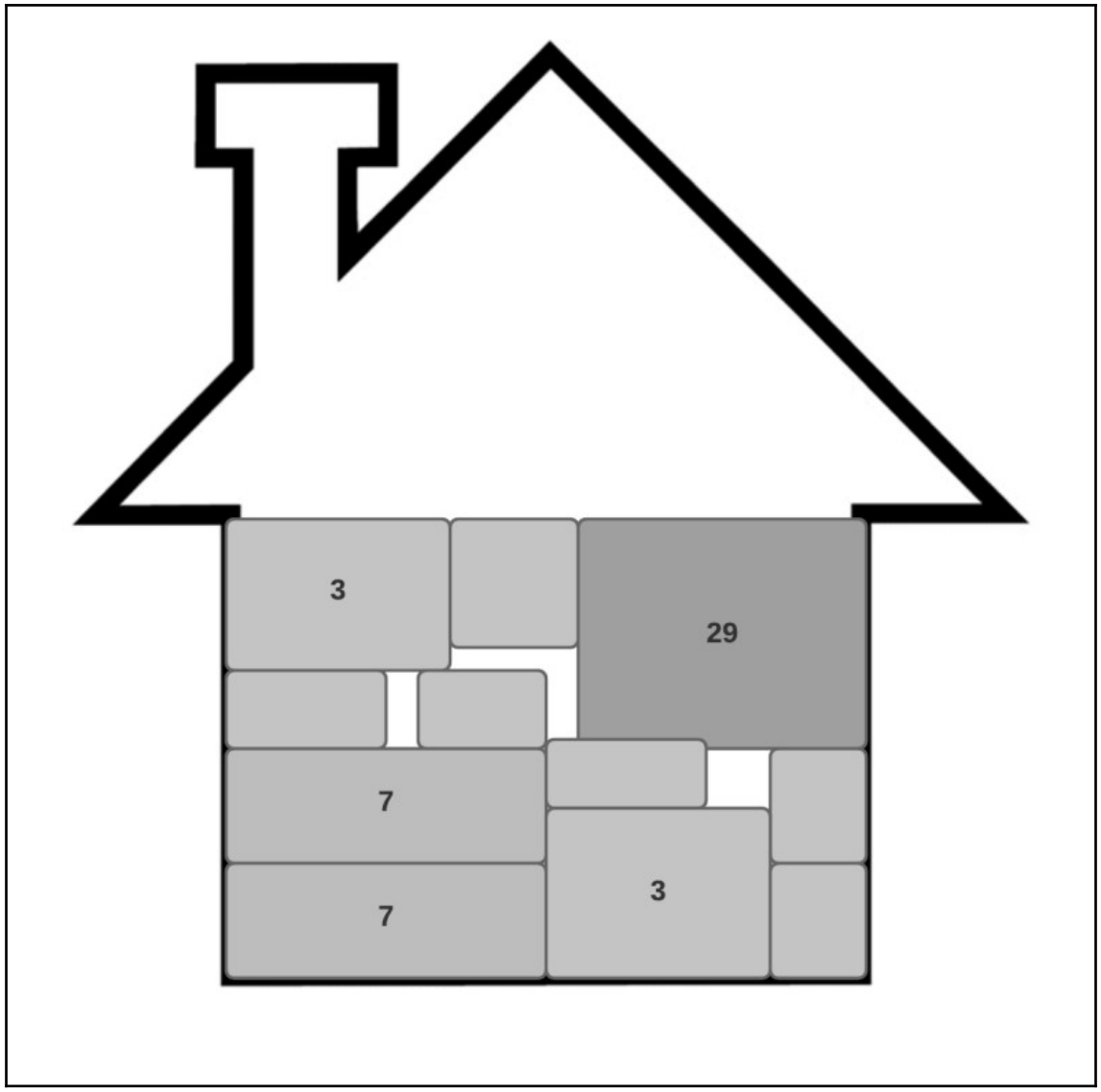

Execute shell
Command
sh test/test.sh
See the list of available environment variables
Advanced...

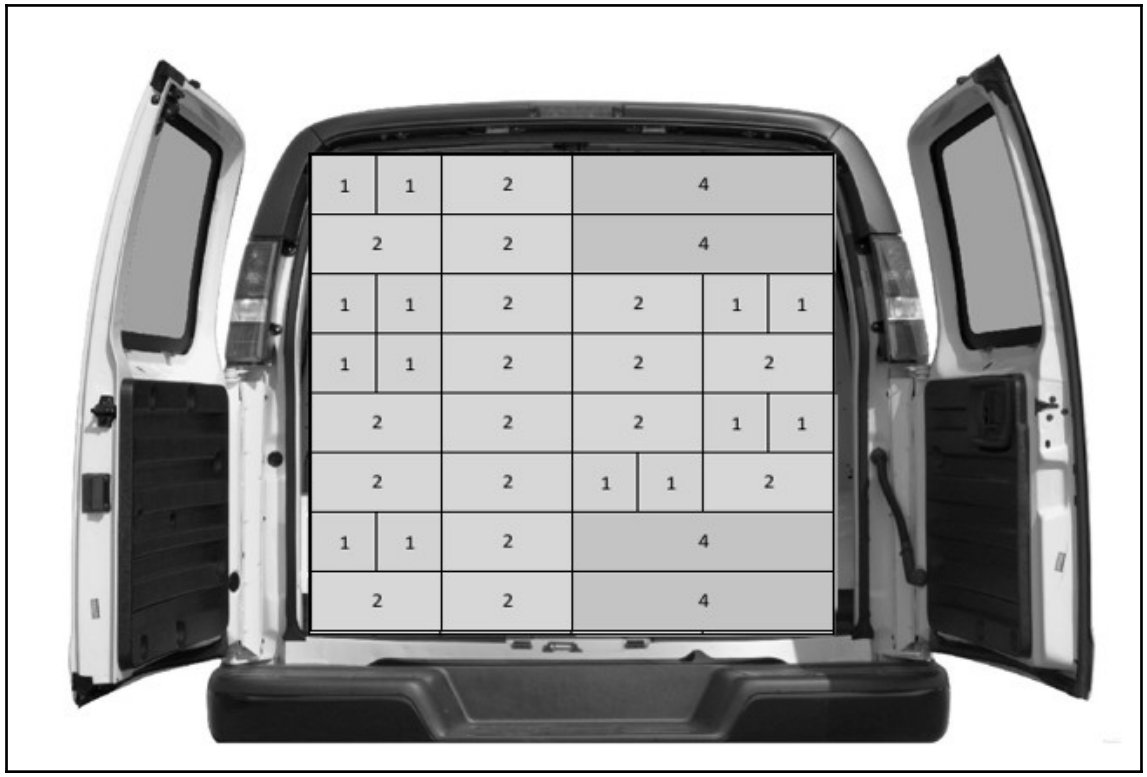
Chapter 5: Building to Operate

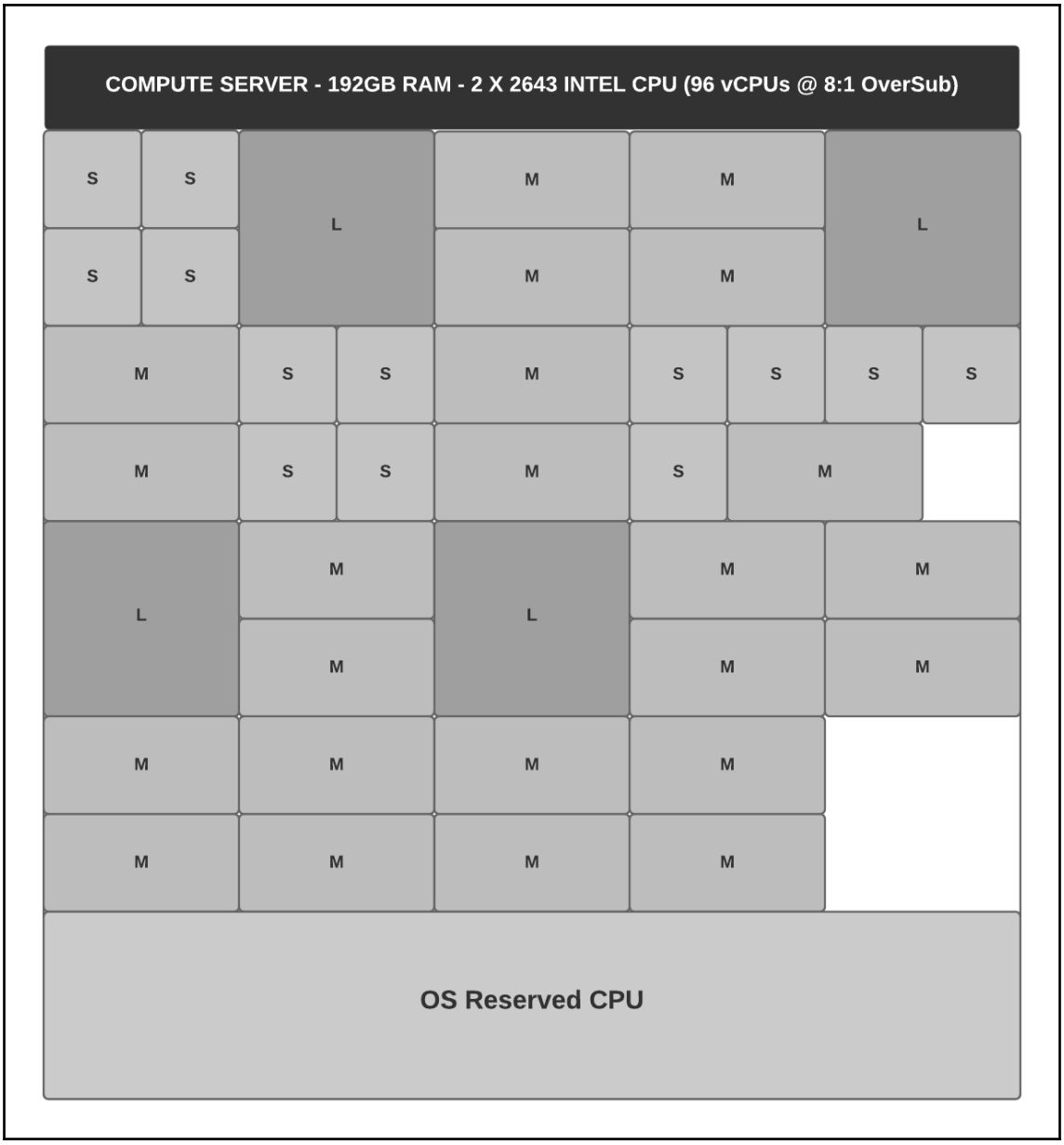



E
External IP
I
Internal IP
Controller Node 1
pacemaker
neutron agents (active)
mysql-wsrep
E
HAProxy
I
horizon
glance-registry
nova-scheduler
nova-api
glance-api
keystone-api
neutron-api
cinder-api
rabbitmq
Controller Node 2
pacemaker
neutron agents (hot standby)
mysql-wsrep
E
HAProxy
I
horizon
glance-registry
nova-scheduler
nova-api
glance-api
keystone-api
neutron-api
cinder-api
rabbitmq
MySQL Galera Cluster (Active/Active)
RabbitMQ Cluster (Active/Active)

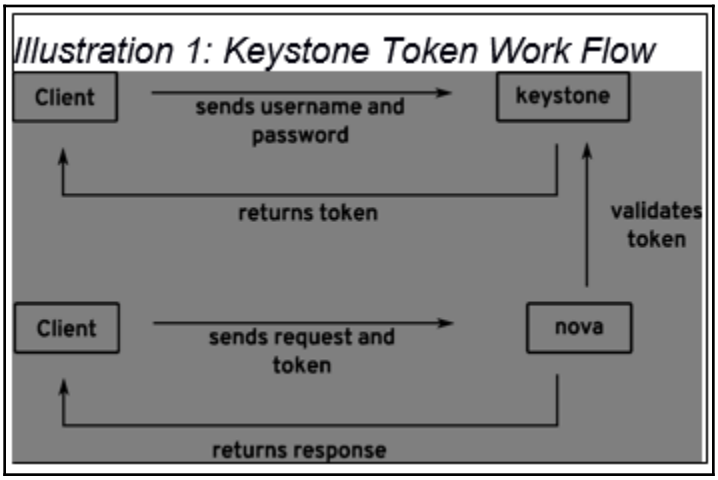

Loom
Hello, Admin
Showing 8 incidents
Application
Hotels
Dec 11
22:56
Traffic from Affiliate: 1145 volume is below normal
ID: 46
Application
NetApp
Nov 26
09:27
Pattern Connection to 4.247.34.145 on port 443 for protocol HTTPS timed out. volume is above normal
ID: 71
Application
VMWare_ESXi
Sep 15
03:47
Many appearances of failed
ID: 1
Application
Hive
Sep 14
11:09
New
New type of pattern - Background retry gave up org.apache.curator.CuratorConnectionLossException:
ID: 2
Application
My-eCommerce-App
Sep 06
17:44
Pattern: Error(s) found in configuration file: /etc/haproxy/haproxy.cfg is appearing again
ID: 3
Application
Flights
Aug 23
11:30
Predictive Pattern Timeout expired. The timeout period elapsed prior to completion of the operation or
ID: 4
Application
Core
Jul 17
09:06
Detection date
Sep 06 | 17:44
Duration
4 Minutes
Share
Mute
Raise
Remove
Done
Application: My-eCommerce-Ap... | Service: HA-Proxy
Error(s) found in configuration file: /etc/haproxy/haproxy.cfg
292
Above Normal
Application: My-eCommerce-Ap... | Service: HA-Proxy
Severity - ERROR
292
354%
Above Normal
Application: My-eCommerce-Ap... | Service: Application-log...
User transaction for [EMAIL] cannot be completed
141
>1K%
Above Normal
Application: My-eCommerce-Ap... | Service: Apache-Tomcat
Connection pool is full. discarding connection: [DOMAIN_NAME]
141
Above Normal
Hey! 1 Insight for you
Seems like bad configuration has been loaded, causing user transactions to fail.
1 Recommendation
The configuration manual can be found here: http://www.haproxy.org/download/1.7/doc/configuration.txt

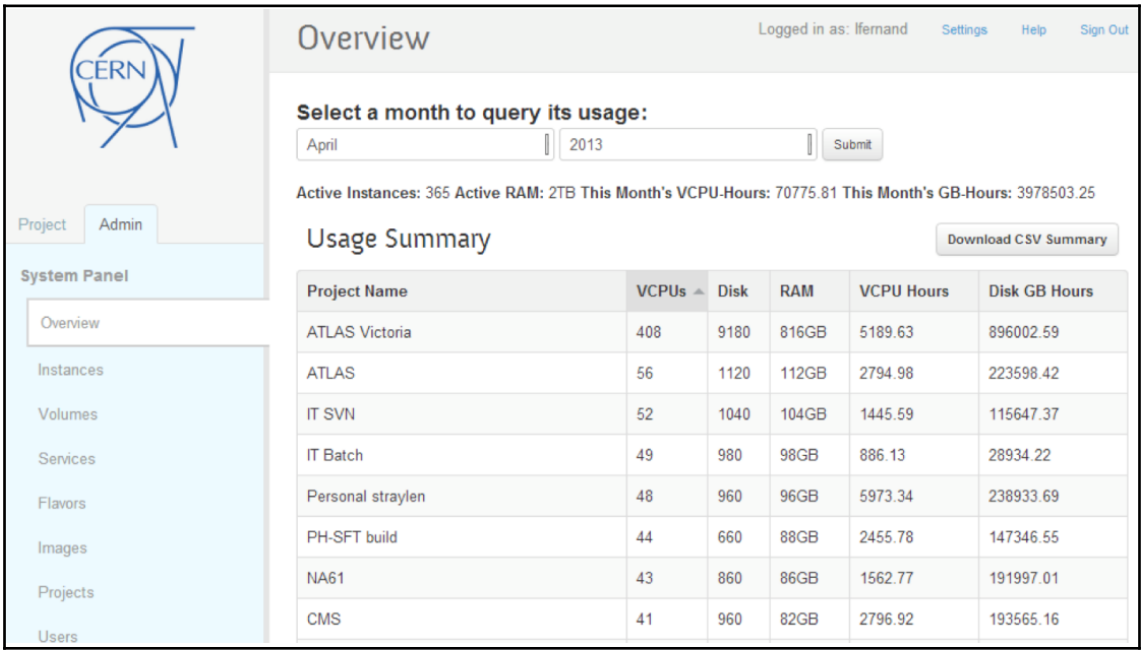

3
29
7
7
3


1 1 2 4
2 2 4
1 1 2 2 1 1
1 1 2 2 2
2 2 2 1 1
2 2 1 1 2
1 1 2 4
2 2 4

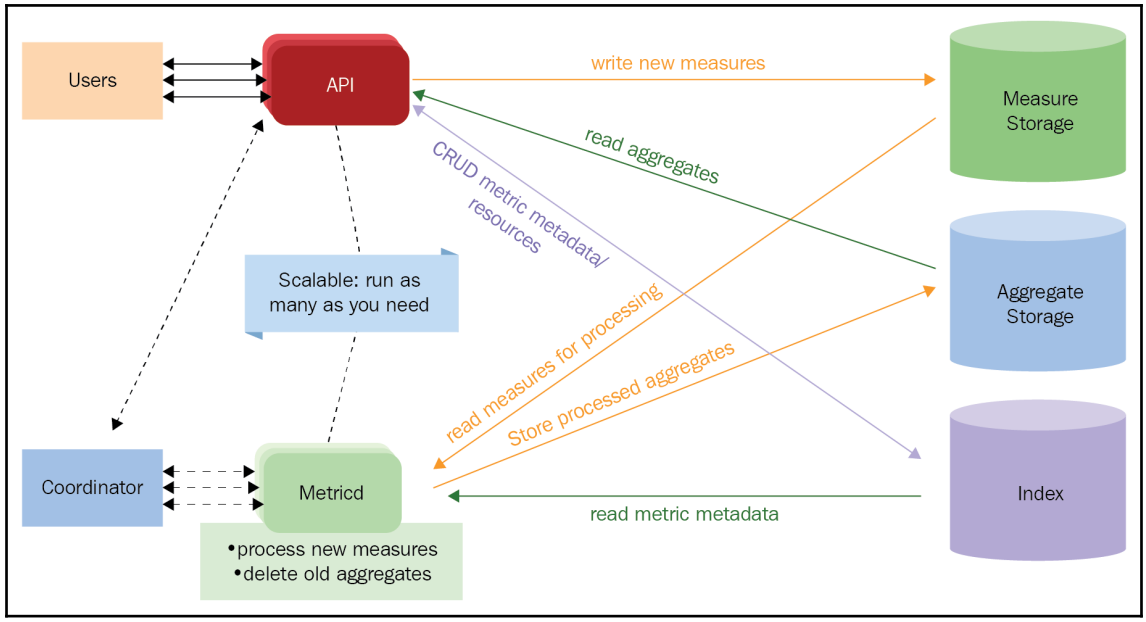

COMPUTE SERVER - 192GB RAM - 2 X 2643 INTEL CPU (96 vCPUs @ 8:1 OverSub)
S
S
L
M
M
L
S
S
M
M
M
S
S
M
S
S
S
S
M
S
S
M
S
M
L
M
L
M
M
M
M
M
M
M
M
M
M
M
M
M
M
OS Reserved CPU

Chapter 6: Integrating the Platform

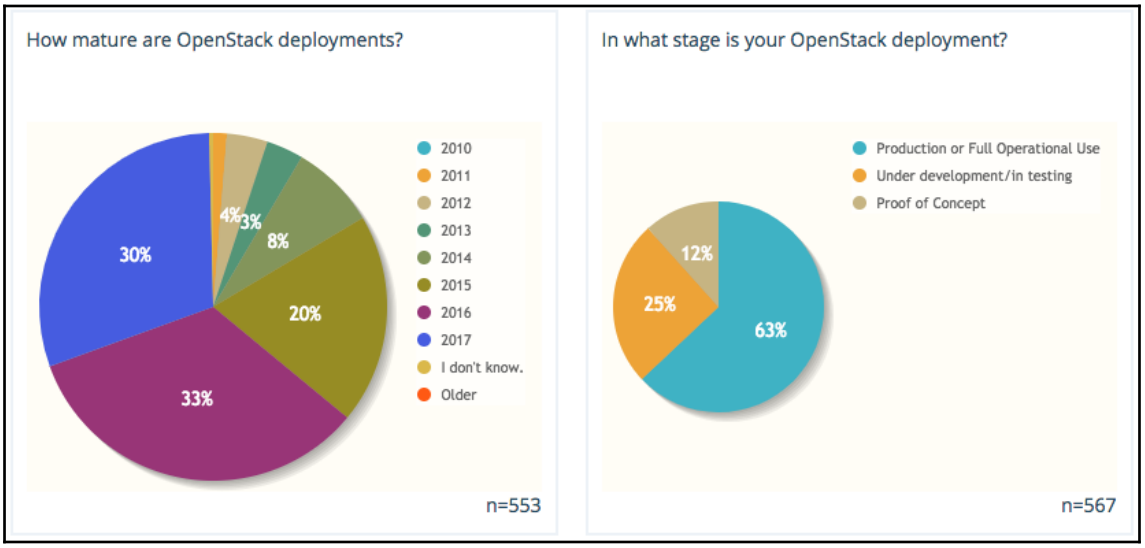


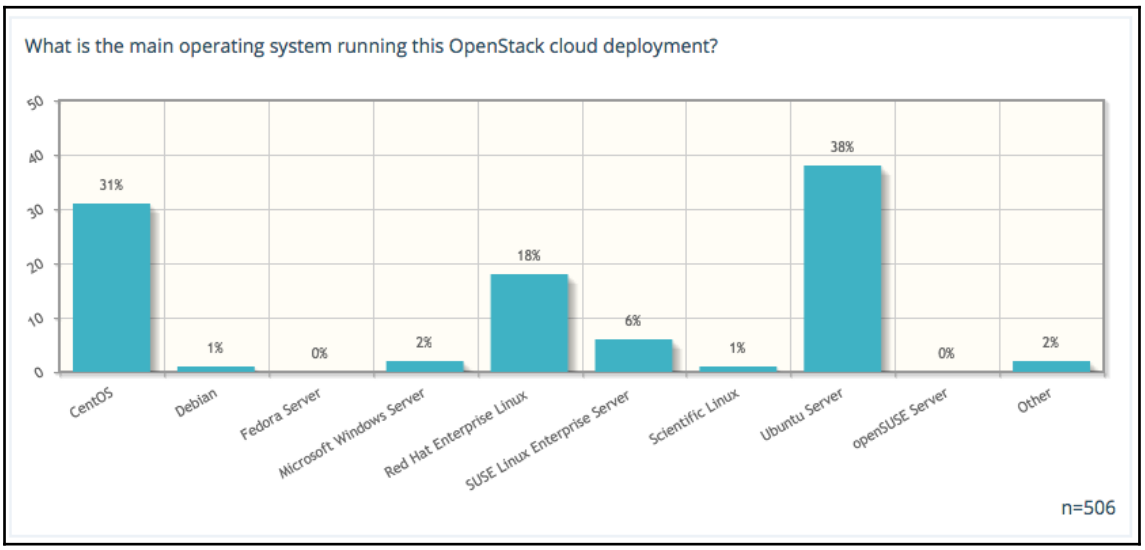


Project Name	VCPUs	Disk	RAM	VCPU Hours	Disk GB Hours
ATLAS Victoria	408	9180	816GB	5189.63	896002.59
ATLAS	56	1120	112GB	2794.98	223598.42
IT SVN	52	1040	104GB	1445.59	115647.37
IT Batch	49	980	98GB	886.13	28934.22
Personal straylen	48	960	96GB	5973.34	238933.69
PH-SFT build	44	660	88GB	2455.78	147346.55
NA61	43	860	86GB	1562.77	191997.01
CMS	41	960	82GB	2796.92	193565.16


Users
API
write new measures
Measure Storage
read aggregates
CRUD metric metadata/ resources
Scalable: run as many as you need
Aggregate Storage
read measures for processing
Store processed aggregates
Coordinator
Metricd
Index
read metric metadata
•process new measures
•delete old aggregates

Chapter 7: Securing the Cloud

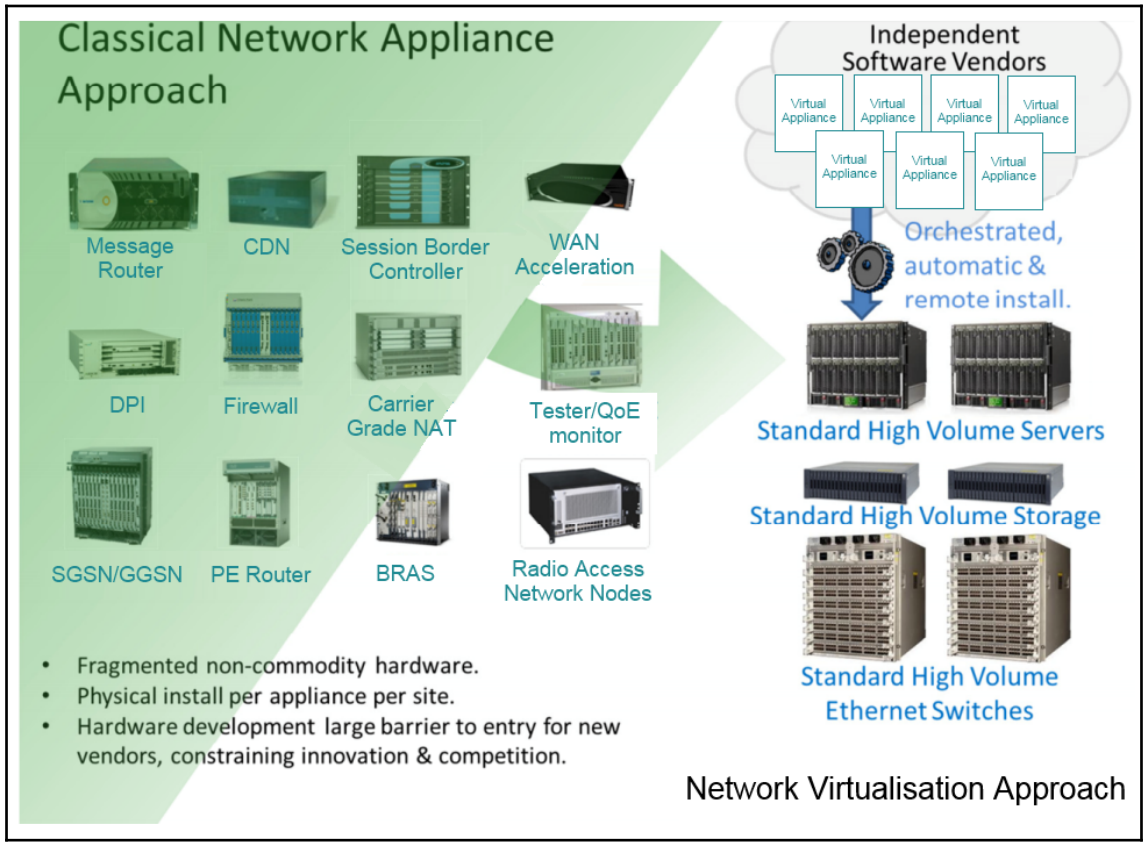


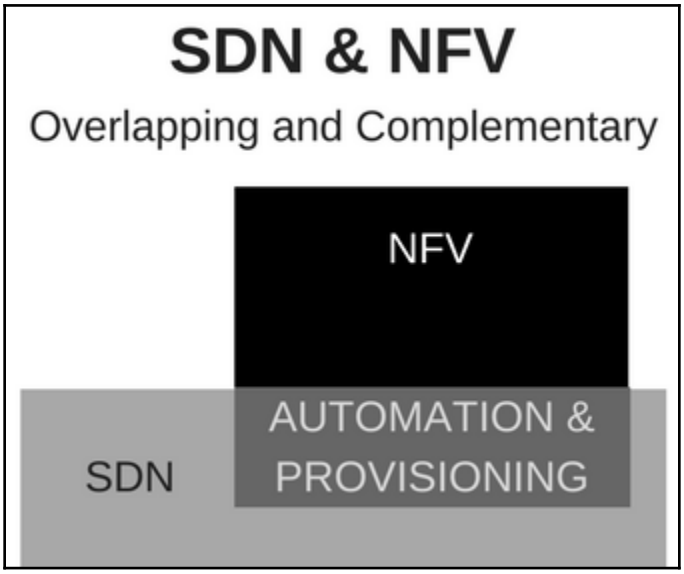


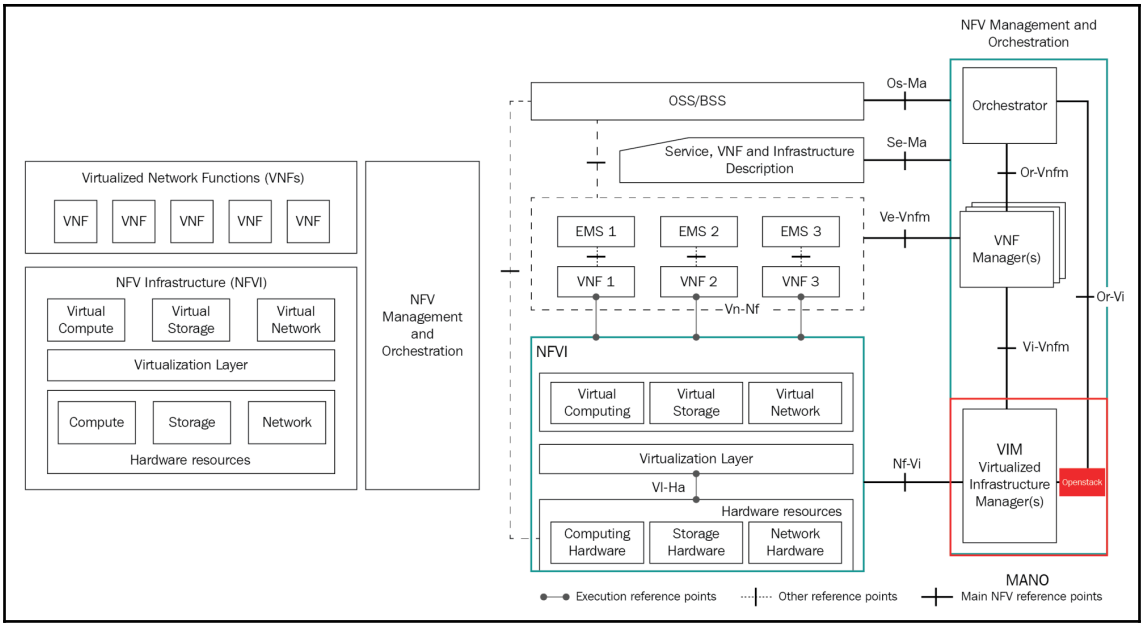
Model Component	CADF Definition
OBSERVER	The RESOURCE that generates the CADF Event Record based on its observation (directly or indirectly) of the Actual Event.
INITIATOR	The RESOURCE that initiated, originated, or instigated the event's ACTION, according to the OBSERVER.
ACTION	The operation or activity the INITIATOR has performed, attempted to perform or has pending against the event's TARGET, according to the OBSERVER.
TARGET	The RESOURCE against which the ACTION of a CADF Event Record was performed, was attempted, or is pending, according to the OBSERVER. *Note: a TARGET (in the CADF Event Model) can represent a plurality of target resources.*
OUTCOME	The result or status of the ACTION against the TARGET, according to the OBSERVER.

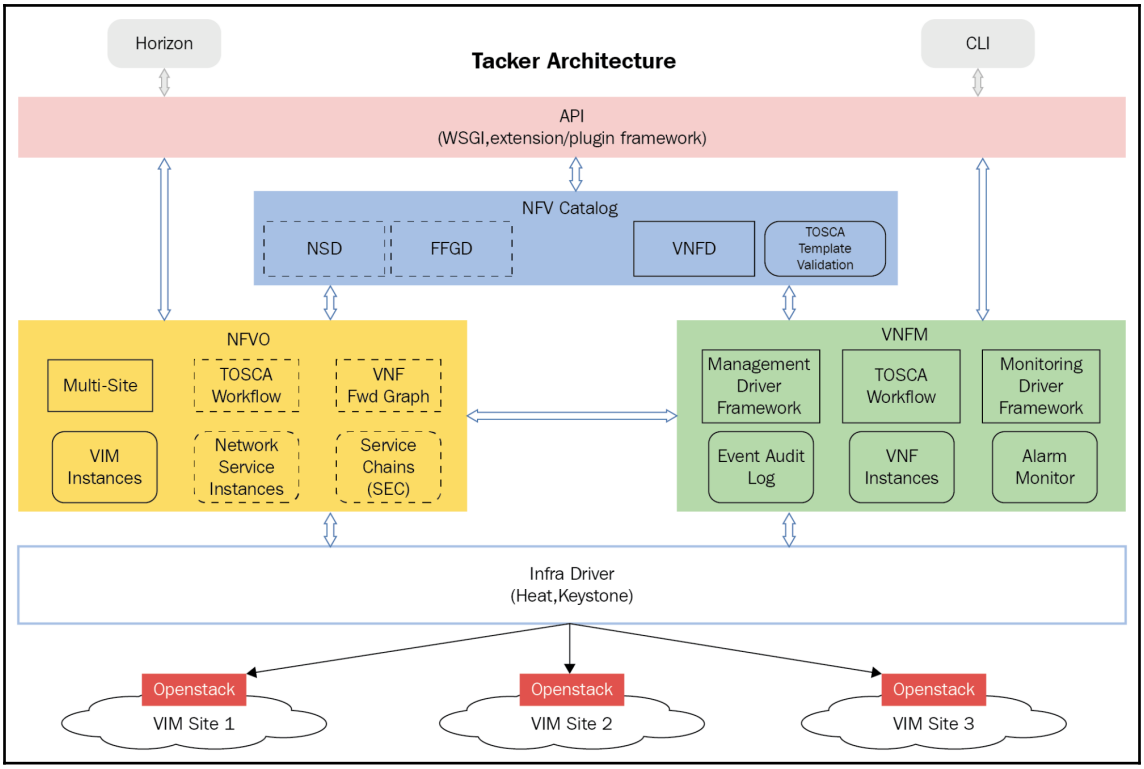
"W" Component	CADF Mandatory Properties	CADF Optional Properties (where applicable)	Description
What	event.action event.outcome event.type	event.reason *(e.g., severity, reason code, policy id)*	"what" activity occurred; "what" was the result
When	event.eventTime	reporter.timestamp (detailed), *for each reporter* event.duration	"when" did it happen • Any granularity via ISO 8601 format
Who	initiator.id initiator.type	initiator.id (id, name): (basic) initiator.credential (token): (detailed) initiator.credential.assertions (precise)	"who" (person or service) initiated the action
FromWhere		initiator.addresses (basic) initiator.host (agents, platforms, …) (detailed) Initiator.geolocation (precise)	FromWhere provides information describ ing where the action was initiated from. May include • logical/physical addresses • ISO-6709-2008, precise geolocations
OnWhat	target.id target.type		"onWhat" resource did the activity target
Where	observer.id observer.type	reporterstep.role (detailed) reporterstep.reporterTime (detailed)	"where" did the activity get observed (reported), or modified in some way.
ToWhere		target.addresses (basic) target.host (agents, platforms, …) (detailed) target.geolocation (precise)	ToWhere provides information describing where the target resource that is affected by the action is located. For example, this can be as simple as an IP address or server name.

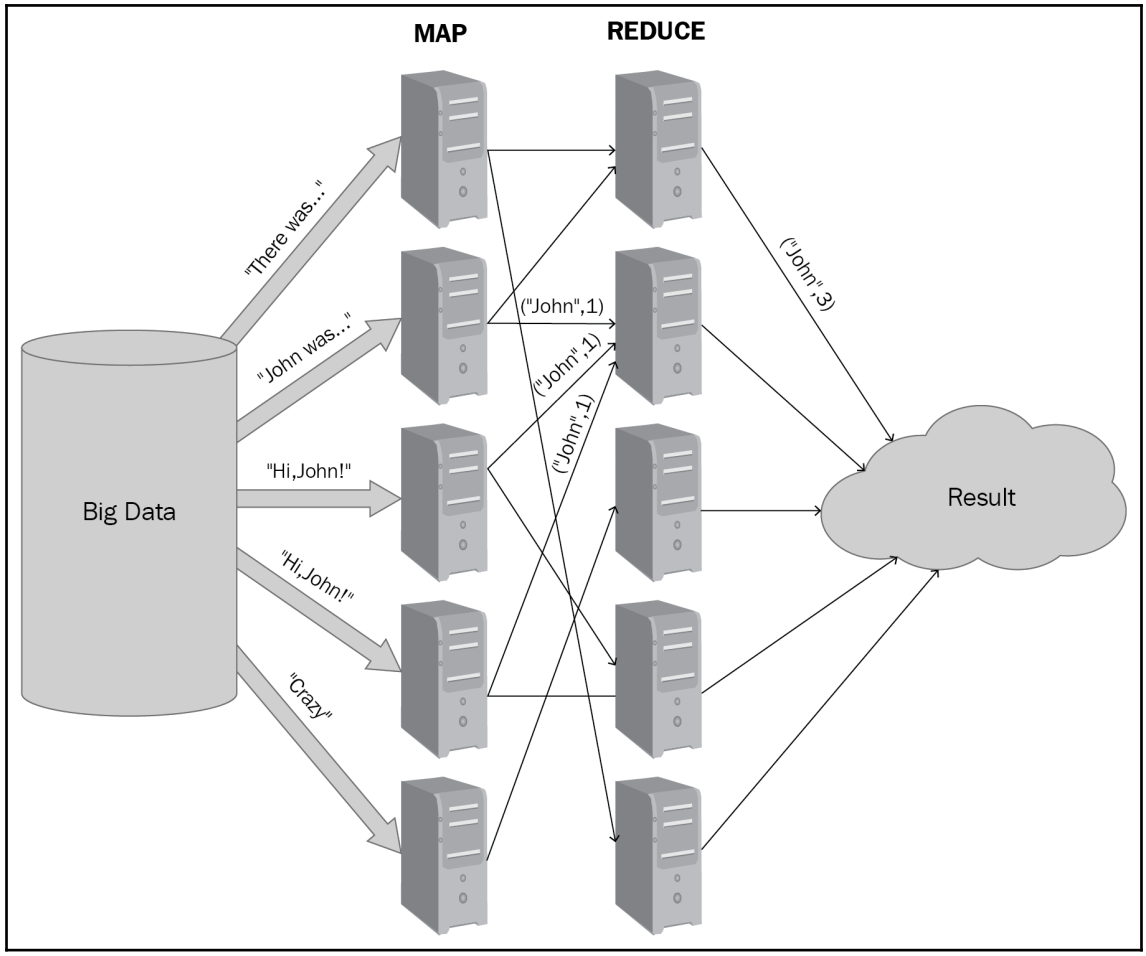
Chapter 8: OpenStack Use Cases

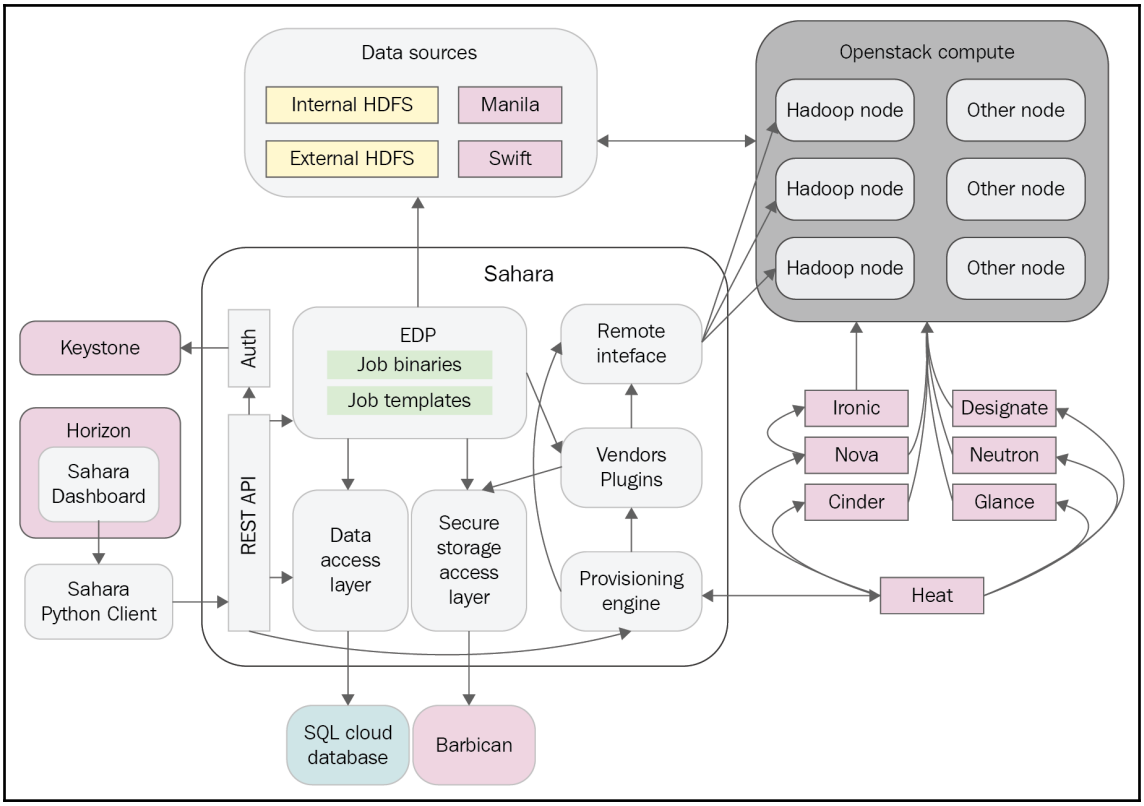


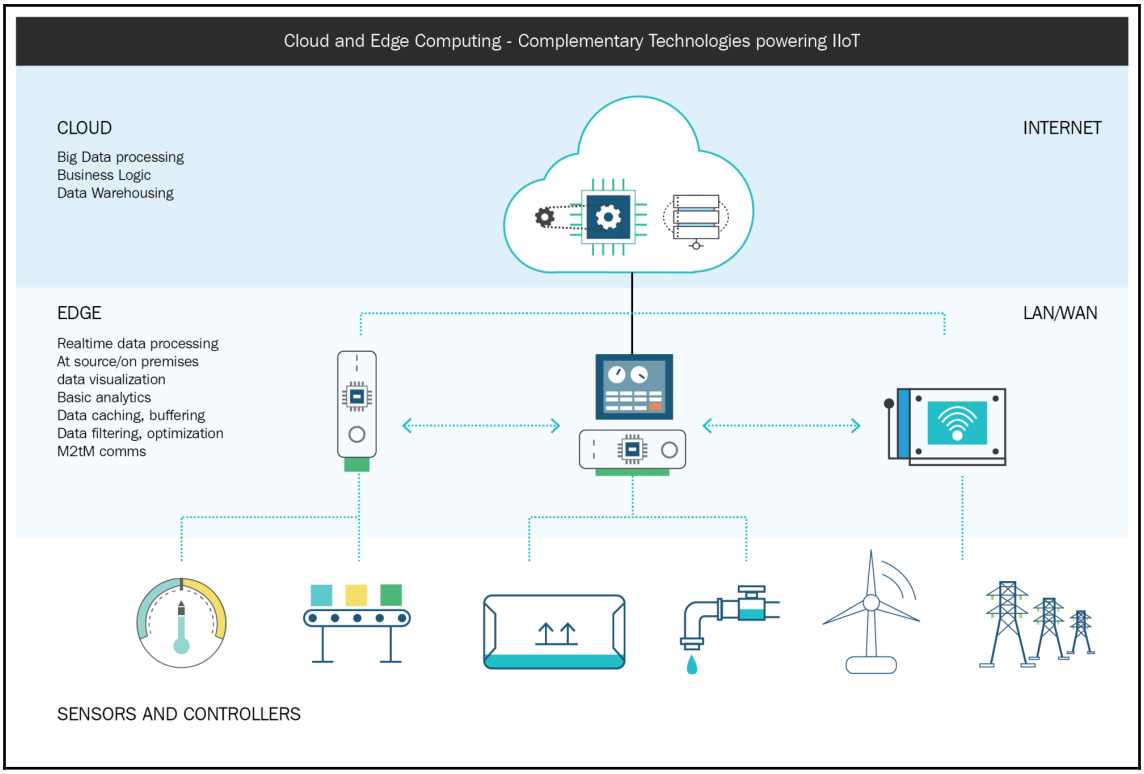

SDN & NFV
Overlapping and Complementary
NFV
SDN
AUTOMATION &
PROVISIONING


NFV Management and Orchestration
Virtualized Network Functions (VNFs)
VNF
VNF
VNF
VNF
VNF
NFV Infrastructure (NFVI)
Virtual Compute
Virtual Storage
Virtual Network
Virtualization Layer
Compute
Storage
Network
Hardware resources
NFV Management and Orchestration
OSS/BSS
Service, VNF and Infrastructure Description
EMS 1
EMS 2
EMS 3
VNF 1
VNF 2
VNF 3
Vn-Nf
NFVI
Virtual Computing
Virtual Storage
Virtual Network
Virtualization Layer
Vl-Ha
Hardware resources
Computing Hardware
Storage Hardware
Network Hardware
Os-Ma
Se-Ma
Ve-Vnfm
Nf-Vi
Orchestrator
Or-Vnfm
VNF Manager(s)
Or-Vi
Vi-Vnfm
VIM
Virtualized Infrastructure Manager(s)
Openstack
MANO
Execution reference points
Other reference points
Main NFV reference points

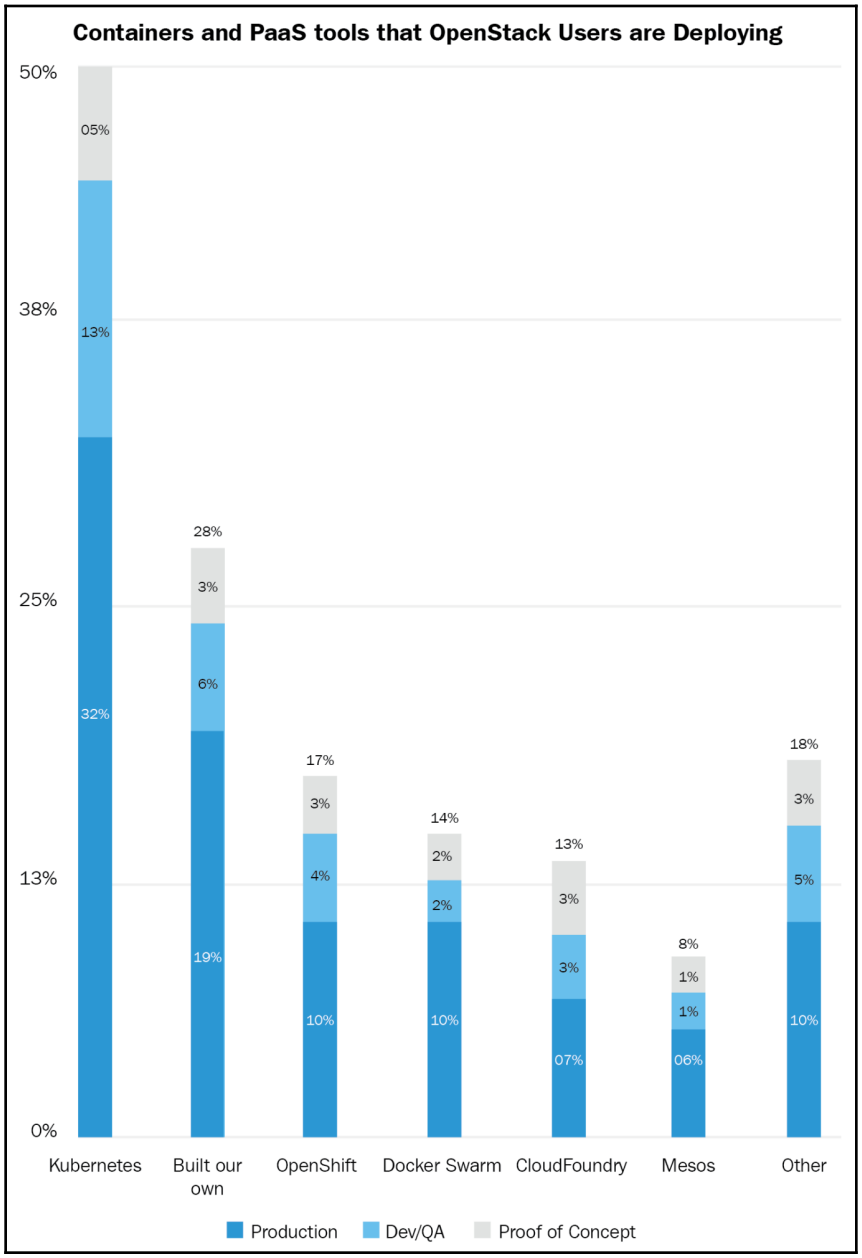

Tacker Architecture
Horizon
CLI
API
(WSGI,extension/plugin framework)
NFV Catalog
NSD
FFGD
VNFD
TOSCA
Template
Validation
NFVO
Multi-Site
TOSCA
Workflow
VNF
Fwd Graph
VIM
Instances
Network
Service
Instances
Service
Chains
(SEC)
VNFM
Management
Driver
Framework
TOSCA
Workflow
Monitoring
Driver
Framework
Event Audit
Log
VNF
Instances
Alarm
Monitor
Infra Driver
(Heat,Keystone)
Openstack
VIM Site 1
Openstack
VIM Site 2
Openstack
VIM Site 3

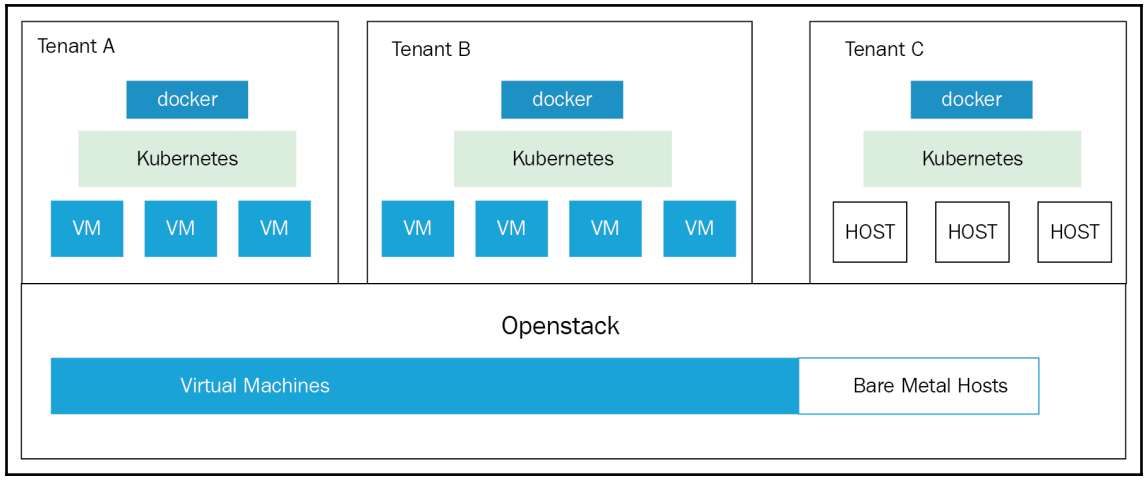

MAP
REDUCE
Big Data
"There was..."
"John was..."
"Hi,John!"
"Hi,John!"
"Crazy"
("John",1)
("John",1)
("John",1)
("John",3)
Result

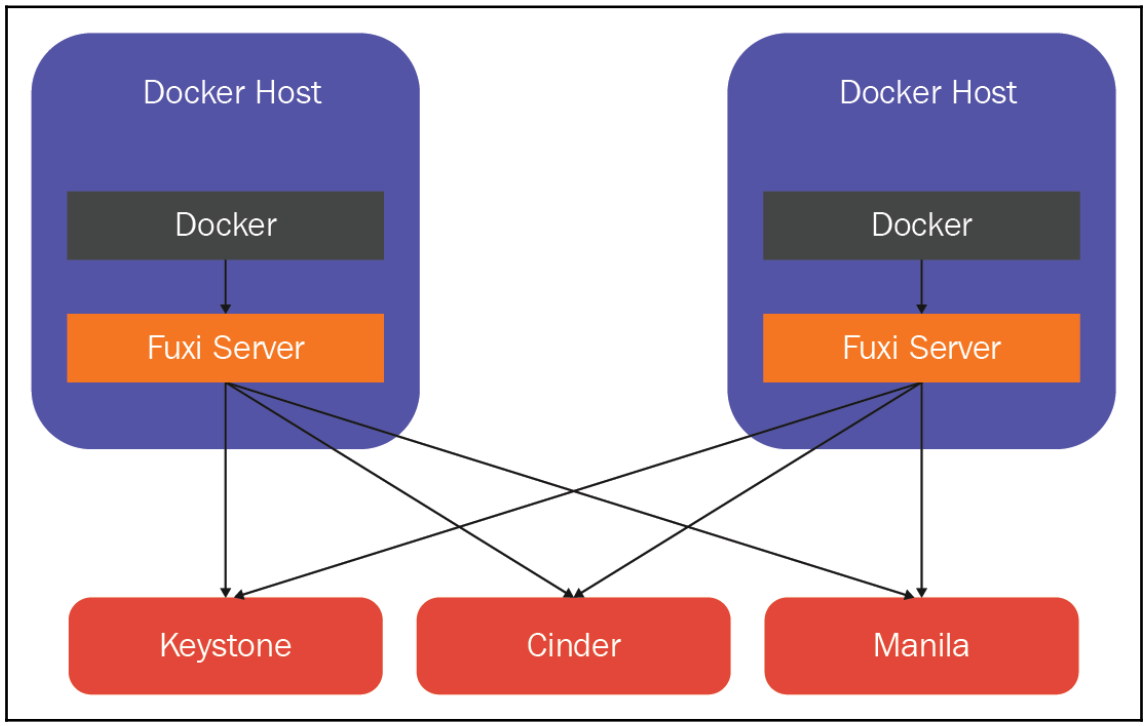

Data sources
Internal HDFS
Manila
External HDFS
Swift
Openstack compute
Hadoop node
Other node
Hadoop node
Other node
Hadoop node
Other node
Sahara
Keystone
Auth
EDP
Job binaries
Job templates
Remote inteface
Horizon
Sahara Dashboard
REST API
Vendors Plugins
Ironic
Designate
Nova
Neutron
Cinder
Glance
Data access layer
Secure storage access layer
Provisioning engine
Heat
Sahara Python Client
SQL cloud database
Barbican

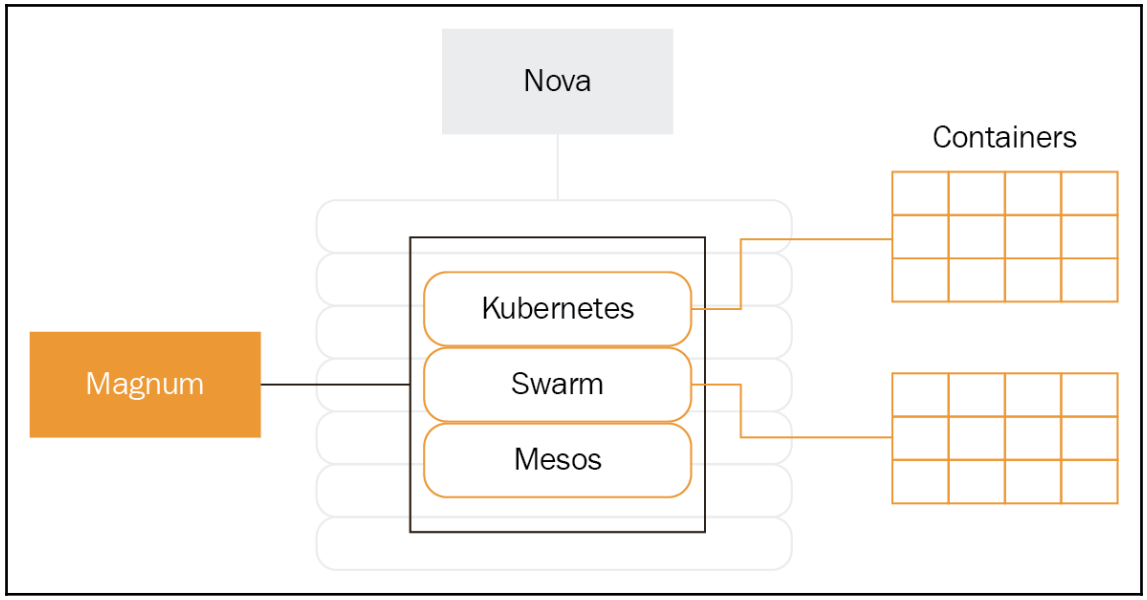

Cloud and Edge Computing - Complementary Technologies powering IIoT
CLOUD
Big Data processing
Business Logic
Data Warehousing
INTERNET
EDGE
Realtime data processing
At source/on premises
data visualization
Basic analytics
Data caching, buffering
Data filtering, optimization
M2tM comms
LAN/WAN
SENSORS AND CONTROLLERS

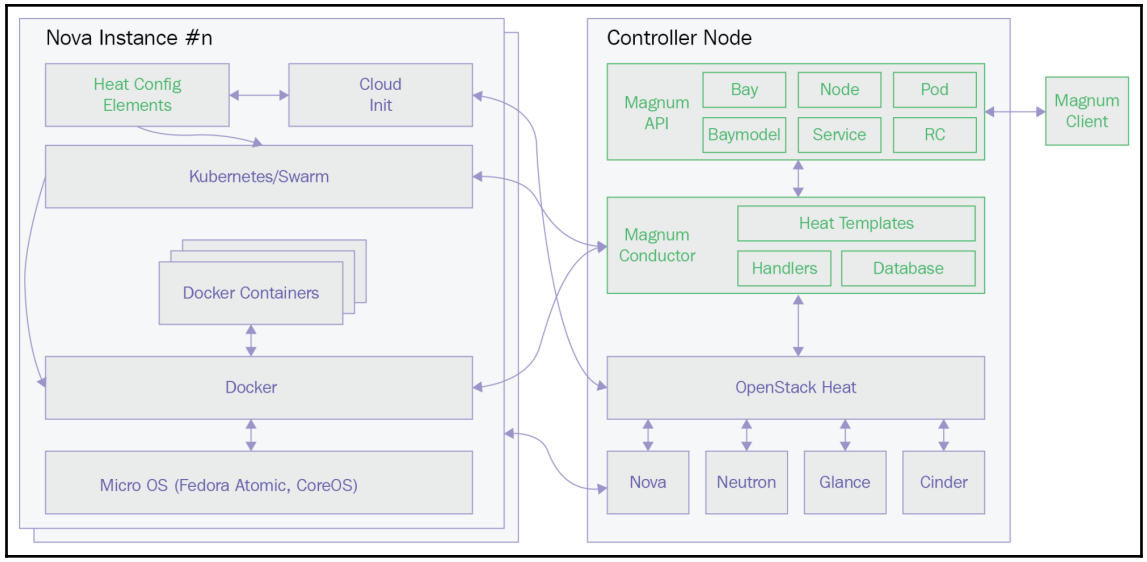
Chapter 9: Containers

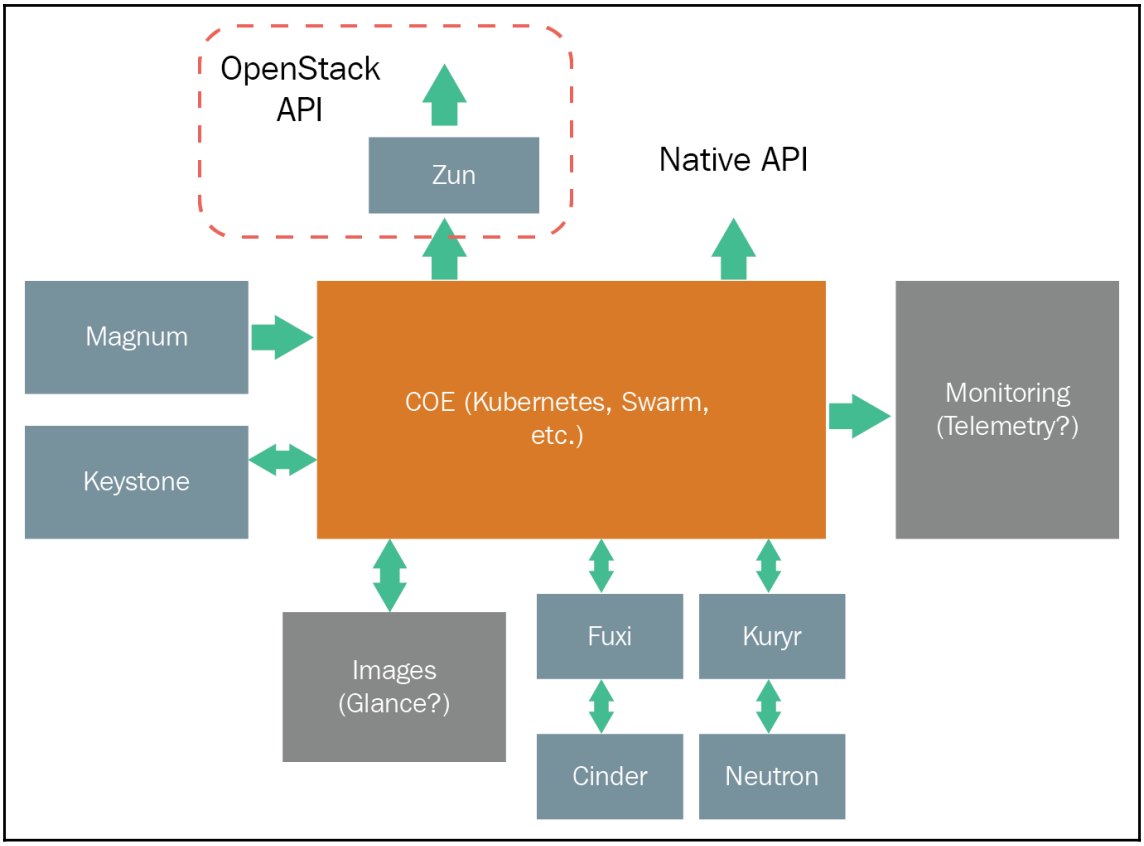
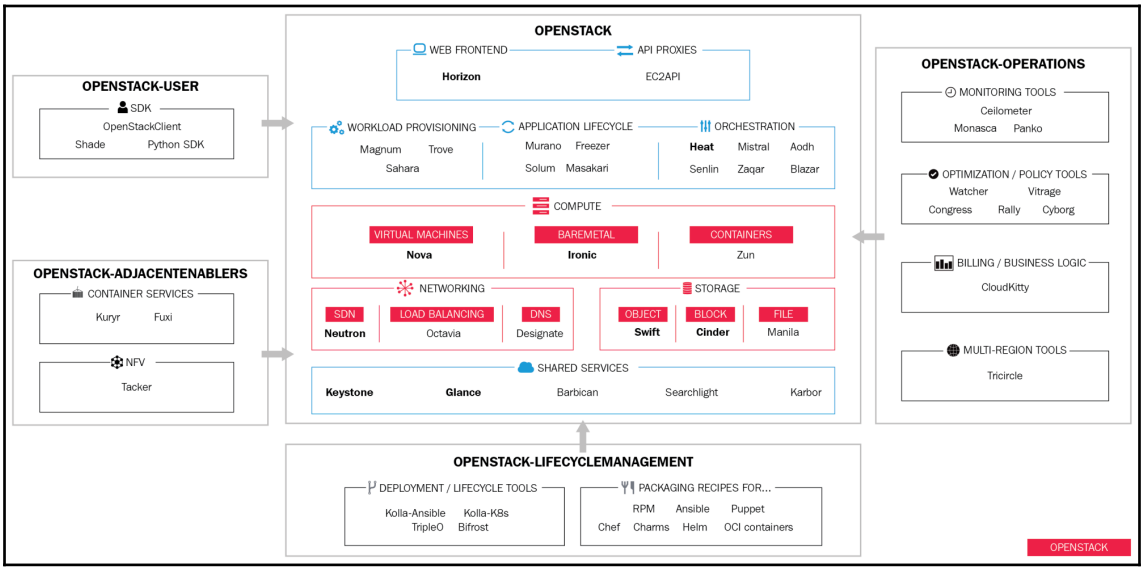



Tenant A
docker
Kubernetes
VM
VM
VM
Tenant B
docker
Kubernetes
VM
VM
VM
VM
Tenant C
docker
Kubernetes
HOST
HOST
HOST
Openstack
Virtual Machines
Bare Metal Hosts


Docker Host
Docker
Fuxi Server
Docker Host
Docker
Fuxi Server
Keystone
Cinder
Manila


Nova
Containers
Kubernetes
Swarm
Mesos
Magnum


Nova Instance #n
Heat Config Elements
Cloud Init
Kubernetes/Swarm
Docker Containers
Docker
Micro OS (Fedora Atomic, CoreOS)
Controller Node
Magnum API
Bay
Node
Pod
Baymodel
Service
RC
Magnum Client
Magnum Conductor
Heat Templates
Handlers
Database
OpenStack Heat
Nova
Neutron
Glance
Cinder


OpenStack
API
Zun
Native API
Magnum
Keystone
COE (Kubernetes, Swarm,
etc.)
Monitoring
(Telemetry?)
Images
(Glance?)
Fuxi
Kuryr
Cinder
Neutron

Chapter 10: Conclusion