

# OpenStack Upstream開発におけるCI品質向上施策

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[github.com/masayukig/better-testing-through-statistics-ja](https://github.com/masayukig/better-testing-through-statistics-ja)

# Agenda

- ▶ 自己紹介
- ▶ 今日のゴール
- ▶ OpenStack開発の概要
- ▶ OpenStack QAチームの役割
- ▶ “OpenStackゲート”とは？
- ▶ 問題点・課題・困った点
  - ▶ 大量のログの中から目的のものを見つける必要あり
  - ▶ 大量のテスト実行結果を俯瞰的に確認したい（パフォーマンス低下・向上の検出）
- ▶ 解決方法（利用・開発しているツール）
  - ▶ Logstash と elastic-recheck
  - ▶ openstack-health/subunit2sqlを用いた解析
  - ▶ stackviz
- ▶ 結果
- ▶ どのような成果・改善が得られたのか？
- ▶ 今後の課題
- ▶ 質疑応答

# 自己紹介

- ▶ 日本ヒューレット・パッカード株式会社
  - ▶ Hewlett Packard Enterprise/OpenStack アップストリーム開発チーム所属
  - ▶ メンバー数：20数名
  - ▶ チームメンバー日本人は私だけ。日本にいるのも私だけ!
- ▶ 業務活動内容：OpenStack QA 領域でアップストリームを通じた開発
  - ▶ Tempest, OpenStack-Health, Subunit2SQL, Stackviz等のコアメンバ (≒コミッタ?)
  - ▶ [stackalytics.com/?user\\_id=igawa](http://stackalytics.com/?user_id=igawa)

## 今日のゴール

- ▶ OpenStackアップストリーム開発概要を理解する
- ▶ 利用されているツール・手法を知る
- ▶ (できれば) アップストリーム開発に興味を持つ

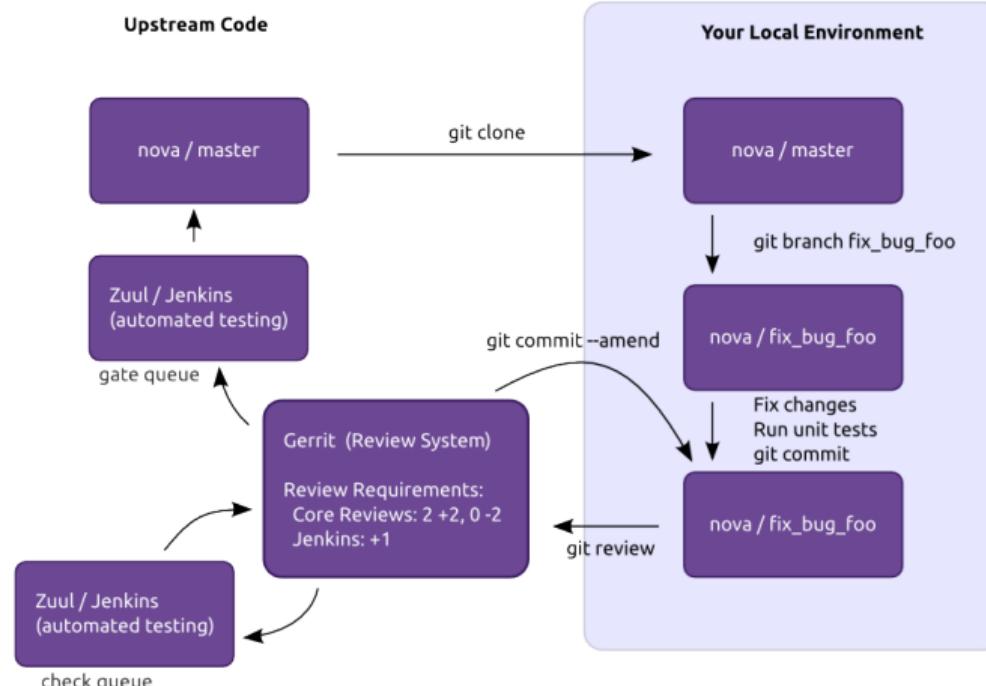
# OpenStack開発の概要

- ▶ 6ヶ月毎のリリース (... Liberty, Mitaka, Newton, Ocata,...)
- ▶ Gate ([gerrit.openstack.org](https://gerrit.openstack.org), zuul/Jenkins...) → 詳細後述
- ▶ 参考資料
  - ▶ [governance.openstack.org/reference/release-naming.html](https://governance.openstack.org/reference/release-naming.html)
  - ▶ [docs.openstack.org/ja/upstream-training/01-release-cycle.html](https://docs.openstack.org/ja/upstream-training/01-release-cycle.html)

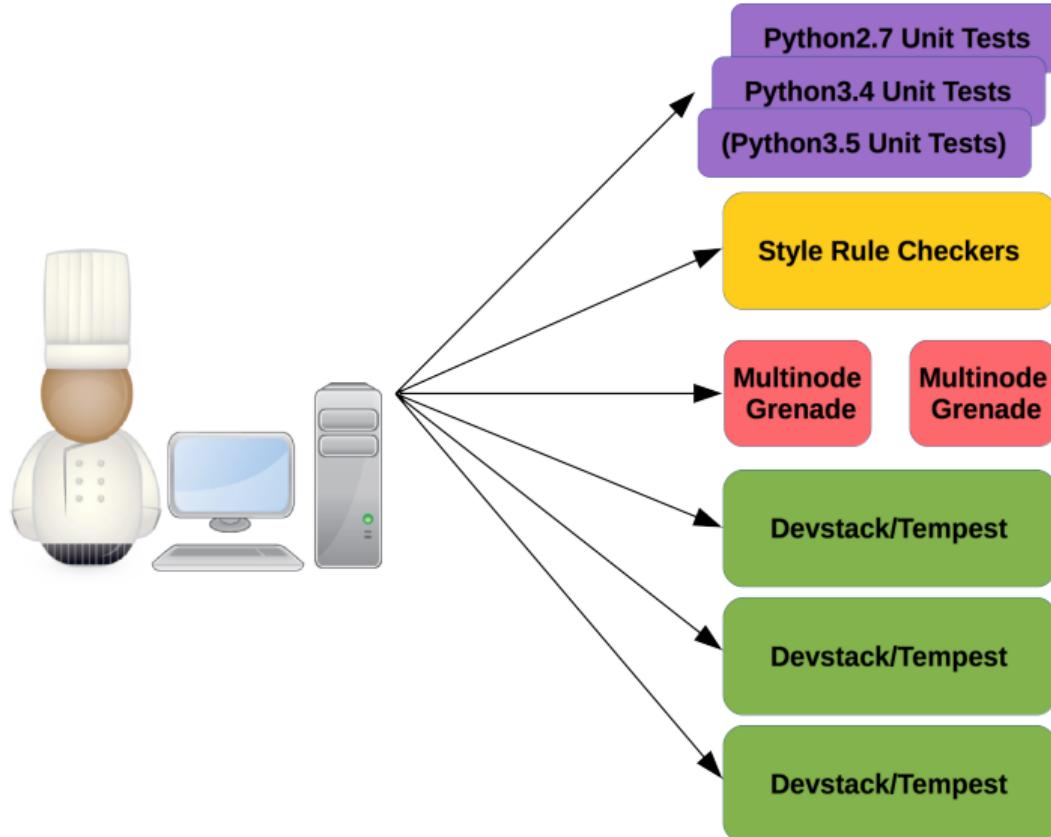
# “OpenStack QAチーム”って何？

- ▶ An official OpenStack project team
- ▶ Develop, maintain, and initiate tools and plans to ensure the upstream stability and quality of OpenStack, and its release readiness at any point during the release cycle. → CI/CDできるように整える役割
- ▶ 13プロジェクト (2016/7/4現在)
  - ▶ Tempest, DevStack, os-testr, openstack-health, stackviz, Grenade, Hacking, Bashate, etc..

# OpenStackの“Gate”って何？



# 1つのパッチを投げると何が起こるのか？



**check**

(268)

**gate**

(26)

**post**

(79)

Newly uploaded patchsets enter this pipeline to receive an initial +1-1 Verified vote from Jenkins.

Changes that have been approved by core developers are enqueued in order in this pipeline, and if they pass tests in Jenkins, will be merged.

This pipeline runs jobs that operate after each change is merged.

Change queue: [openstack/neutron](#)

	<a href="#">openstack/neutron</a>	181574,23	unknown	3 hr 57 min
gate-neutron-docs:	SUCCESS			
gate-neutron-pep8:	SUCCESS			
gate-neutron-python27:	FAILURE			
gate-neutron-python34:	FAILURE			
gate-tempест-dsvm-neutron-full:	queued			
gate-grenade-dsvm-neutron:	SUCCESS			
gate-neutron-dsvm-api:	SUCCESS			
gate-neutron-dsvm-functional:	SUCCESS			
gate-neutron-dsvm-fullstack: (non-voting)	SUCCESS			
gate-rally-dsvm-neutron-neutron: (non-voting)	SUCCESS			
gate-tempест-dsvm-neutron-dvr:	SUCCESS			
gate-tempест-dsvm-neutron-identity-v3-only-full-rv: (non-voting)	SUCCESS			
gate-tempест-dsvm-neutron-linuxbridge:	SUCCESS			
gate-tempест-dsvm-neutron-pg-full: (non-voting)	SUCCESS			
gate-neutron-lbaasv2-dsvm-minimal:	SUCCESS			
gate-grenade-dsvm-neutron-multinode: (non-voting)	SUCCESS			
gate-grenade-dsvm-neutron-dvr-multinode: (non-voting)	SUCCESS			
gate-tempест-dsvm-neutron-multinode-full: (non-voting)	SUCCESS			
gate-tempест-dsvm-neutron-dvr-multinode-full: (non-voting)	SUCCESS			
gate-tempест-dsvm-ironic-ipa-rv: (non-voting)	SUCCESS			

Change queue: [openstack/networking-generic-swift](#)

	<a href="#">openstack/networking-generic-switch</a>	308884,3	unknown	3 hr 52 min
gate-networking-generic-switch-docs:	queued			
gate-networking-generic-switch-pep8:	SUCCESS			
gate-networking-generic-switch-python27:	SUCCESS			
gate-networking-generic-switch-python34:	SUCCESS			
gate-networking-generic-switch-dsvm:	SUCCESS			

Change queue: [openstack/neutron](#)

	<a href="#">openstack/neutron</a>	280595,12	unknown	3 hr 38 min
gate-neutron-docs:	SUCCESS			
gate-neutron-pep8:	SUCCESS			
gate-neutron-python27:	SUCCESS			
gate-neutron-python34:	SUCCESS			
gate-tempест-dsvm-neutron-full:	SUCCESS			
gate-grenade-dsvm-neutron:	SUCCESS			
gate-neutron-dsvm-api:	SUCCESS			
gate-neutron-dsvm-functional:	SUCCESS			
gate-neutron-dsvm-fullstack: (non-voting)	FAILURE			
gate-rally-dsvm-neutron-neutron: (non-voting)	queued			
gate-tempест-dsvm-neutron-dvr:	SUCCESS			
gate-tempест-dsvm-neutron-identity-v3-only-full-rv: (non-voting)	SUCCESS			
gate-tempест-dsvm-neutron-linuxbridge:	SUCCESS			
gate-tempест-dsvm-neutron-pg-full: (non-voting)	SUCCESS			

Change queue: [integrated](#)

	<a href="#">openstack/khovva</a>	307269,1	0 min	1 hr 10 min
gate-nova-docs:	SUCCESS			
gate-nova-pep8:	SUCCESS			
gate-nova-python27-db:	FAILURE			
gate-nova-python34-db:	FAILURE			
gate-nova-requirements:	SUCCESS			
gate-tempест-dsvm-full:	SUCCESS			
gate-tempест-dsvm-postgres-full:	SUCCESS			
gate-tempест-dsvm-neutron-full:	SUCCESS			
gate-grenade-dsvm:	SUCCESS			
gate-nova-releasenotes:	SUCCESS			
gate-nova-tox-db-functional:	SUCCESS			
gate-grenade-dsvm-multinode:	SUCCESS			
gate-tempест-dsvm-cells:	SUCCESS			
gate-tempест-dsvm-full-devstack-plugin-ceph:	SUCCESS			

	<a href="#">openstack/khovva</a>	304730,1	0 min	1 hr 10 min
gate-nova-docs:	SUCCESS			
gate-nova-pep8:	SUCCESS			
gate-nova-python27-db:	SUCCESS			
gate-nova-python34-db:	SUCCESS			
gate-tempест-dsvm-full:	SUCCESS			
gate-tempест-dsvm-postgres-full:	SUCCESS			
gate-tempест-dsvm-neutron-full:	SUCCESS			
gate-grenade-dsvm:	SUCCESS			
gate-nova-releasenotes:	SUCCESS			
gate-nova-tox-db-functional:	SUCCESS			
gate-grenade-dsvm-multinode:	SUCCESS			
gate-tempест-dsvm-cells:	SUCCESS			
gate-tempест-dsvm-full-devstack-plugin-ceph:	SUCCESS			

	<a href="#">openstack/khovva</a>	303995,1	0 min	1 hr 5 min
gate-nova-docs:	SUCCESS			
gate-nova-pep8:	SUCCESS			
gate-nova-python27-db:	SUCCESS			
gate-nova-python34-db:	SUCCESS			
gate-tempест-dsvm-full:	SUCCESS			
gate-tempест-dsvm-postgres-full:	SUCCESS			
gate-tempест-dsvm-neutron-full:	SUCCESS			
gate-grenade-dsvm:	SUCCESS			
gate-nova-releasenotes:	SUCCESS			
gate-nova-tox-db-functional:	SUCCESS			
gate-grenade-dsvm-multinode:	SUCCESS			
gate-tempест-dsvm-cells:	SUCCESS			
gate-tempест-dsvm-full-devstack-plugin-ceph:	SUCCESS			

	<a href="#">openstack/dev/devstack</a>	308791,1	0 min	1 hr 5 min
gate-devstack-docs:	SUCCESS			
gate-devstack-pep8:	SUCCESS			

Change queue: [openstack/osl.concurrency](#)

	<a href="#">openstack/osl.concurrency</a>	342ef03	unknown	5 hr 2 min
oslo.concurrency-branch-tarball:	SUCCESS			
oslo.concurrency-docs:	queued			
oslo.concurrency-upstream-translation-update:	SUCCESS			
oslo.concurrency-coverage:	queued			

Change queue: [openstack-infra/project-config](#)

	<a href="#">openstack-infra/project-config</a>	08001cc	unknown	5 hr 0 min
publish-infra-docs-index:	queued			
publish-specs-site:	queued			

Change queue: [openstack-infra/project-config](#)

	<a href="#">openstack-infra/project-config</a>	b7d07b6	unknown	4 hr 56 min
publish-infra-docs-index:	queued			
publish-specs-site:	queued			

Change queue: [openstack-infra/project-config](#)

	<a href="#">openstack-infra/project-config</a>	8cb6337	unknown	4 hr 52 min
publish-infra-docs-index:	queued			
publish-specs-site:	queued			

Change queue: [openstack/stackalytics](#)

	<a href="#">openstack/stackalytics</a>	40f07b8	unknown	4 hr 7 min
hook-stackalyticcs-rtfd:	SUCCESS			
stackalytics-branch-tarball:	queued			

Change queue: [openstack/stackalytics](#)

	<a href="#">openstack/stackalytics</a>	a5e58a37	unknown	4 hr 7 min
hook-stackalyticcs-rtfd:	SUCCESS			
stackalytics-branch-tarball:	queued			

Change queue: [openstack/governance](#)

# Gateの規模感

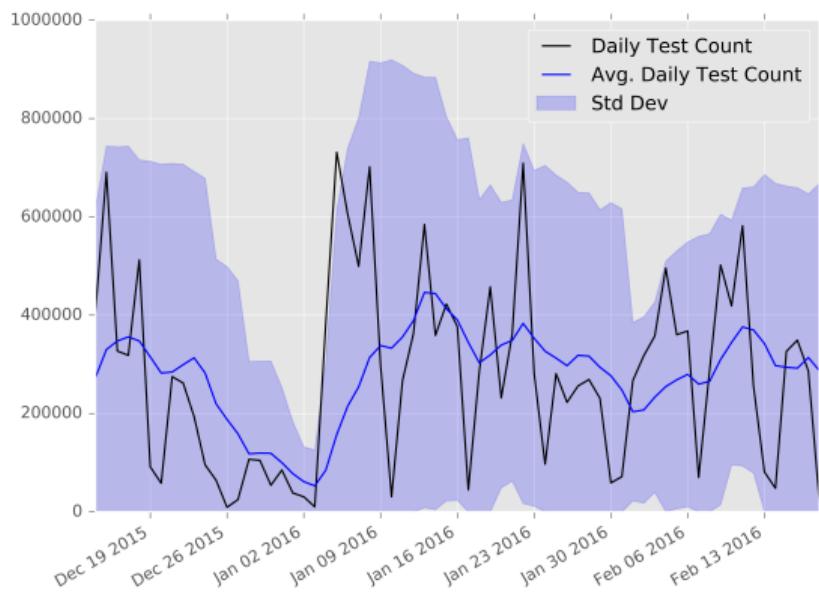
1つのパッチで行われること:

- ▶ 5–25 Devstacks
- ▶ ~10,000 integration tests  
(約1.5k/devstack)
- ▶ ~151 2ndレベルゲスト生成/devstack
- ▶ ~1 GBログファイル(非圧縮時)/実行毎

合計すると:

- ▶ ~12,500 ジョブ(check or gate)実行/日
- ▶ ~0.01% 個別tempestテスト毎失敗率
- ▶ ~.77% tempest 実行全体失敗率

Tempestテスト実行数/日(GateQ):



## Log Server

- ▶ Log Server: [logs.openstack.org/](https://logs.openstack.org/)
- ▶ 全ジョブの生成物を~4ヶ月保持
- ▶ ~8 TBの圧縮データ

## Graphite

- ▶ [graphite.openstack.org](http://graphite.openstack.org)
- ▶ OpenStack Infra チームが提供
- ▶ Include job results
- ▶ Jobレベルのデータに限定
- ▶ 個別のJobへのリンクはできない

# Grafana

- ▶ [grafana.openstack.org](http://grafana.openstack.org)
- ▶ Graphiteに対するDashboard機能を提供 (簡単に視覚化できる)
- ▶ 既にいくつかのダッシュボードが提供されている
- ▶ 数プロジェクト (Neutron等) がJob失敗率視覚化に利用中

# ELK

- ▶ Elasticsearch, Logstash, Kibana
- ▶ [logstash.openstack.org](http://logstash.openstack.org)
- ▶ 大量のログファイルを検索する機能を提供
- ▶ 10日間のログデータに制限

# Elastic Recheck

- ▶ 「このエラー前にも起きたよね？」という質問に答えるべく設計
- ▶ [status.openstack.org/elastic-recheck/](http://status.openstack.org/elastic-recheck/)

Jenkins Patch Set 9: Verified-1 Build failed (check pipeline). For information on how to proceed, see <http://docs.openstack.org/in>

**Elastic Recheck**

Patch Set 9:

I noticed jenkins failed, I think you hit bug(s):

- gate-grenade-dsvm-multinode: <https://bugs.launchpad.net/bugs/1298006> <https://bugs.launchpad.net/bugs/1282876>
- gate-grenade-dsvm: unrecognized error
- gate-tempest-dsvm-cells: unrecognized error
- gate-tempest-dsvm-full-devstack-plugin-ceph: unrecognized error
- gate-tempest-dsvm-full: unrecognized error
- gate-tempest-dsvm-neutron-full: unrecognized error
- gate-tempest-dsvm-postgres-full: unrecognized error

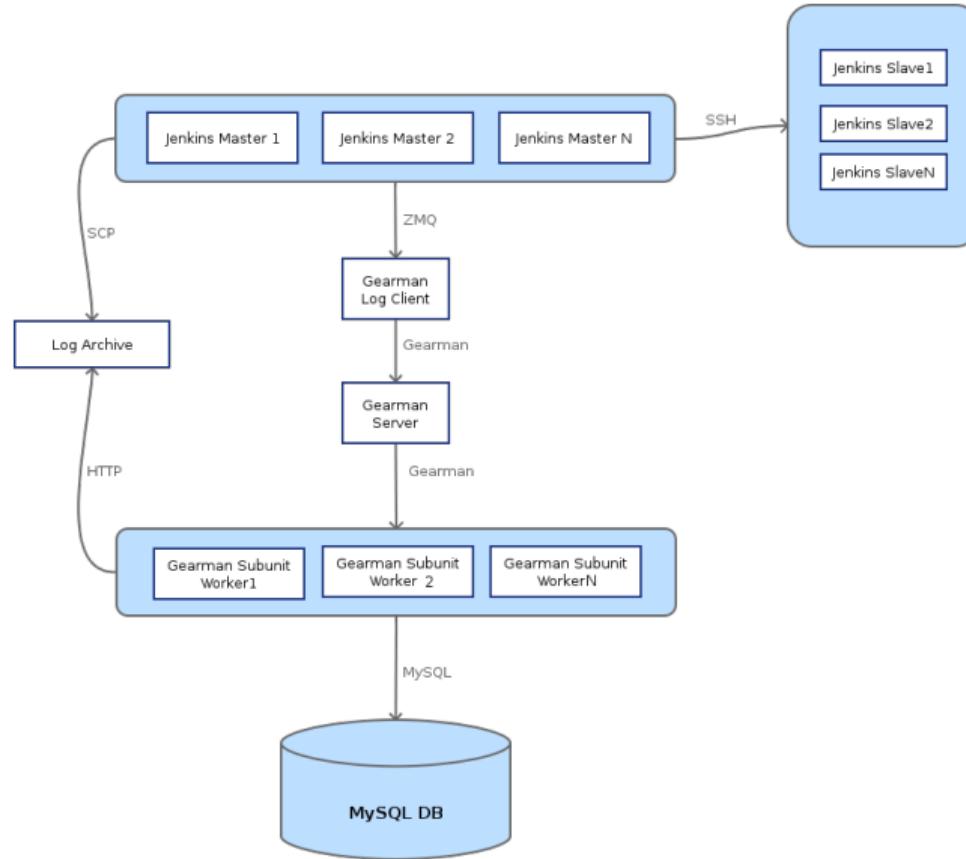
Some of the tests failed in a way that we did not understand. Please help us classify these issues so that they can be part of Elastic Recheck  
<http://status.openstack.org/elastic-recheck/>

For more details on this and other bugs, please see <http://status.openstack.org/elastic-recheck/>

## subunit2sql

- ▶ テスト結果データをSQLデータベース (MySQL, PostgreSQL, SQLite)に保持する機能を提供
- ▶ DBに保持したデータに対するPython APIを提供
- ▶ 6ヶ月間の実行結果を保持（ゲート環境）

# subunit2sql in OpenStackインフラ



# openstack-health

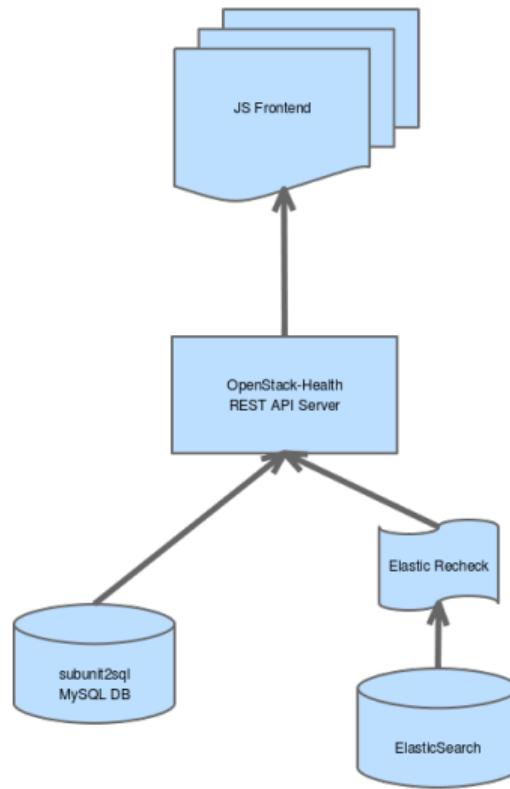
- ▶ [status.openstack.org/openstack-health/](http://status.openstack.org/openstack-health/)
- ▶ ゲートの実行結果データをアクセスできるダッシュボードとして開発開始
- ▶ subunit2sqlとelastic recheckのデータと連携



Project Status

#	Name	Passes	Failures	% Passes	% Failures	Bar Graph
1	<a href="#">openstack/networking-midonet</a>	59	39	60.20	39.80	
2	<a href="#">openstack/monasca-api</a>	55	10	84.62	15.38	
3	<a href="#">openstack/networking-ovn</a>	131	21	86.18	13.82	
4	<a href="#">openstack/murano-agent</a>	13	2	86.67	13.33	
5	<a href="#">openstack/networking-ofagent</a>	41	6	87.23	12.77	
6	<a href="#">openstack/networking-odl</a>	35	5	87.50	12.50	

# OpenStack-Health Architecture



# StackViz

個々のCIビルド結果を視覚化するツール

▶ ソースコード：[git.openstack.org/cgit/openstack/stackviz](https://git.openstack.org/cgit/openstack/stackviz)

## Datasets

[Home](#) / stdin

stdin 3 Jul, 2016

41:11

runtime

1509

tests run

1

failed

72

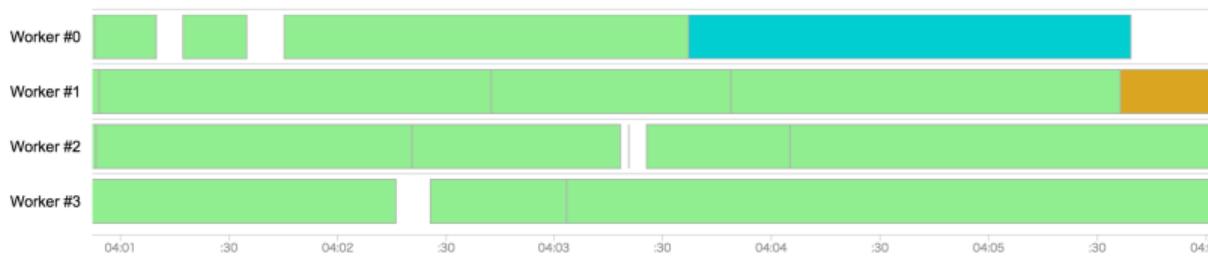
skipped

Details

### Failures

TestSecurityGroupsBasicOps.test\_port\_update\_new\_security\_group

## Timeline

[Show in OpenStack-health](#)

Details: [test\\_port\\_update\\_new\\_security\\_group](#) fail

Class	TestSecurityGroupsBasicOps
Module	tempest.scenario.test_security_groups_basic_ops
Tags	worker-1
Duration	24.7 seconds
Start	Jul 3, 2016 4:05:36 PM
End	Jul 3, 2016 4:06:01 PM

## TestSecurityGroupsBasicOps.test\_port\_update\_new\_security\_group

[Summary](#)[traceback](#)[pythonlogging](#)

```
Traceback (most recent call last):
  File "tempest/scenario/test_security_groups_basic_ops.py", line 188, in setUp
    self._deploy_tenant(self.primary_tenant)
  File "tempest/scenario/test_security_groups_basic_ops.py", line 352, in _deploy_tenant
    self._set_access_point(tenant)
  File "tempest/scenario/test_security_groups_basic_ops.py", line 320, in _set_access_point
    self._assign_floating_ips(tenant, server)
  File "tempest/scenario/test_security_groups_basic_ops.py", line 326, in _assign_floating_ips
    client=tenant.manager.floating_ips_client)
  File "tempest/scenario/manager.py", line 868, in create_floating_ip
    port_id, ip4 = self._get_server_port_id_and_ip4(thing)
  File "tempest/scenario/manager.py", line 847, in _get_server_port_id_and_ip4
    "No IPv4 addresses found in: %s" % ports)
  File "/opt/stack/new/tempest/.tox/tempest/local/lib/python2.7/site-packages/unittest2/case.py", line 845, in assertNotEqual
    raise self.failureException(msg)
AssertionError: 0 == 0 : No IPv4 addresses found in: [{u'extra_dhcp_opts': [], u'admin_state_up': True, u'mac_address': u'fa:16:3e:ee:7f:bc'}
```

[Timeline](#)

## 改善できたポイント

- ▶ 全てのパッチに対してIntegrationテストを実行しており、破滅的な改変などを防いでいる
- ▶ Job実行結果を俯瞰的に視覚化するにより、パフォーマンス劣化・改善を確認することができた
- ▶

## 課題

- ▶ 非常に多くの種類のデータ・制限があり、効果的な見せ方が難しい
- ▶ GateとPeriodicジョブのデータしか保持していない  
(subunit2sql/openstack-health)
- ▶ インフラに起因するエラーが対象外 (subunit2sql/openstack-health)
- ▶ 企業に所属する開発者のコントリビューションが得られにくい

## Future work

- ▶ openstack-health改善
  - ▶ 全てのデータを見られるように
  - ▶ elastic recheckデータの更なる統合
  - ▶ zuulデータの統合
  - ▶ 単体テストカバレッジ推移
- ▶ 各種UIの改善
- ▶ APIテスト実施状況 (カバレッジ)の把握

## Summary

- ▶ 活発な開発を維持するため、OpenStackアップストリーム開発ではCIが行われている
- ▶ CIを支える各種ツールが開発・導入され運用されている
  - ▶ graphite/grafana
  - ▶ Zuul (Gate)
  - ▶ elastic-recheck
  - ▶ subunit2sql
  - ▶ openstack-health
  - ▶ stackviz, etc.
- ▶ OpenStack開発を支える、QAに興味がある開発者・支援者募集中！

Questions?

## Where to get more information

- ▶ openstack-dev ML [openstack-dev@lists.openstack.org](mailto:openstack-dev@lists.openstack.org)
- ▶ #openstack-qa on Freenode
- ▶ <http://git.openstack.org/cgit/openstack/openstack-health/>
- ▶ <http://git.openstack.org/cgit/openstack-infra/subunit2sql>
- ▶ <http://git.openstack.org/cgit/openstack-infra/elastic-recheck/>