

# 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チームって何？
  - ▶ “OpenStackゲート”って何？
- ▶ 困ったこと
- ▶ 解決方法（利用・開発しているツール）
- ▶ Keep/良かった点
- ▶ Problem/改善点
- ▶ Try/今後の活動
- ▶ まとめ
- ▶ 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

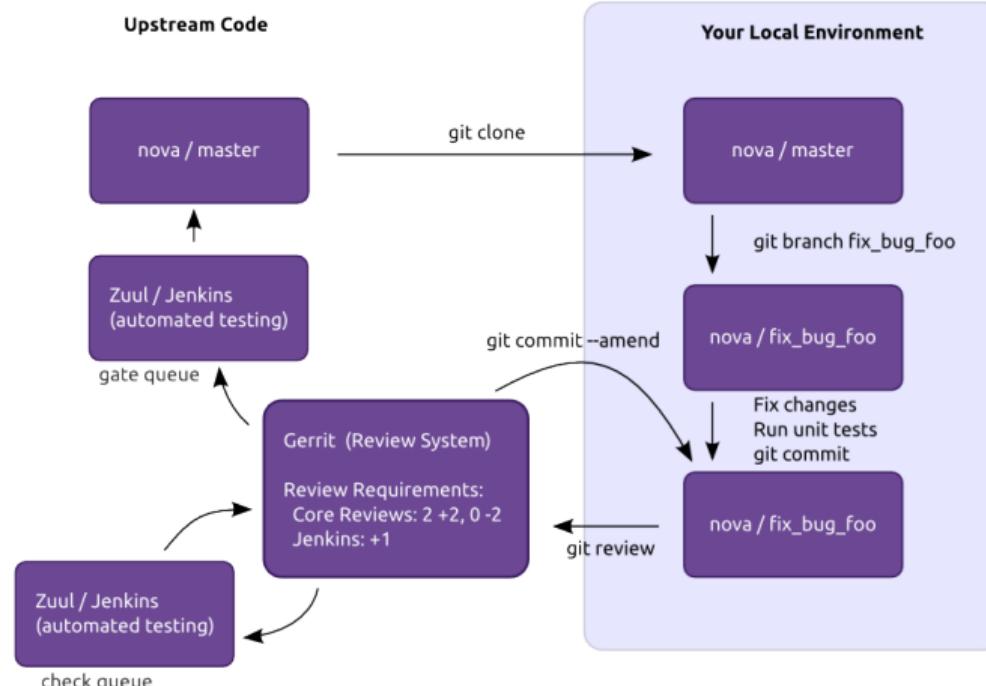
# OpenStack開発の概要

- ▶ 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)

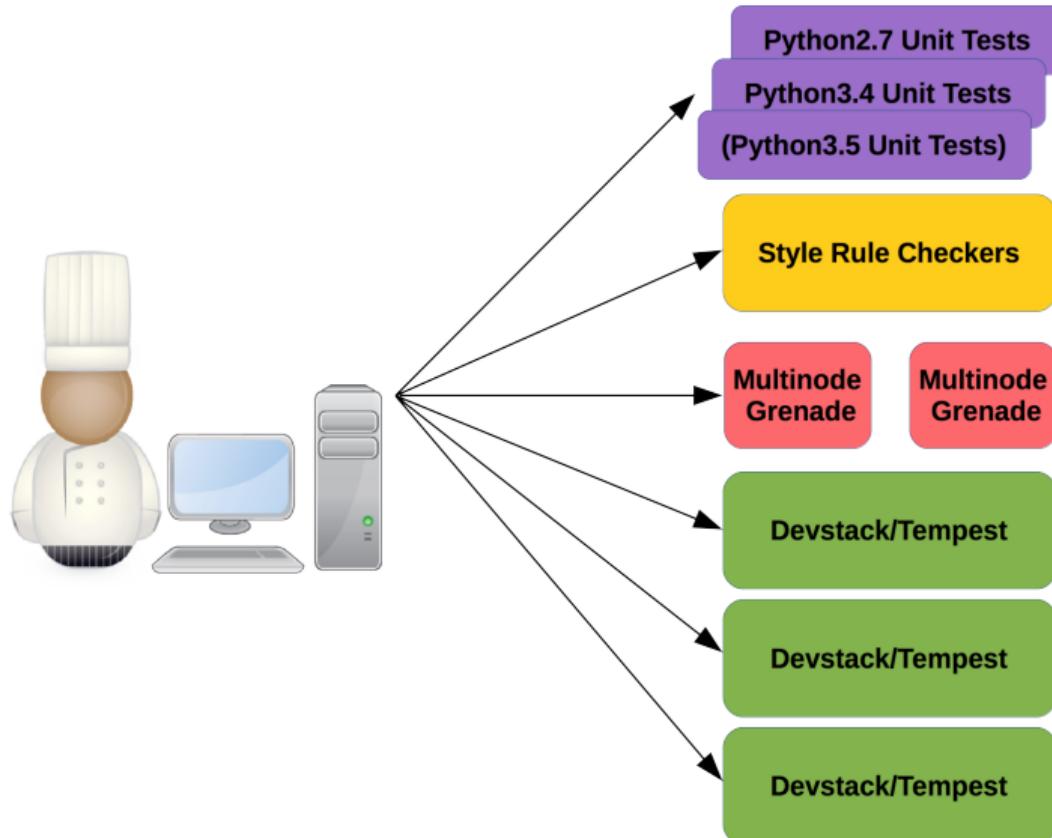
# “OpenStack QAチーム”って何？

- ▶ 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> | b7d7b6c | 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> | d7f08ff | unknown | 4 hr 54 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-stackalytics-ics-rtfd:  | SUCCESS                                |         |         |            |
| stackalytics-branch-tarball: | queued                                 |         |         |            |

Change queue: [openstack/stackalytics](#)

|                              |  |         |         |            |
|------------------------------|--|---------|---------|------------|
|                              | <a href="#">openstack/stackalytics</a> | a5e5a37 | unknown | 4 hr 7 min |
| hook-stackalytics-ics-rtfd:  | SUCCESS                                |         |         |            |
| stackalytics-branch-tarball: | queued                                 |         |         |            |

# Gateの規模感

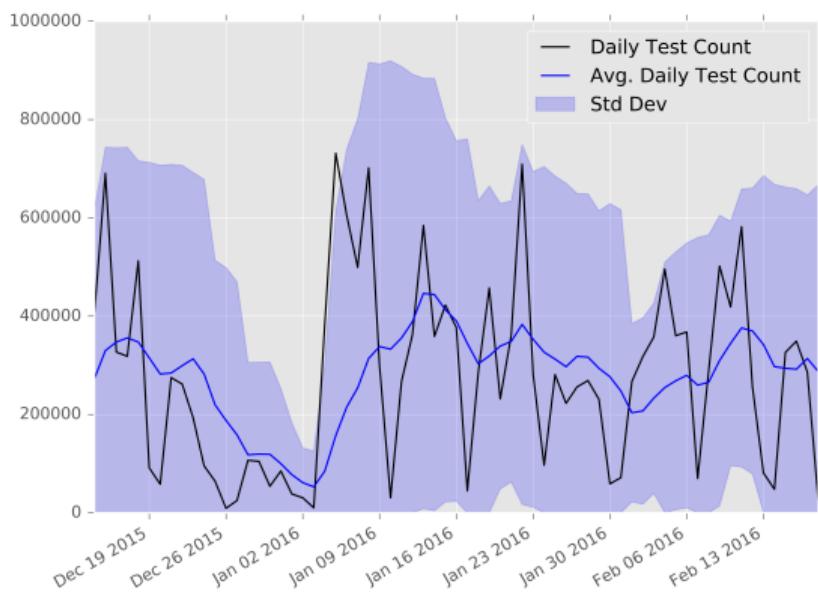
1つのパッチで行われること:

- ▶ 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

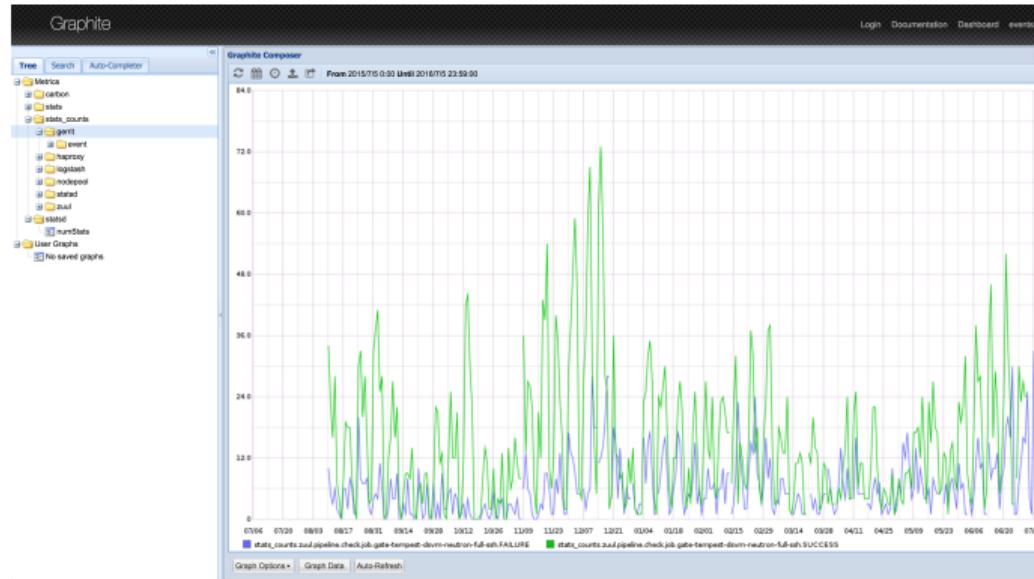
- ▶ Log Server: [logs.openstack.org](https://logs.openstack.org)
- ▶ 全ジョブの生成物を~4ヶ月保持
- ▶ ~8 TBの圧縮データ

## 困ったこと

- ▶ 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 (パフォーマンス劣化・向上の検出等)

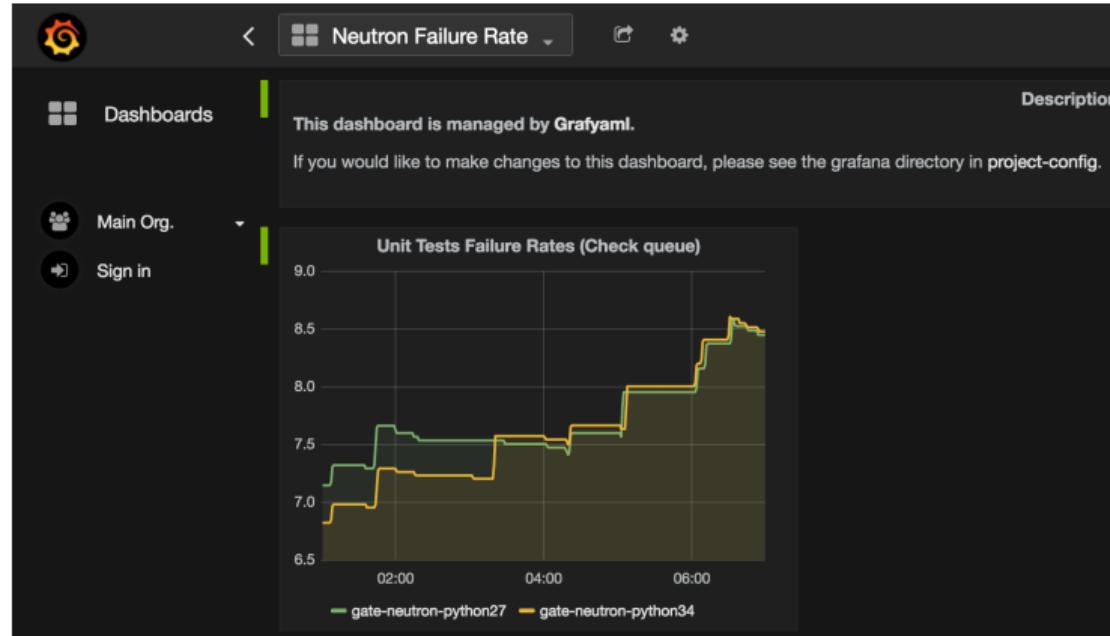
# Graphite

- ▶ [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？」を自動的に検出する
- ▶ [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

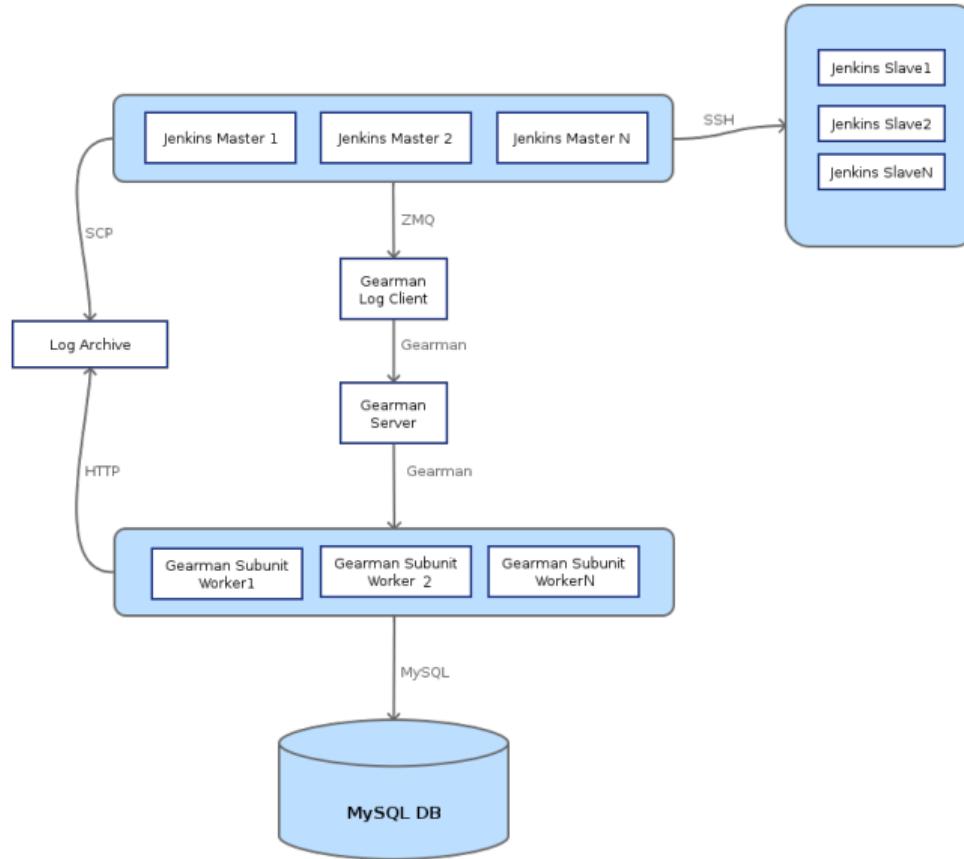
Some of the tests failed in a way that we did not understand. Please help us classify these issues so that they can be part of Elastic Recheck  
<http://status.openstack.org/elastic-recheck/>

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データベースに保持する機能を提供
- ▶ 対応DB : MySQL, PostgreSQL, SQLite
- ▶ 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

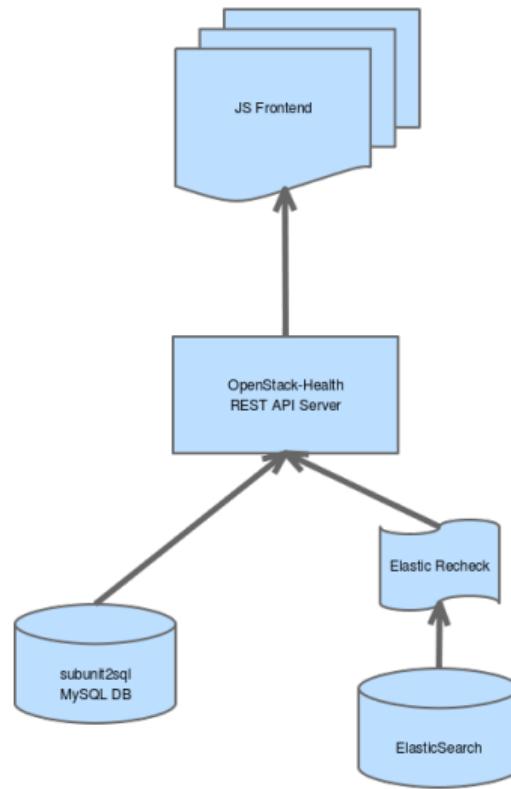
- ▶ [status.openstack.org/openstack-health](http://status.openstack.org/openstack-health)
- ▶ ゲートの実行結果データをアクセスできるダッシュボードとして開発開始
- ▶ subunit2sqlとelastic recheckのデータと連携



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

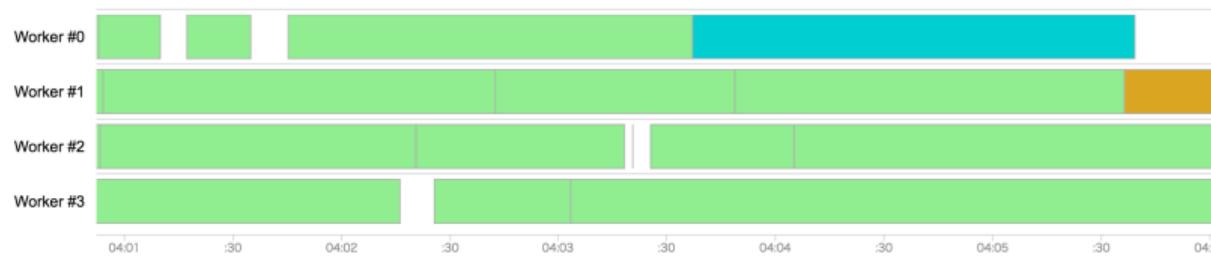
skipped

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

Q ▾

Summary

traceback

pythonlogging

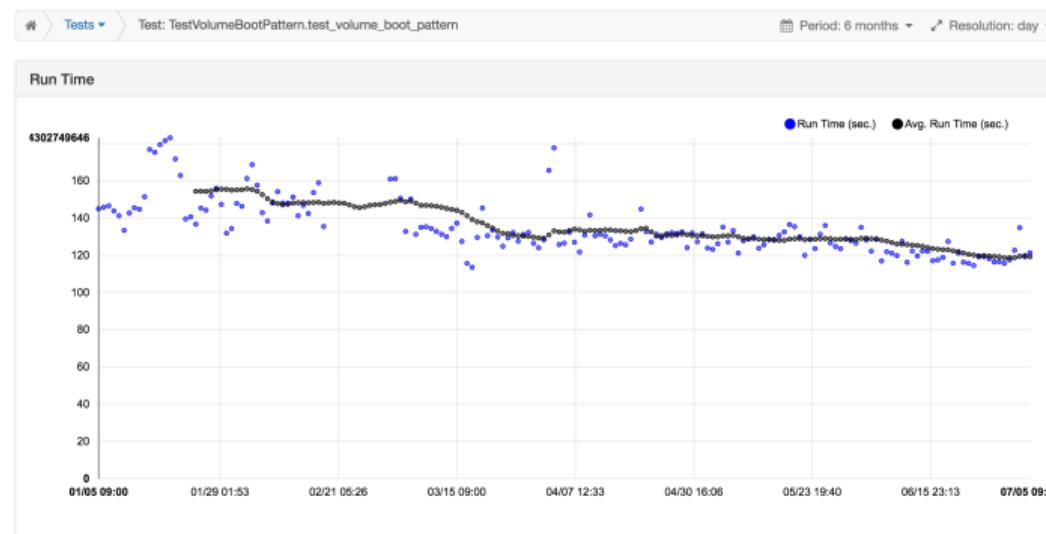
```
Traceback (most recent call last):
  File "tempest/scenario/test_security_groups_basic_ops.py", line 188, in setUp
    self._deploy_tenant(self.primary_tenant)
  File "tempest/scenario/test_security_groups_basic_ops.py", line 352, in _deploy_tenant
    self._set_access_point(tenant)
  File "tempest/scenario/test_security_groups_basic_ops.py", 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

## Keep/良かった点

- ▶ 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

TestVolumeBootPattern.test\_volume\_boot\_pattern



## Problem/改善点

- ▶ 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

## Try/今後の活動

- ▶ 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
- ▶ QAプロジェクトの宣伝

# まとめ

- ▶ 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
- ▶ <https://wiki.openstack.org/wiki/QA>
- ▶ <http://git.openstack.org/cgit/openstack/openstack-health/>
- ▶ <http://git.openstack.org/cgit/openstack/stackviz/>
- ▶ <http://git.openstack.org/cgit/openstack-infra/subunit2sql>
- ▶ <http://git.openstack.org/cgit/openstack-infra/elastic-recheck/>