

OpenStack Upstream開発におけるCI品質向上施策

Masayuki Igawa

masayuki.igawa@gmail.com

masayukig on Freenode, Twitter, GitHub

July 7, 2016

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

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

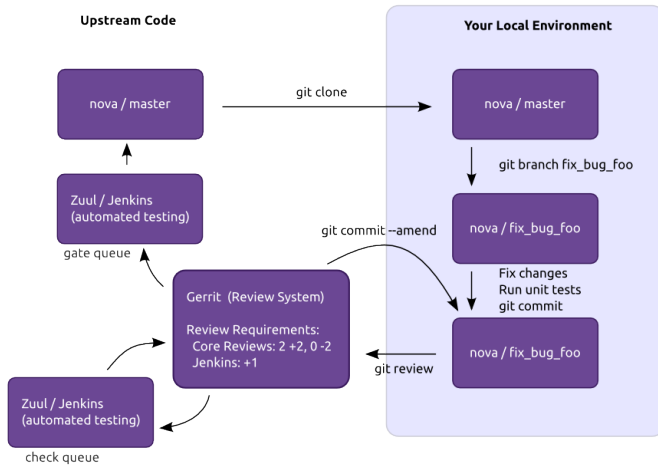
OpenStack開発の概要

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

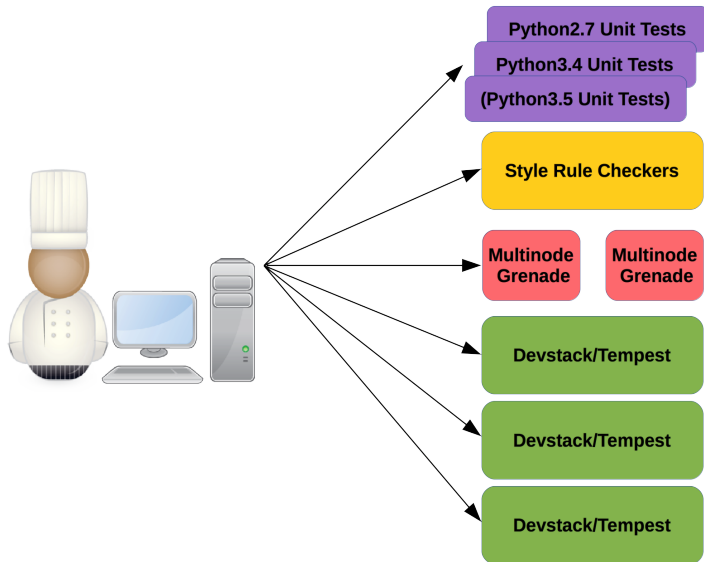
“OpenStack QAチーム”って何？

- ▶ 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？



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

Change queue: **openstack/neutron**

openstack/neutron 181674.23	unknown 3 hr 57 min
gate-neutron-docs:	SUCCESS
gate-neutron-pep8:	SUCCESS
gate-neutron-python27:	FAILURE
gate-neutron-python34:	FAILURE
gate-tempest-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-tempest-dsvm-neutron-dvr:	SUCCESS
gate-tempest-dsvm-neutron-identity-v3-only-full-nv: (non-voting)	SUCCESS
gate-tempest-dsvm-neutron-linuxbridge:	SUCCESS
gate-tempest-dsvm-neutron-pg-full: (non-voting)	SUCCESS
gate-neutron-ibaaSv2-dsvm-minimal:	SUCCESS
gate-grenade-dsvm-neutron-multinode: (non-voting)	SUCCESS
gate-grenade-dsvm-neutron-dvr-multinode: (non-voting)	SUCCESS
gate-tempest-dsvm-neutron-multinode-full: (non-voting)	SUCCESS
gate-tempest-dsvm-neutron-dvr-multinode-full: (non-voting)	SUCCESS
gate-tempest-dsvm-ironic-pxe_ipa-nv: (non-voting)	SUCCESS

Change queue: **openstack/networking-generic-sw...**

openstack/networking-generic-switch 306894.3	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**

openstack/neutron 280595.12	unknown 3 hr 39 min
gate-neutron-docs:	SUCCESS
gate-neutron-pep8:	SUCCESS
gate-neutron-python27:	SUCCESS
gate-neutron-python34:	SUCCESS
gate-tempest-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-tempest-dsvm-neutron-dvr:	SUCCESS
gate-tempest-dsvm-neutron-identity-v3-only-full-nv: (non-voting)	SUCCESS
gate-tempest-dsvm-neutron-linuxbridge:	SUCCESS
gate-tempest-dsvm-neutron-pg-full: (non-voting)	SUCCESS

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.

Change queue: **integrated**

openstack/nova 307269.1	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-nova-requirements:	SUCCESS
gate-tempest-dsvm-full:	SUCCESS
gate-tempest-dsvm-postgres-full:	SUCCESS
gate-tempest-dsvm-neutron-full:	SUCCESS
gate-grenade-dsvm:	SUCCESS
gate-nova-releasenotes:	SUCCESS
gate-nova-tox-db-functional:	SUCCESS
gate-grenade-dsvm-multinode:	SUCCESS
gate-tempest-dsvm-cells:	SUCCESS
gate-tempest-dsvm-full-devstack-plugin-ceph:	SUCCESS

openstack/nova 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-tempest-dsvm-full:	SUCCESS
gate-tempest-dsvm-postgres-full:	SUCCESS
gate-tempest-dsvm-neutron-full:	SUCCESS
gate-grenade-dsvm:	SUCCESS
gate-nova-releasenotes:	SUCCESS
gate-nova-tox-db-functional:	SUCCESS
gate-grenade-dsvm-multinode:	SUCCESS
gate-tempest-dsvm-cells:	SUCCESS
gate-tempest-dsvm-full-devstack-plugin-ceph:	SUCCESS

openstack/nova 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-tempest-dsvm-full:	SUCCESS
gate-tempest-dsvm-postgres-full:	SUCCESS
gate-tempest-dsvm-neutron-full:	SUCCESS
gate-grenade-dsvm:	SUCCESS
gate-nova-tox-db-functional:	SUCCESS
gate-grenade-dsvm-multinode:	SUCCESS
gate-tempest-dsvm-cells:	SUCCESS
gate-tempest-dsvm-full-devstack-plugin-ceph:	SUCCESS

openstack/dev/devstack 308791.1	0 min 1 hr 5 min
gate-devstack-docs:	SUCCESS

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

Change queue: **openstack/oslo.concurrency**

openstack/oslo.concurrency 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**

openstack-infra/project-config 08001cc	unknown 5 hr 0 min
publish-infra-docs-index:	queued
publish-specs-site:	queued

Change queue: **openstack-infra/project-config**

openstack-infra/project-config bd07b6c	unknown 4 hr 56 min
publish-infra-docs-index:	queued
publish-specs-site:	queued

Change queue: **openstack/networking-vsphere**

openstack/networking-vsphere 1931ebe	unknown 4 hr 55 min
networking-vsphere-branch-tarball:	queued
networking-vsphere-docs:	queued

Change queue: **openstack-infra/project-config**

openstack-infra/project-config d700f6	unknown 4 hr 54 min
publish-infra-docs-index:	queued
publish-specs-site:	queued

Change queue: **openstack-infra/project-config**

openstack-infra/project-config 8cb6337	unknown 4 hr 52 min
publish-infra-docs-index:	queued
publish-specs-site:	queued

Change queue: **openstack/stackalytics**

openstack/stackalytics 4007b8	unknown 4 hr 7 min
hook-stackalytics-rtd:	SUCCESS
stackalytics-branch-tarball:	queued

Change queue: **openstack/stackalytics**

openstack/stackalytics ae58a37	unknown 4 hr 7 min
hook-stackalytics-rtd:	SUCCESS
stackalytics-branch-tarball:	queued

Change queue: **openstack/invenance**

Gateの規模感

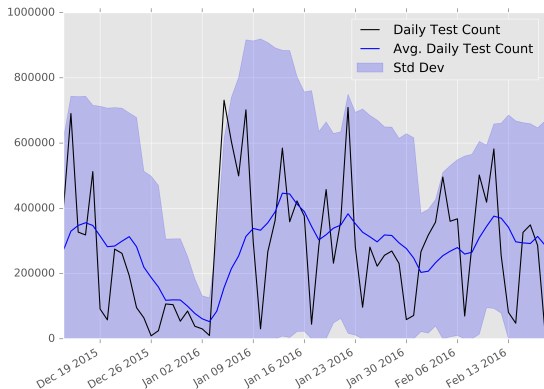
1つのパッチで行われること:

- ▶ 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

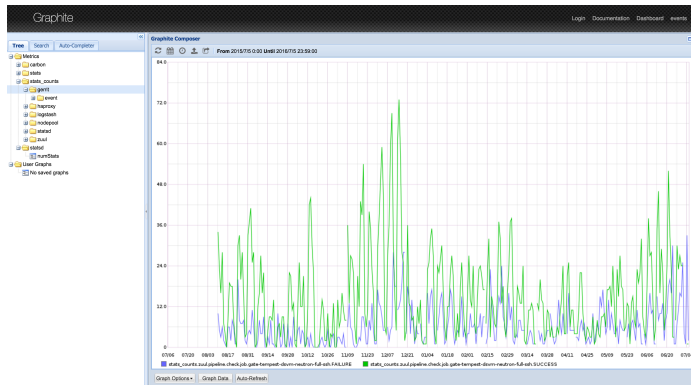
- ▶ Log Server: logs.openstack.org
- ▶ 全ジョブの生成物を~4ヶ月保持
- ▶ ~8 TBの圧縮データ

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)

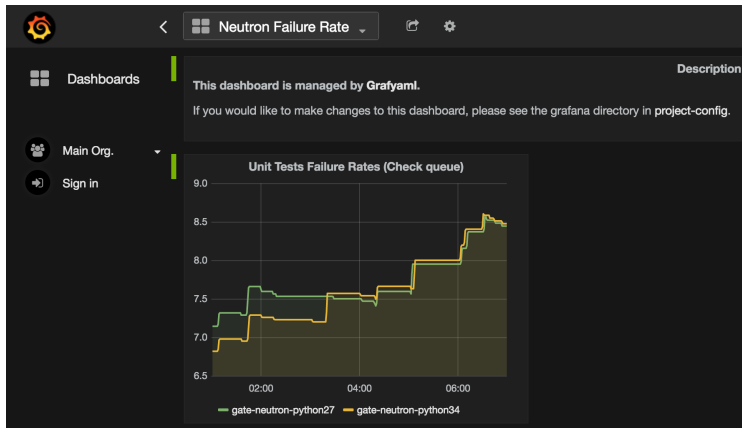
Graphite

- ▶ graphite.openstack.org
- ▶ 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



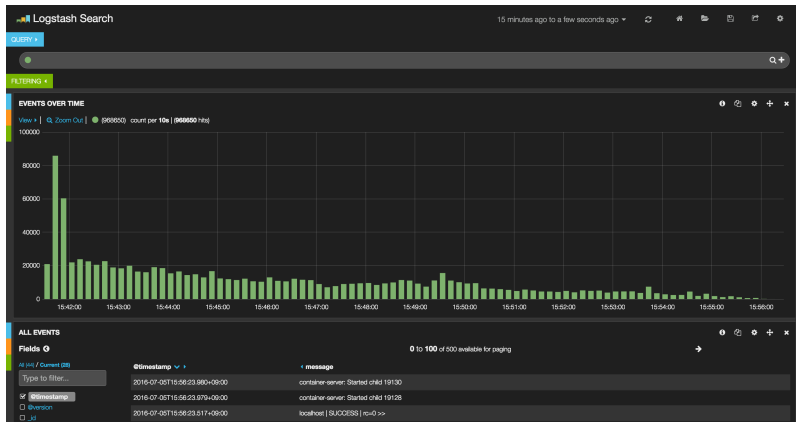
Grafana

- ▶ grafana.openstack.org
- ▶ 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
- ▶ 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

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):

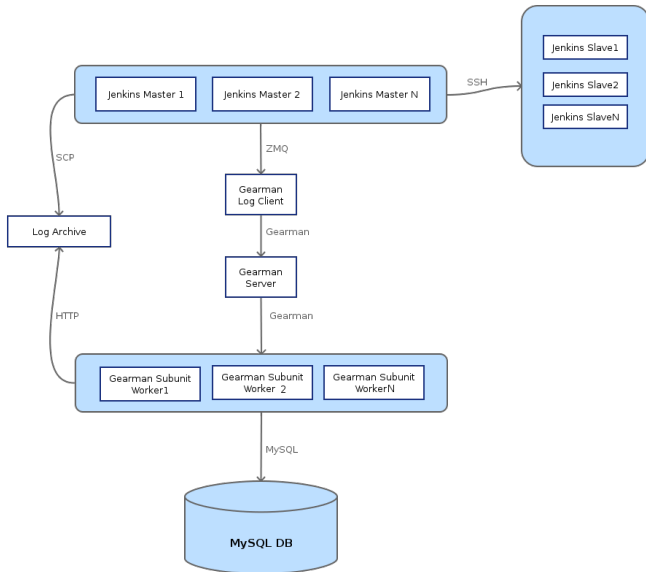
- gate-grenade-dsvm-multinode: <https://bugs.launchpad.net/bugs/1298006> <https://bugs.launchpad.net/bugs/1282876>
- gate-grenade-dsvm: unrecognized error
- gate-tempest-dsvm-cells: unrecognized error
- gate-tempest-dsvm-full-devstack-plugin-ceph: unrecognized error
- gate-tempest-dsvm-full: unrecognized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

- ▶ 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）

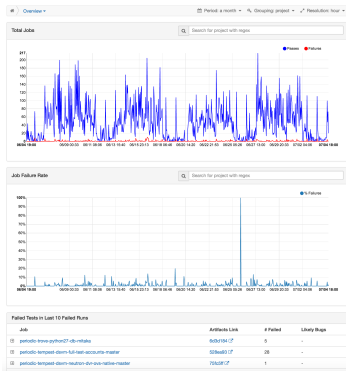
subunit2sql in OpenStackインフラ



openstack-health

- ▶ status.openstack.org/openstack-health
- ▶ 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

OpenStack Health is a dashboard for visualizing test results of OpenStack CI jobs.

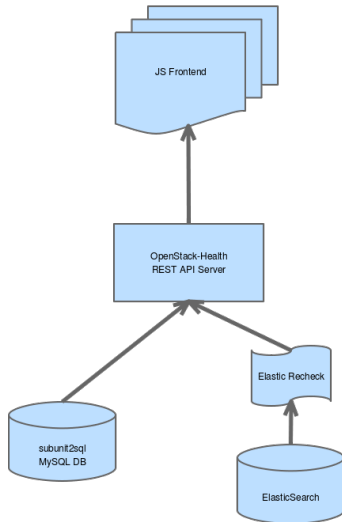


periodic-glance-python27-db-liberty	e9203bc	1	-
periodic-tempest-dsvm-networking-ofagent-mitaka	281aec0	1	-
periodic-manila-python27-liberty	9bf0c2b	19	-
periodic-tempest-dsvm-neutron-full-non-admin-master	67a82f7	20	-
gate-mistral-python34	2543277	1	-
periodic-tempest-dsvm-neutron-full-ssh-master	e528f55	1	-

Project Status

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

OpenStack-Health Architecture

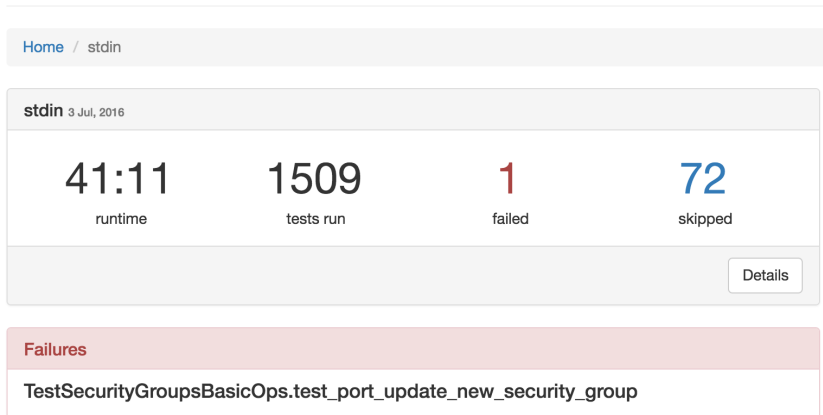


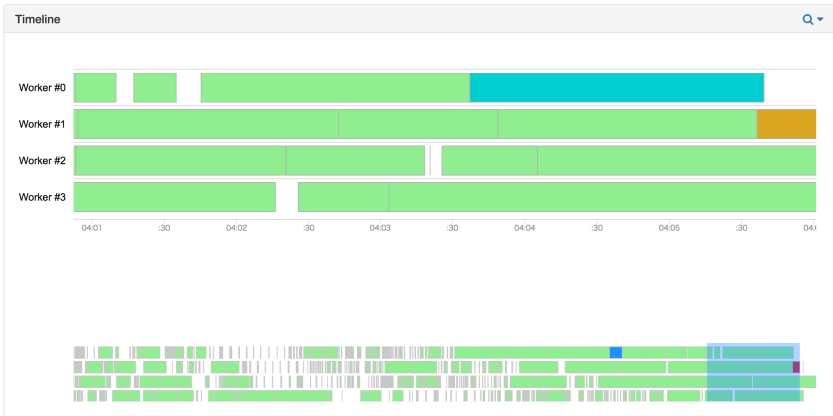
StackViz

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

Datasets





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](#)

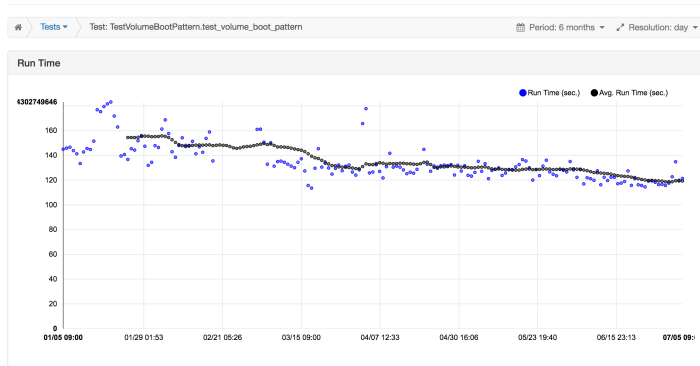
```
Traceback (most recent call last):
  File "tempest/scenario/test_security_groups_basic_ops.py", line 188, in setUp
    self._deploy_tenant(self.primary_tenant)
  File "tempest/scenario/test_security_groups_basic_ops.py", line 352, in _deploy_tenant
    self._set_access_point(tenant)
  File "tempest/scenario/test_security_groups_basic_ops.py",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

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
- ▶ #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/>