Better Testing Through Statistics

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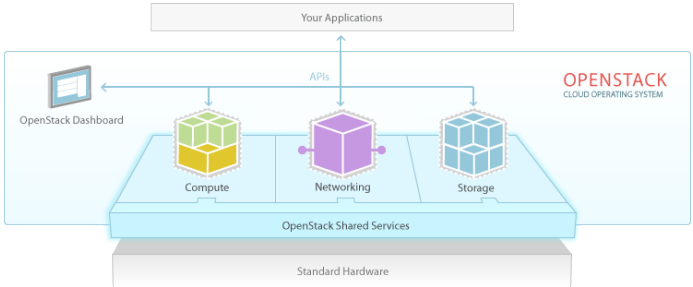
https://github.com/masayukig/better-testing-through-statistics

What is “the OpenStack”?

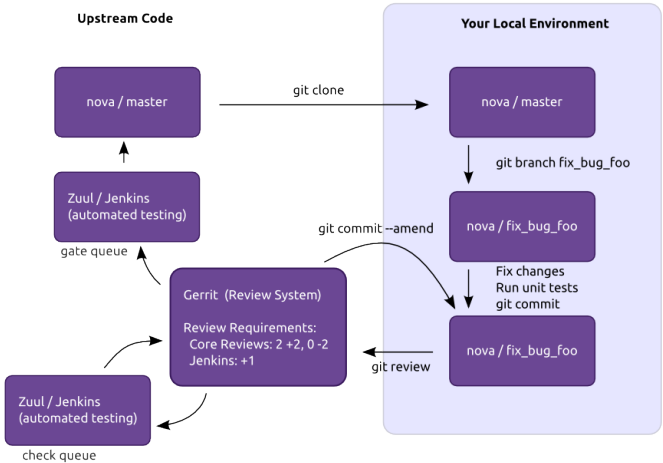
- Open Source Cloud Software: Apache License Version 2.0
- consists of a lot of projects: 57 projects
- released every 6 month: Latest version is called ‘Mitaka’



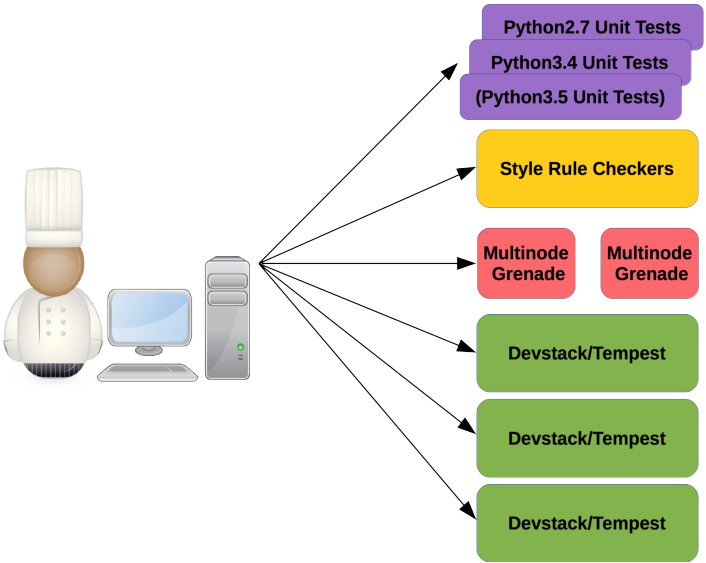
What is "the OpenStack QA"

- 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.
- 17 repositories (2016/7/8)
  - Tempest, DevStack, os-testr, openstack-health, stackviz, Grenade, Hacking, Bashate, etc..

What is “the OpenStack Gate”?



What Happens when you push a change?



check (268)

Newly uploaded patchsets enter this pipeline to receive an initial +/-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-lbaasv2-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-swi...

openstack/networking-generic-switch 308894,3 — 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 38 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

gate (26)

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:	
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:	
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

post (79)

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

Change queue: openstack/oslo.concurrency

openstack/oslo.concurrency 342ef43 — 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 193febe — unknown, 4 hr 55 min

networking-vsphere-branch-tarball:	queued
networking-vsphere-docs:	queued

Change queue: openstack-infra/project-config

openstack-infra/project-config d7f06f6 — 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 40f07b8 — unknown, 4 hr 7 min

hook-stackalytics-rtfd:	SUCCESS
stackalytics-branch-tarball:	queued

Change queue: openstack/stackalytics

openstack/stackalytics ae58a37 — unknown, 4 hr 7 min

hook-stackalytics-rtfd:	SUCCESS
stackalytics-branch-tarball:	queued

Change queue: openstack/governance

The Size of the Gate

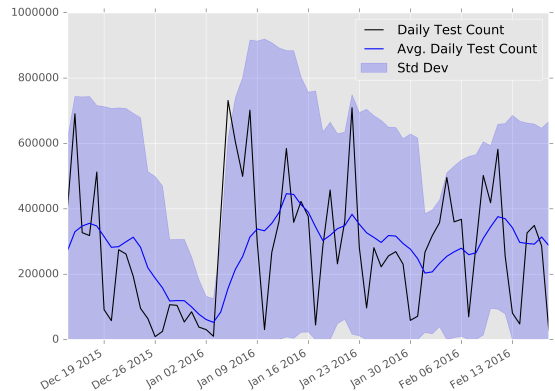
One Proposed Change Generates:

- 5–25 Devstacks
- ~10,000 integration tests (roughly 1.5k per devstack)
- ~151 2nd level guests created in each devstack cloud
- ~1 GB of logs uncompressed for each run

In aggregate:

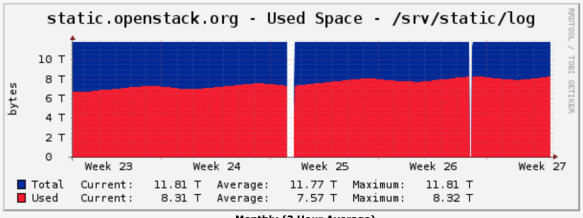
- ~12,500 jobs run in check and gate daily
- ~0.01% individual tempest test failure rate
- ~.77% tempest run failure rate

Number of Tempest Tests per Day in the Gate Queue:



Log Server

- Log Server: http://logs.openstack.org/
- Archive of all artifacts from all jobs for ~4 months
- ~8 TB of data compressed



Problem/Issue

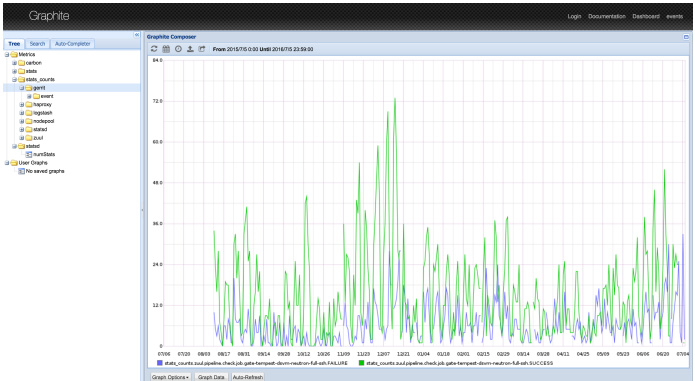
- It's difficult to find a problem from the large amount of log
- It's difficult to find performance regression/improvement
-

General Approach

- Look at things on the larger scale
- Use statistics and data mining to find
- Make the data from test runs open and accesible to
- Ensure there are APIs for accessing everything

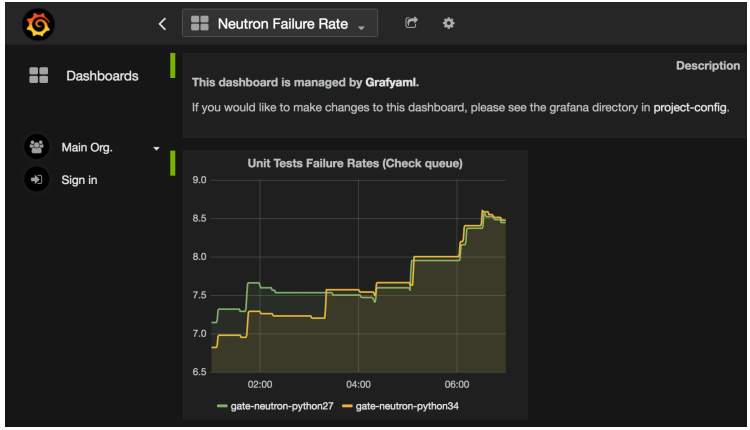
Graphite

- http://graphite.openstack.org/
- Infra services report to graphite
- Include job results
- Limited to job level data
- Time based, can't be linked to an individual job
-



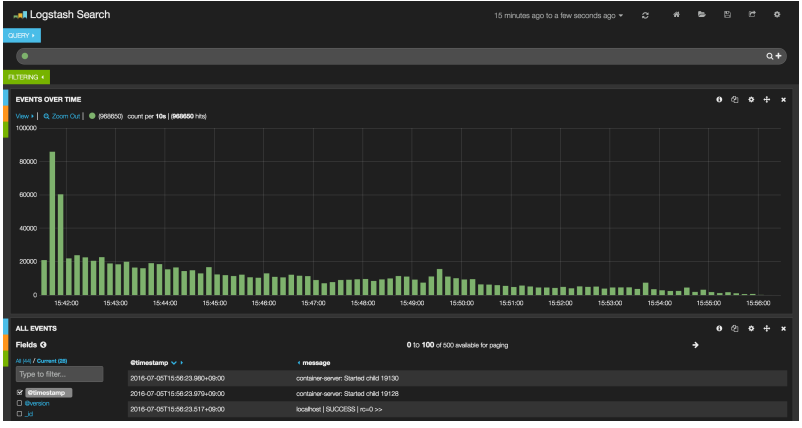
Grafana

- http://grafana.openstack.org/
- Provides a layer on top of graphite to easily make useful visualizations
- Adds a number of dashboards
- Some projects using this to track job failure rates

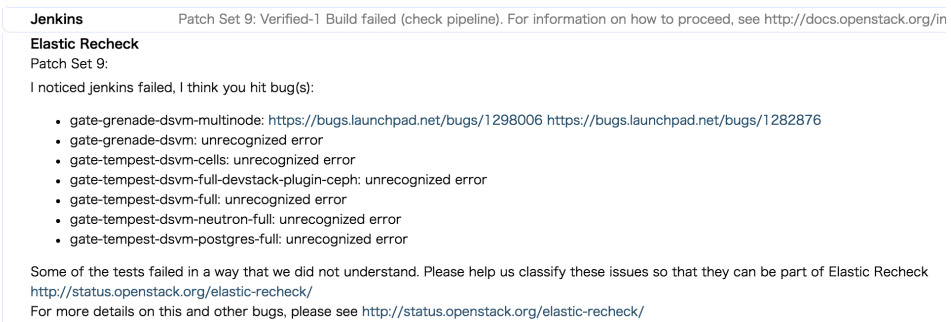


ELK

- Elasticsearch, Logstash, Kibana
- http://logstash.openstack.org
- Provides a search engine on top of are job artifacts
- Limited to 10 days of results



Elastic Recheck

- Designed to answer the question "Have you seen this recently?"
- 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):

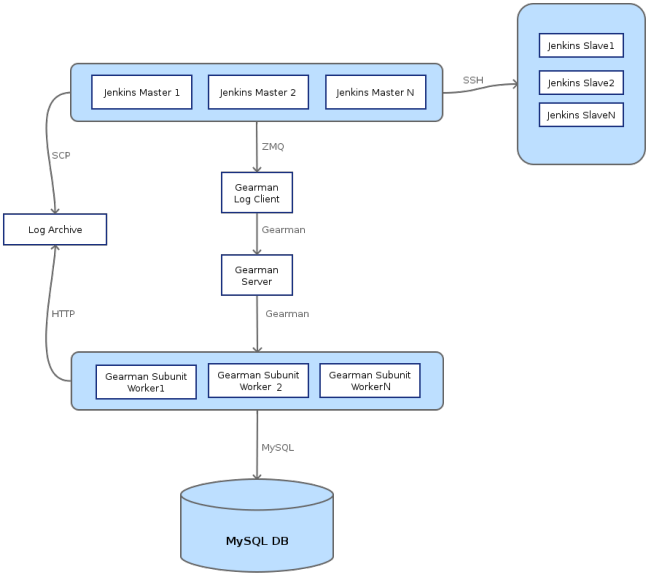
- gate-grenade-dsvm-multinode: https://bugs.launchpad.net/bugs/1298006 https://bugs.launchpad.net/bugs/1282876
- gate-grenade-dsvm: unrecognized error
- gate-tempest-dsvm-cells: unrecognized error
- gate-tempest-dsvm-full-devstack-plugin-ceph: unrecognized error
- gate-tempest-dsvm-full: unrecognized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

- Designed to store test results data in a sql database
- Provides a DB schema and a python API for interacting with the database
- Used to the results from test runs for 6 months
-

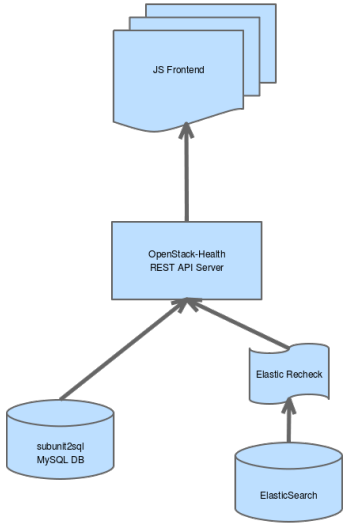
subunit2sql in OpenStack Infrastructure



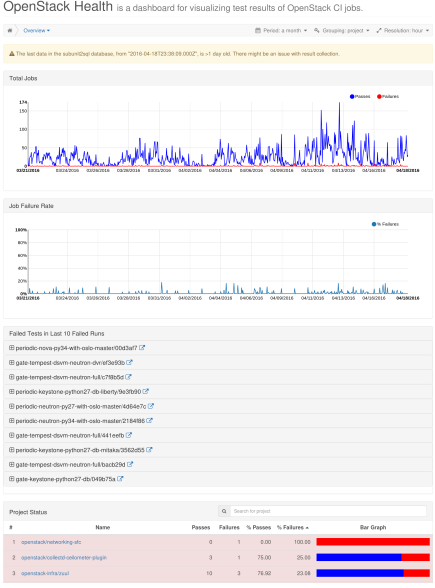
openstack-health

- http://status.openstack.org/openstack-health/#/
- Designed to be a single point of access for all the data about the gate
- Currently can leverage subunit2sql and elastic-recheck

OpenStack-Health Architecture



Using OpenStack Health



Data Driven Decision Making

- Determine when it's time to skip a test
- Identify tests that are actually catching bugs
- Determine if failures are isolated to region, config, etc.
-

Finding trends amongst the noise

- Catch performance regressions
-

Issues

- Too many varied data sources each with unique limitations
-

Future work

- Integrate all the things in openstack-health
- Use the data to optimize our test runner scheduler
-

Where to get more information

- openstack-dev ML 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/

Questions?