The OpenStack Project Continuous Integration System

Elizabeth K. Joseph
@pleia2
Elizabeth K. Joseph

- Core/root member of the OpenStack Infrastructure Team
- Author of Common OpenStack Deployments (along with Matt Fischer)
Projects

- Over 1500 individual git repositories
- All need capacity for CI
- Many need integration testing
Other efforts

• Documentation
• Translations (i18n)
• Infrastructure
• Quality Assurance
• Release Management
• Oslo
Contributors

- Unaffiliated individuals
- Commercial entities
- Non-profit organizations
- Research facilities
- National and local governments
Specific Challenges

• Testing effect of merging change
• Using cloud builders
• Large numbers of similar projects
• Disparate hardware configurations
Consistent Tooling

• Minimize meta-development
• Process divergence == wasted developer time
• Lowers on-boarding time
• Consolidate tool development
• Minimize project-specific weird build crud
Developer Infrastructure

- Code review and git
- Test/build automation
- Job logs, artifacts
- Releases (PyPI, tarballs, etc)
- Collaboration and communication tools
- Feature, bug and task tracking
Project Infrastructure in Git

• All system administration performed via code review
• Anyone on the internet can look at our changes
• Anyone can sign up for a code review account
• Anyone can write and propose changes
• https://git.openstack.org/cgit/openstack-infra/system-config/tree/
Development Environment

- Python using pep8, Ubuntu, Fedora
- Tests run on all submitted changes
- Code merges are gated on tests
Project Gating

- Ensures code quality
- Protects developers from each other
- Protects tree so bad code doesn’t land
- The process is the same for everyone
Everything is automated

http://status.openstack.org/zuul/

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CI Workflow

GitHub mirror  git.openstack.org
mirror

Git repository

Gerrit code review

Zuul, Gearman, Zuul Launcher

pipy mirrors & other
semi-privileged servers

ubuntu, fedora,
centos &
devstack slaves

Local changes
submitted via
git-review

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Process Flow

1. **nova/master**
   - Git clone

2. **Jenkins (automated testing)**
3. **Gerrit Review Server (needs 2 +1, 0 -1)**
   - Git commit
4. **Your Local Environment**
   - Git branch fix_bug_foo
   - Fix changes
   - Run unit tests
   - Git commit
5. **nova/fix_bug_foo**
   - Git review

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Gerrit Code Review

• Stand-alone patch review system
• Integration points: hooks, JSON queries, event-stream
• Extensible review categories, default: Verified, Code-Review
• REST API
This prevents nova-api from dying if there are values in the "enabled-apis" field that don't actually exist. This is all the way out at the CLI for nova-api, which makes it really hard to test for runs with anything in tree, so should be looked at carefully.

Files:
- nova/nova/api.py

```
+22 -1
```

History:
- Sean Dague (Apr 20 2018 03:53 AM)
  - Uploaded patch set 1
- Sean Dague (Apr 20 2018 03:53 AM)
  - Post patch set 1: Verify+1: Database migration testing succeeds - nova-db-upgrade-nova_mysql\_devstack_1931077\_myproject\_myproject\_dbupgrade\_nova_mysql): http://www.redhat.com/turboinfrastructure
- [Gerrit]
  - NOVABUILD1 TEST RESULT: SUCCESS
- [Gerrit]
  - NOVABUILD1 TEST RESULT: SUCCESS
- [Gerrit]
  - NOVABUILD1 TEST RESULT: SUCCESS
Gerrit diff view
Bug Integration - Launchpad

### Nova API fails to start if "ec2" is specified in enabled_apis

Bug #1572405 reported by Sean Dague on 2016-04-20

This bug affects 1 person. Does this bug affect you?

<table>
<thead>
<tr>
<th>Affects</th>
<th>Status</th>
<th>Importance</th>
<th>Assigned to</th>
<th>Milestone</th>
</tr>
</thead>
<tbody>
<tr>
<td>OpenStack</td>
<td>In Progress</td>
<td>High</td>
<td>Sean Dague</td>
<td></td>
</tr>
</tbody>
</table>

Also affects project, Also affects distribution/package

**Bug Description**

As reported by Kevin Foxx yesterday, if "ec2" is listed in enabled_apis in Mitaka and beyond Nova will refuse to start because we removed it.

We assumed the change in defaults was good enough for people to move forward, but didn't realize that many of the install tools (packstack for sure) hardcoded this value into the config instead of sticking with the defaults.

While we've added a new upgrade note on this, we could also actually catch the error and not crash people.

**Tags:** api upgrades

---

Sean Dague (sdague) on 2016-04-20

Changed in nova:
- status: New → Confirmed
- importance: Undecided → High
  - tags: added: api
  - tags: added: upgrades
## Reviews at a glance

<table>
<thead>
<tr>
<th>ID</th>
<th>Subject</th>
<th>Owner</th>
<th>Project</th>
<th>Branch</th>
<th>Updated</th>
<th>V</th>
<th>R</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>17353991f</td>
<td>Add hypervisor information extension.</td>
<td>Kevin L. Mitchell</td>
<td>openstack/python-novaclient</td>
<td>master (hypervisor-info)</td>
<td>2:56 PM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I29b69022</td>
<td>Expand HACKING with commit message guidelines</td>
<td>Brian Waldon</td>
<td>openstack/nova</td>
<td>master (hacking-commit-messages)</td>
<td>2:54 PM</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>1e6d68026</td>
<td>Add multi-process support for API services</td>
<td>Johannes Erdfelt</td>
<td>openstack/nova</td>
<td>master (bp/multi-process-api-service)</td>
<td>2:53 PM</td>
<td>+1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I3bb1b83b</td>
<td>IP Address allocation</td>
<td>garyk</td>
<td>openstack/quantum</td>
<td>master (bug/1008029)</td>
<td>2:53 PM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ied0d325a</td>
<td>Change cli options to use dashes</td>
<td>Dean Troyer</td>
<td>openstack/python-keystoneclient</td>
<td>master (bp/https)</td>
<td>2:49 PM</td>
<td>-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ib87c3dad</td>
<td>Refactoring of base test case classes</td>
<td>Rohit Karajgi</td>
<td>openstack/tempest</td>
<td>master (whitebox-manager)</td>
<td>2:49 PM</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>I90ce78d7</td>
<td>Allow specification of the libvirt guest CPU model per host</td>
<td>Daniel Berrange</td>
<td>openstack/nova</td>
<td>master (bug/1003373)</td>
<td>2:47 PM</td>
<td>+1</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>8d535cb6</td>
<td>Updated files from openstack-common.</td>
<td>andrewbogott</td>
<td>openstack/nova</td>
<td>master (newcommon)</td>
<td>2:45 PM</td>
<td>+1</td>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>Iafa80a71</td>
<td>Add Java Melody to Gerrit.</td>
<td>Clark Boylan</td>
<td>openstack-ci/gerrit</td>
<td>openstack/2.4.1 (bug/1013201)</td>
<td>2:45 PM</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>I5b96e453</td>
<td>Set the default CPU mode to 'host-model' for Libvirt KVM/QEMU guests</td>
<td>Daniel Berrange</td>
<td>openstack/nova</td>
<td>master (bug/1003373)</td>
<td>2:40 PM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I121e8cc6</td>
<td>Webob needs body to calc Content-Length (bug 1016171)</td>
<td>Dolph Mathews</td>
<td>openstack/keystone</td>
<td>master (bug/1016171)</td>
<td>2:40 PM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I3e55ffcc</td>
<td>Add compatibility for CPU model config with libvirt &lt; 0.9.10</td>
<td>Daniel Berrange</td>
<td>openstack/nova</td>
<td>master (bug/1003373)</td>
<td>2:38 PM</td>
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</tr>
<tr>
<td>I6e9d7bd2</td>
<td>Removed the min_count and max_count attributes from create server. These are a R</td>
<td>Diane Fleming</td>
<td>openstack/compute-api</td>
<td>master (mincount_undo)</td>
<td>2:33 PM</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Git Review

• External Git subcommand
• Developers can easily incorporate code review into git workflow
• Zero-configuration
• Can be used for any project, being adopted by other projects
Gerrit git prep, Zuul Cloner

• Test the result of the change, not the change
• openstack-infra/project-config:jenkins/scripts/gerrit-git-prep.sh
• Gerrit git prep:
  – grabs target branch
  – cleans tree
  – merges change to be tested
• Zuul Cloner:
  – grabs target branch (from local cache)
  – cleans tree
  – merges change to be tested
  – cross project dependencies with Depends-On header
Interrelated Integration Testing

• devstack-gate & Nodepool
  - boot fresh servers
  - run DevStack
  - run integration tests

• OpenStack Puppet Integration
  - boot fresh servers
  - use puppet to provision OpenStack
  - deploy tempest to run integration tests

• Gate proposed change against current state of other projects
Zuul

• A general purpose trunk gating system
• Interfaces with Gerrit and Nodepool (via Zuul Launcher)
• Flexible configuration allows for many kinds of project automation
• Allows parallel testing of serialized changes
Logs

- Massive amount of logs generated
  - Terabytes of compressed logs per development cycle
- Filtered and normalized by LogStash
- Recent logs indexed by ElasticSearch
  - Searchable through Kibana and ElasticSearch API
- Driving automatic failure classification
Elastic test nodes with Nodepool

- Automate management (build, delete) of test nodes
- Handles multiple OpenStack clouds
- Hit 2k test nodes in the Newton cycle
Questions?

System Documentation
http://docs.openstack.org/infra/system-config/

Email me
lyz@princessleia.com

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