From code to cloud - the journey of OpenStack package

The continous-delivery approach to delivering packages in the RDO project

Karolina Kula

February 3, 2023

Software Engineer, Red Hat

Would you like to try **latest**, cutting-edge **OpenStack** on a stable platform..?

Would you like to move later to stable release without wasting time for changing platform...?

Here is **RDO**.



Agenda

We are RDO

Package - initial step on the journey

A bit of order

New packages in RDO

Updating and fixing

DLRN - the automatic packager

Deliverables

Continuous Integration

Release time!

Future of RDO



We are RDO

RDO introduction

RDO totals

Current release is RDO's 21 OpenStack major release.

We manage **330** OpenStack packages and **365** dependencies on current release.

At the end of January for Centos9-master branch there are **13958** builds.



RDO introduction

- Ridiculously Dedicated OpenStackers
- Rapidly Deploy OpenStack
- Rebuilt Daily, Regularly Delivered OpenStack



RDO introduction

RPM Distribution of OpenStack





RDO in short

- Community-supported OpenStack distribution
- Tested and deployed on CentOS Stream
- Deployed by different deployment tools like TripleO, packstack, puppet modules or other custom tools
- Provides two different set of repos for different purposes:
 RDO Trunk and Centos CloudSIG



Package - initial step on the journey

Packaging software - what is a package?

- A way to distribute code
- A bundle of files needed to install software
- A way to specify dependencies between software components, and perform prior setup actions
- Packages are easy to manage installing, versioning, tracking, verifying...
- They are a very initial brick for building complex systems, like clouds



How to package - different concepts

There are many ways of creating packages out of source code. It's usage depends on what kind of package format is desired. There might be distro packages (rpms) or language native packages (pypi for Python) and others corresponding. For needs of RDO project, we are focusing on distro ones.

.rpm? .deb? .tar? flatpak?

RPM? pacman? apt? dnf?



How packages come into being

Packages to be build, has to have specific "receipt" - a set of instructions how the package should be build, what dependencies it has, what tools should be used or - finally - what a package should contain.

In rpm-based world we call this files - spec files (short from specification file). All the package details are configured there.



SPEC files

Spec contains several mandatory sections, which sequence is not accidental. We use some of them to shape a packages to RDO's requirements:

%prep Preparation phase which allows to do operations on source code.

%build Commands actually building software

%install Instruction of installing in users' like directory

%check Running tests after installing package

%files Files that will come with the package to user system

BuildRequires Requirements for package building

Requires Run time requirements



A bit of order

rdoinfo

rdoinfo repo - repository containing information about current RDO releases, dependencies, packages, maintainers organized in set of yaml files describing project fundamentals.

rdoinfo repo is used for task **automation**. Also **adding and updating** packages into a OpenStack repo is being done through a change in rdoinfo content.



rdopkg

Digging through hundreds of lines in **yaml** is not the most comfortable way to search information in rdoinfo.

For such case we have dedictated tool to process those yaml - **rdopkg**[6].

rdopkg is a mighty tool which provides abilities to:

- cloning package distgit and setting up remotes
- introducing patches
- rebases to new versions
- sending changes for review
- · modifying .spec files
- querying rdoinfo metadata



rdopkg info

```
" % rdopkg info openstack—octavia
name: openstack-octavia
project: octavia
conf: rpmfactory-core
upstream: https://opendev.org/openstack/octavia
patches: http://review.rdoproject.org/r/openstack/octavia.git
distgit: https://github.com/rdo-packages/octavia-distgit.git
buildsys-tags:
  (...)
  cloud8s-openstack-voga-release: openstack-octavia -10.0.0-2.el8
  cloud8s-openstack-yoga-testing: openstack-octavia -10.0.0-2.el8
  cloud9s-openstack-yoga-release: openstack-octavia -10.0.0-2.el9s
  cloud9s—openstack—voga—testing: openstack—octavia -10.0.0-2.el9s
  cloud9s—openstack—zed—release: openstack—octavia -11.0.0-1.el9s
  cloud9s-openstack-zed-testing: openstack-octavia -11.0.0-1.el9s
component: octavia
master-distgit: https://github.com/rdo-packages/octavia-distgit.git
review—origin: ssh://review.rdoproject.org:29418/openstack/octavia—distgit.git
review-patches: ssh://review.rdoproject.org:29418/openstack/octavia.git
```



rdopkg info

```
tags:
  antelope: null
  antelope-uc: null
  ocata: null
  pike: null
  queens: null
  rocky:
    source-branch: rocky-eol
  stein ·
    source-branch: stein-eol
  train: null
  ussuri: null
  victoria: null
  wallaby: null
  xena: null
  yoga: null
  zed: null
maintainers:
- cgoncalves@redhat.com

    bcafarel@redhat.com

- gthiemon@redhat.com
- johnsomor@gmail.com
```



New packages in RDO

Types of packages in RDO

In RDO we manage two types of packages: **OpenStack packages** and **dependencies**.

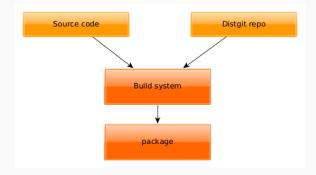
OpenStack packages	dependencies		
Code comes from upstream OpenStack project	Comes from any upstream project		
Created in RDO	Comes from Fedora		
Build by DLRN (Trunks) or CentOS CBS (CloudSIG)	Build by CentOS Community Build Service		

Note that we provide two kinds of repositories: RDO Trunks and CloudSIGs. Both of them are composed from OpenStack packages and dependencies, but they are **shipped differently**.



Distgits

Both types of package has distgits in common. This are a repositories containing spec files and used in building process.





Add dependency package

- Packages has to be present in Fedora repo. If not, the procedure of adding new fedora package has to be proceeded.
- Package has to be marked as RDO dependency in our rdoinfo repo.
- Tag package appropriately to promote it



Add new OpenStack package

- Those packages on a contrary to dependencies, don't come from external repo but from RDO itself.
- The process starts with adding review bug in Red Hat RDO product bugzilla.
- The same like for dependencies, new project has to be created in rdoinfo. This will trigger some necessary automated tasks like repo creation and sync, add CI check jobs and others.
- In the end the review with new spec file can be send and reviewed.



Fedora OpenstackSIG - additional packages

Beside the dependencies and OpenStack packages, RDO also maintains Fedora OpenStackSIG. The purpose is to maintain and ship latest packages such as: **OpenStack clients, libraries and dependencies** in Fedora.

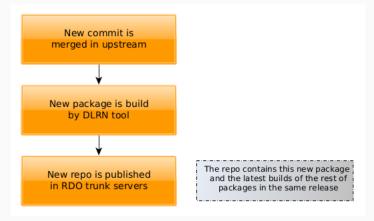
The procedure of update is the same like for any others, with the small difference, that distgit maintenance is being done in RDO Community, then synchronized to Fedora.



Updating and fixing

Trunks - updates

For OpenStack (trunk) packages:



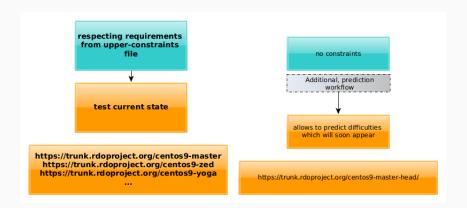


upper-constraints.txt

In OpenStack world there is a requirements repository containing **global requirements list**. In RDO we are basing on upper-constraints.txt, which is basically a list of highest upstream CI - tested version of package or library. Depending on this list allows as consistently follow OpenStack development.



Trunks - chasing the upstream



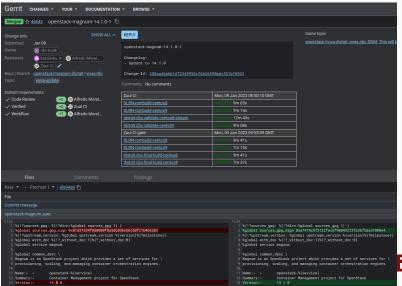
When there appears an update in upper-constraints.txt, automated Gerrit review is proposed which needs manual approval[3].

Updates in CloudSIG

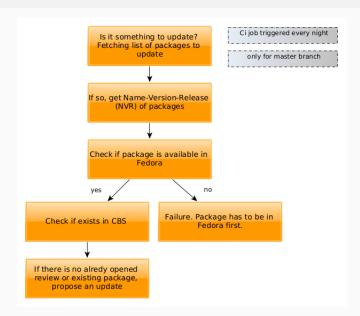




Updates in CloudSIG



Updates in dependencies





DLRN - the automatic packager

DLRN overview



DLRN main task is **provide repository with new package built**, but in general DLRN is a generic tool for tracking any upstream project.



DLRN overview

The name is a reference to be able to go back in time. The repository created by DLRN is:

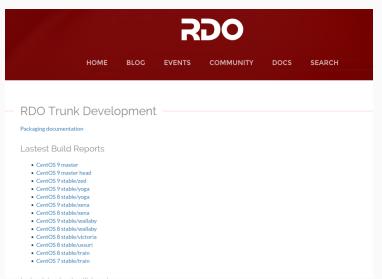
- not changable
- will not be overwrite
- is stored in unique, commit hash name-based directory

All the builds history are limited to storage restrictions.



Trunks example

https://trunk.rdoproject.org/



Trunks example

Delorean - Centos9-master-uc (master)

Build Dat 🔻	Commit D \$	Project Name	Commit Hash	Component \$	Status 🛊	Repository \$	Build Log	
2023-01-17 12:23:49	2023-01-17 12:19:41	python-django- horizon	2 ce282leed49d046d38187l66127lfbc89ffflce8	ui	∂ SUCCESS	⊘ геро	build log	
2023-01-17 08:48:50	2023-01-17 08:43:56	openstack-neutron	₽ ab79ba917b7a4915a3ca0753676a69c88af87f70	network	∂ SUCCESS	⊕ геро	build log	
2023-01-17 06:44:38	2023-01-17 06:39:29	puppet-glance	₱ 340f25aeaaaa61127cac8fbfeaf9965b3b6bbb05	tripleo	∂ SUCCESS	⊕ геро	build log	
2023-01-17 05:14:18	2023-01-17 05:01:03	puppet-nova	2 2e0276d34878293a140815fad6376f6c3ef6f55e	tripleo	∂ SUCCESS	⊘ геро	build log	
2023-01-17 04:59:11	2023-01-17 04:51:57	puppet-octavia	P 241d341c8a8615304e30b17a0a03f2ca93302583	tripleo	∂ SUCCESS	⊕ геро	build log	



Trunks example

Index of /centos9-master/component/network/ab/79 /ab79ba917b7a4915a3ca0753676a69c88af87f70_ab623fd4

<u>Name</u>	Last modified Size
Parent Directory	
build.log	2023-01-17 08:57 1.2M
commit.yaml	2023-01-17 09:00 2.8K
delorean.repo	2023-01-17 09:00 260
hw_info.log	2023-01-17 08:59 1.6K
installed installed	2023-01-17 09:00 99
installed_pkgs.log	2023-01-17 08:54 63K
mock.log	2023-01-17 09:00 1.6M
ppenstack-bagpipe-bgp-17.1.0-0.20230104173345.0d094ba.el9.noarch.rpm	2023-01-04 17:39 15K
penstack-designate-15.1.0-0.20230104230845.de00051.el9.src.rpm	2023-01-04 23:14 1.0M
penstack-designate-agent-15.1.0-0.20230104230845.de00051.el9.noarch.rpm	2023-01-04 23:14 12K
openstack-designate-api-15.1.0-0.20230104230845.de00051.el9.noarch.rpm	2023-01-04 23:14 13K



Name - Version - Release naming convention

Examples:

 $open stack-nova-26.1.0-1. el 9 s \\ python-glance client-4.2.0-0.20221118120049. f41 f2c3. el 9. src.rpm$

Name	Version	Release	extension
openstack-nova	26.1.0	1	.el9s

Name	Version	Release	commit hash	extension
python-glanceclient	4.2.0	0.20221118120049	f41f2c3	.el9.src.rpm



Fail to build from sources

If build succeeds, package appears in trunk. If fails, automatic FTBFS (Fail To Build From Source) review is created in gerrit, providing building logs and information which commit caused FTBFS, like in example. All FTBFS' have to be reviewed and fixed.

∑ Delorea	n - Centos9)-master (ma	ster)					
Build Date Time 💠	Commit Date Ti \$	Project Name \$	Commit Hash		Component \$	Status	Repository \$	Build Log
2023-01-24 00:41:05	2023-01-23 20:18:38	openstack-octavia	₱ 38ec0d66733118da5a1fa7496bbf0d0344d200a1	Т	octavia	∂ FAILED	€ геро	build log
2023-01-24 13:38:29	2023-01-24 11:48:47	puppet-barbican	P 0480d0a2924108a694faf7cdc959bdf6c3a916d1		tripleo	∂ SUCCESS	∂ repo	build log
2023-01-24 13:25:24	2023-01-24 11:16:32	openstack-tempest	₱ 1982a60dbb4e8b4f50889376039b4f2a5ae9dc08		tempest	∂ SUCCESS	∂ геро	build log



FTBFS dashboard





Deliverables

Types of repositories in RDO

In RDO we deliver two types of repositories: RDO Trunks and RDO CloudSIGs.

Trunks repositories are managed and delivered in different way than CloudSIGs!

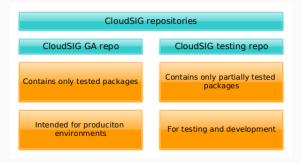
Trunks	CloudSIG
build by DLRN	build by CentOS Community Build Service
new package with every new commit	new package with every new tag released upstream
Delivered very close in time after new commit	Delivered in days
Fetch source code through involved repo	Fetch tarball for point release
Continuous delivery of master branch	Repo released after OpenStack GA
Unsigned packages	Signed packages
Delivered in trunk.rdoproject.org server	Delivered in official Centos mirrors in CloudSIG



CloudSIG repo types

There are two kinds of **CloudSIG repos**.

Both are only published **after GA** of a upstream release and are published only for **stable branches**.





RDO Trunks repo types

RDO Trunks are delivered continuously. When new release appear, master DLRN builder is still following upstream master, but there is created new builder instance for appearing stable branch.

DLRN repositiories						
current	consistent	current-passed-ci				
Repo with the latest version of every package that successfully built	Repo with set of packages that have no build failures	Repo with set of packages that have no build failures				
This repo allows situation, when one of package failed to build and is in version behind current master		Also the repo is verified by CI jobs to ensure stability				



Continuous Integration

Promotions

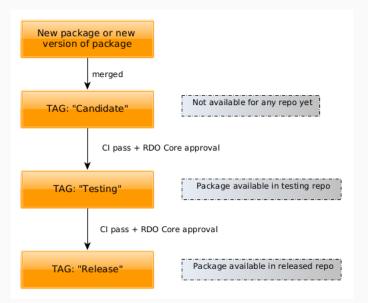
As **promotions** we understand the mechanism of moving package from one phase to another. We are defining three kinds of package phase:

- Candidate
- Testing
- Release

Between each phase, there are performed various set of tests which including packages installations and different OpenStack deployments with currently tested packages.

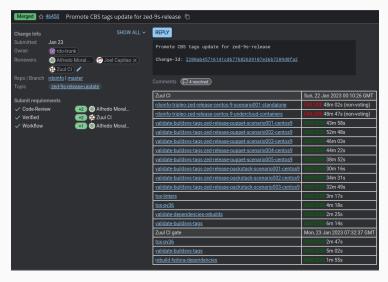


Package promotions



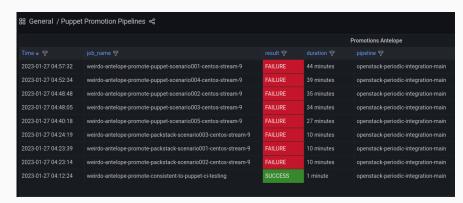


Package promotions





Puppet promotion pipelines dashboard





Release time!

Getting ready for the release

OpenStack is having major release around every 6-month and releasing in RDO is trying to stick upstream release schedule as close as possible.

To maintain delivery pipeline undistracted, some actions has to be done before release.



- 1. RDO infrastructure preparation
 - Adding a new DLRN builder
 - Create CI jobs for incoming release
 - Add new release to all automation bots and scripts
- 2. Update distgits
 - rdopkg reqcheck tool for validate package dependencies
- 3. Create new release-related branch in distgits
- 4. Request new builds for CloudSIG repos
- 5. Pin branchless projects in rdoinfo
 - Some projects don't create stable branches upstream
 - Packages should be pinned to a specific git tag, commit or branch in that case (in rdoinfo)



Future of RDO

What we currently working on

Currently Openstack RDO **Zed** release is the newest maintained release, while futhering **Antelope** is under development [5].

OpenStack Releases

Release Series

OpenStack is developed and released around 6-month cycles. After the initial release, additional stable point releases will be released in each release series. You can find the detail of the various release series here on their series page. Subscribe to the combined release calendar for continual updates.

Series	Status	Initial Release Date	Next Phase	EOL Date
2023.1 Antelope (SLURP)	Development	2023-03-22 estimated (schedule)	Maintained estimated 2023-03-22	
<u>Zed</u>	Maintained	2022-10-05	Extended Maintenance estimated 2024-04-05	
<u>Yoga</u>	Maintained	2022-03-30	Extended Maintenance estimated 2023-09-30	
<u>Xena</u>	Maintained	2021-10-06	Extended Maintenance estimated 2023-04-06	
<u>Wallaby</u>	Extended Maintenance (see <u>note</u> below)	2021-04-14	Unmaintained TBD	



Features: new pyproject macros in spec files

Fedora switch to the pyproject-rpm-macros as the recommended way to build python packages. As we strongly depend on Fedora SIG packages, we plan to also introduce this macros in every package.



Features: new monitoring

On our daily basis work, we used multiple dashboards to monitor processes.

https://dashboards.rdoproject.org/report-ftbfs

			Report	FTBFS		
			Last updat	ed at 12:17		
			Filter by Value			
Project	Component	Status	Release	Review	Logs	Date of FTBFS
		FAILED				2023-01-22 00:08:18
					rpmbuild.log	
	Patches for t	his dash	board can be submitte	d via RDO Gerrit (dashboard source & FAQ)	

Features: new monitoring

https://dashboards.rdoproject.org/report-uc-cs9

Report UC on CS9 comparing upper constraints modules in master branch to packages in master trunk repo on c59 Last updated at 7:48 Filter by value							
Release	ModName	ModVers	PkgName	PkgVers	Source	Status	
master							
					delorean-component- clients		
master					AppStream		



器 General / Puppet Promotion Pipelines ዼ

			P	romotions Antelope
Time ↓ 🗑		result ♥		
2023-01-27 04:57:32	weirdo-antelope-promote-puppet-scenario001-centos-stream-9	FAILURE	44 minutes	openstack-periodic-integration-main
2023-01-27 04:52:34	weirdo-antelope-promote-puppet-scenario004-centos-stream-9	FAILURE	39 minutes	openstack-periodic-integration-main
2023-01-27 04:48:48	weirdo-antelope-promote-puppet-scenario002-centos-stream-9	FAILURE	35 minutes	openstack-periodic-integration-main
2023-01-27 04:48:05	weirdo-antelope-promote-puppet-scenario003-centos-stream-9	FAILURE	34 minutes	openstack-periodic-integration-main
2023-01-27 04:40:18	weirdo-antelope-promote-puppet-scenario005-centos-stream-9	FAILURE	27 minutes	openstack-periodic-integration-main
2023-01-27 04:24:19	weirdo-antelope-promote-packstack-scenario003-centos-stream-9	FAILURE	10 minutes	openstack-periodic-integration-main
2023-01-27 04:23:39	weirdo-antelope-promote-packstack-scenario001-centos-stream-9	FAILURE	10 minutes	openstack-periodic-integration-main
2023-01-27 04:23:14	weirdo-antelope-promote-packstack-scenario002-centos-stream-9	FAILURE	10 minutes	openstack-periodic-integration-main
2023-01-27 04:12:24	weirdo-antelope-promote-consistent-to-puppet-ci-testing	SUCCESS	1 minute	openstack-periodic-integration-main



Features: new monitoring

There are plans to integrate all dashboards into one **Graphana** instance, hosted by **Software Factory**[7], who we closely collaborate with, as our infrastructure maintainers. Current monitoring is very diffused.

There is a work needed on data migration and parsing, later also on designing new Graphana panels.



RDO influence on Centos Ecosystem

Testing: OpenStack is a very complex system which testing requires a lot of different resources, so that's a great integration platform to test Centos on multiple levels. As the RDO is testing and deploying OpenStack on Centos, it gives a lot possibility to improve Centos.

SIGs: Not only Centos CloudSIG is used in RDO. RDO members participate in launching new SIGS, are active maintainers of them, i.e. messaging SIG or NFV SIG.



How to join us?

https://www.rdoproject.org/contribute/

We are all available on #rdo IRC channel on the OFTC server. Our weekly meeting takes place **every Wednesday at 14:00 UTC.**



Questions?



Thank you!

Questions?

contact me: user karolinku on # rdo IRC channel on the OFTC

server



- https://dlrn.readthedocs.io/en/latest/index.htm
- https:
 //www.rdoproject.org/documentation/add-packages/
- https://blogs.rdoproject.org/2016/11/ chasing-the-trunk-but-not-too-fast/
- https:
 //www.rdoproject.org/what/promotion-pipeline/
- https://releases.openstack.org/
- https://github.com/softwarefactory-project/rdopkg
- softwarefactory-project.io/

