

OpenStack Community Activity Report
October-December, 2014
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This report would not exist without the effort of the people involved in the development of the OpenStack Activity Board, Grimoire toolset and the feedback of the people in the development mailing list of the OpenStack Foundation.

Executive Summary

The 2014 summary of OpenStack Community Activity Report¹ shows increasing activities compared to previous year on every metric. The quantity of code being contributed, the developers involved and people interested in deploying OpenStack kept growing at fast pace in 2014.

In the past editions of the Report, the major source of concern with this fast growth has been quality of the code shipped, like the lead time to merge new patches. This year-end report shows that some indicators seem to be improving: hopefully future reports will confirm these positive trends. The indicators around bugs are still under special scrutiny since they're not changing much. The largest teams (Nova and Neutron, among others) introduced a "bug liaison" in the past months, these changes should lead to improved indicators.

Key findings:

Coders community keeps growing

The mean number of developers active in a given month peaked at 569 people during the third quarter (the highest number in 2013 was 391). The total number of 'Core' contributors² increased during 2014 but not as dramatically: the highest number in 2014 was 191 people, reached in third quarter (in 2013 the highest was 161 in fourth quarter). "Regular" contributors³ went from a max 245 in 2013 to 369 in 2014.

Lead time to merge code is improving

Mean and median time to merge patches decreased for the first time after growing two years in a row. This is a good sign since many contributors have expressed frustration over lengthy waits. The time to wait for reviewers has decreased two quarters in a row (reviewers are getting faster) while original submitters are still much slower to respond to comments.

¹This report is produced quarterly to give Community Managers and OpenStack Foundation's management better insights on development activities and online conversations. The quantitative and qualitative assessment start from tracking actions across all OpenStack git repositories, gerrit code reviews, bug trackers as well as IRC channels, mailing lists and questions/answers.

²This is the total count of developers responsible for delivering 80% of OpenStack's code

³The count of developers responsible for delivering 95% of OpenStack's code

Ask OpenStack gains popularity while mailing lists have plateaued

With around 10,000 emails sent per quarter during 2014, the mailing lists seem to have reached a plateau while Ask OpenStack keeps gaining in popularity. In 2014 there were regularly over 1,500 questions asked per quarter with a corresponding number of answers given. The most frequently asked questions seem to be around OVS and Neutron. The mailing lists saw conversations about Nova automatic evacuation taking a lot of time. This quarter, we saw changes in Nova and Neutron core reviewers, formation of the API Working Group, a first step to foster a new community of consumers of OpenStack API and more changes in Third-Party Working Group.

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Chapter 1

Overview of the Project

The OpenStack Community Activity Report is produced quarterly to give Community Managers and OpenStack Foundation's management better insights on development activities and online conversations. The quantitative and qualitative assessment start from tracking actions across all OpenStack git repositories, gerrit code reviews, bug trackers as well as IRC channels, mailing lists and questions/answers site Ask OpenStack.

The report looks at activities across the OpenStack community during the fourth quarter of 2014, comparing it to previous eight quarters.¹

The analysis aims at providing a detailed view of how the OpenStack project is evolving with special focus on each of the OpenStack programs². OpenStack Integrated Releases are delivered at the beginning of the second and fourth quarters of each year and cycles of development activity are visible in the report: the first and third quarters of the year are periods of higher activity while during the second and fourth ones show other recognizable patterns of activity in the OpenStack ecosystem.

A more detailed information about the community activity comparing two periods: 2013 and 2014, shows an increase in all of the analyzed data sources. Special focus on the increments in the question and answers tool³ and in the IRC channels⁴.

¹The analyzed data sources are available in appendixB

²Each of the projects mentioned are following the analysis of the Programs specified at <http://git.openstack.org/cgit/openstack/governance/tree/reference/programs.yaml>. In addition, the hierarchy of projects and their repositories can be found at the correspondent appendixB

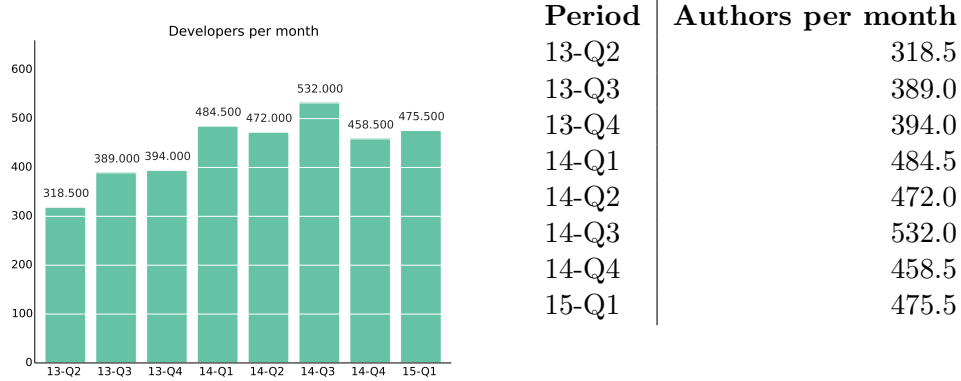
³<https://ask.openstack.org>

⁴<http://eavesdrop.openstack.org/irclogs/>

Data source	Activity 365 days	Change (wrt to prev. 365 days)
Gits	47507 commits	0%
Tickets	11312 closed tickets	22%
Mailing Lists	39314 sent emails	1%
Gerrit	51730 submitted reviews	3%
Askbot	5965 posted questions	38%
IRC	1599795 messages	29%

Table 1.1: Activity during the last 365 days and its evolution

Regarding to the community, during the last quarter of 2014 there were 469 developers in mean per month, lower than the third quarter of 2014 (Juno release), but in line with the rest of the year activity and the releases cycle.



In addition in order to characterize developers, those are divided into three main sets: core, regular and casual⁵.

⁵Contributing developers are characterized as core, regular and casual depending on their activity in the git repositories. The classification is built by sorting contributors by their total number of commits; we sum the total commits per each individual contributors: the individuals whose commits sum up to 80% of the total number of commits in the quarter are the core contributors in that quarter. The regular contributors are those whose commits sum up to 95% of the total. The others are the casual contributors.

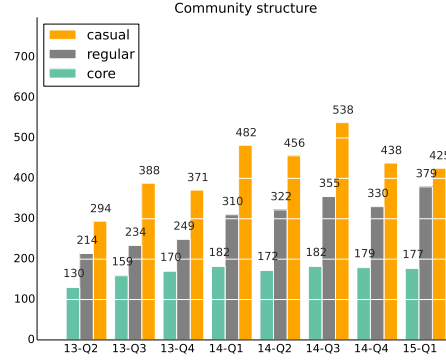


Figure 1.1: Evolution of the last 8 quarters of the core, regular and casual developers (Git activity)

Period	Core	Regular	Occasional
13-Q2	130	214	294
13-Q3	159	234	388
13-Q4	170	249	371
14-Q1	182	310	482
14-Q2	172	322	456
14-Q3	182	355	538
14-Q4	179	330	438
15-Q1	177	379	425

Table 1.2: Characterization of developers by their total contribution to the OpenStack projects

In addition, this report aims to provide some insights about the software development process of the OpenStack community. This report measures efficiency and process of the community based on three metrics. The Review Efficiency Index (REI), the Time to Merge (TTM), and the Backlog Management Index (BMI). REI is measured as the number of closed (merged or abandoned) changesets out of the submitted changesets in a given period. TTM is measured as the time since a review is submitted until this is closed. The BMI is measured as the number of closed tickets out of open tickets in a given period. Typical REI values in the OpenStack Integrated projects is around 0.75, meaning that for 100 opened changesets in a period, the community closed 75. The median TTM is 5.52 days, a decrease from the

previous period.

Integrated project	REI	BMI	TTM
neutron	0.71	0.63	4.53 days
sahara	0.79	0.81	3.12 days
ceilometer	0.81	0.69	3.89 days
horizon	0.73	0.62	3.17 days
heat	0.79	0.83	5.05 days
nova	0.64	0.6	14.07 days
trove	0.8	0.71	7.38 days
swift	0.69	0.37	2.13 days
glance	0.71	0.63	11.76 days
cinder	0.61	0.59	5.31 days
keystone	0.73	0.63	6.52 days

Table 1.3: Closed changesets out of opened changesets (REI), closed ticket out of opened tickets (BMI) and median time to merge in Gerrit (TTM)

Chapter 2

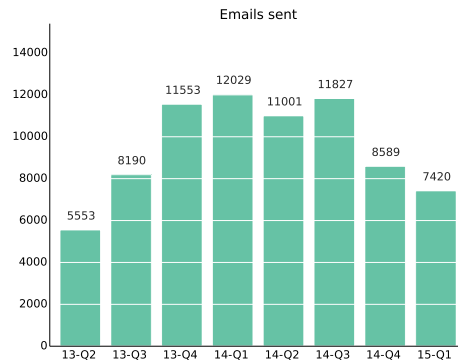
Communication and Support-Related Activities

The OpenStack community uses several channels for communication and support-related activities. Mailing lists were initially the key place for communications, although part of the activity is moving to the questions and answers tool in the Ask OpenStack site.

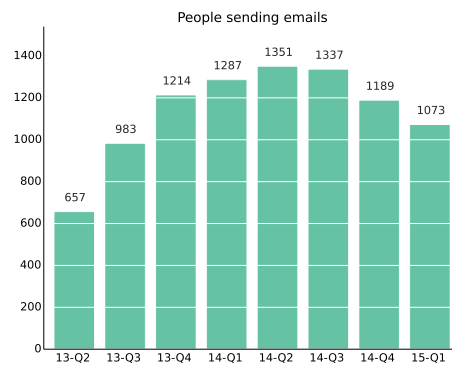
2.1 Mailing Lists

The following charts show activity in terms of emails sent, people sending emails and people initiating threads per quarter. In addition, two tables are presented with the hot topics in the several analyzed mailing lists. First table shows hot topics ordered by number of total posts in such thread, while the second table shows hot topics ordered by the total number of different participants in the discussions. The two tables are based on the last quarter period of activity.

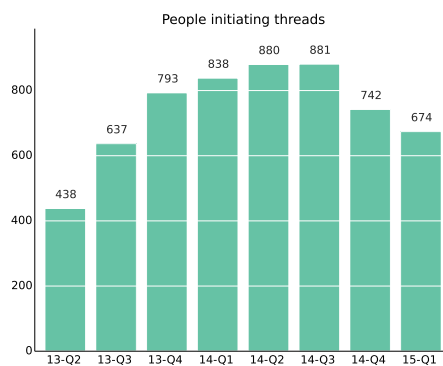
2.1. MAILING LISTS



Period	Emails
13-Q2	5553
13-Q3	8190
13-Q4	11553
14-Q1	12029
14-Q2	11001
14-Q3	11827
14-Q4	8589
15-Q1	7420



Period	People
13-Q2	657
13-Q3	983
13-Q4	1214
14-Q1	1287
14-Q2	1351
14-Q3	1337
14-Q4	1189
15-Q1	1073



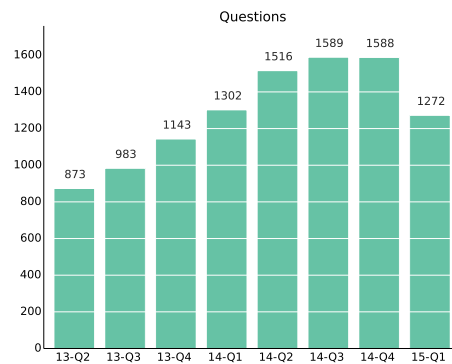
Period	People
13-Q2	438
13-Q3	637
13-Q4	793
14-Q1	838
14-Q2	880
14-Q3	881
14-Q4	742
15-Q1	674

Initial Author and Date	Subject	Number Messages
Flavio Percoco 2015-02-11	[openstack-dev] [all][tc] Lets keep our community open lets fight for it	70
Daniel P. Berrange 2015-02-24	[openstack-dev] [all] Re- evaluating the suitability of the 6 month release cycle	53
Eugeniya Kudryashova 2015-01-29	[openstack-dev] [api][nova] Openstack HTTP error codes	42
Matthew Booth 2015-02-04	[openstack-dev] [all][oslo.db][nova] TL; DR Things everybody should know about Galera	39
cpallares 2015-01-05	[openstack-dev] [Glance] IRC logging	38
Ian Cordasco 2015-02-16	[openstack-dev] [sta- ble][requirements] External dependency caps introduced in 499db6b	35
Nikhil Komawar 2015-02-24	[openstack-dev] [Glance] Core nominations.	31
Sean Dague 2015-01-28	[openstack-dev] Deprecation of in tree EC2 API in Nova for Kilo release	31
Joe Gordon 2015-02-23	[openstack-dev] [stable][all] Revisiting the 6 month release cycle	31
Michael Still 2015-01-29	[OpenStack Foundation] Finding people to work on the EC2 API in Nova	30

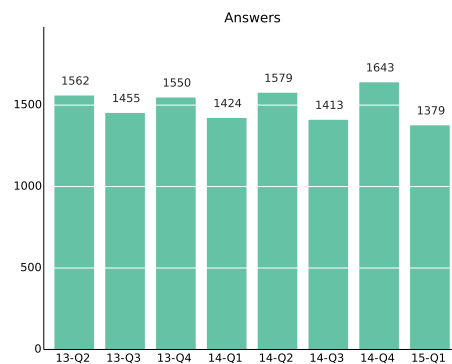
Initial Author and Date	Subject	Diff. People
rbtnollins 2015-02-25	[openstack-dev] [all] Re-evaluating the suitability of the 6 month release cycle	25
Dean Troyer 2015-01-30	[openstack-dev] [Openstack- operators] [all][log] Openstack HTTP error codes	23
Jeremy Stanley 2015-02-12	[openstack-dev] [all][tc] Lets keep our community open lets fight for it	22
Thierry Carrez 2015-01-14	[openstack-dev] [Glance] IRC log- ging	21
vishvananda 2015-02-05	[openstack-dev] Deprecation of in tree EC2 API in Nova for Kilo re- lease	20
rbtnollins 2015-02-24	[openstack-dev] [stable][all] Revisit- ing the 6 month release cycle	18
rodrigodsousa 2015-02-13	[openstack-dev] [Keystone] Propos- ing Marek Denis for the Keystone Core Team	17
Armando Migli- accio 2015-01-15	[openstack-dev] [neutron] Changes to the core team	17
Fei Long Wang 2015-02-24	[openstack-dev] [Glance] Core nom- inations.	16
Dean Troyer 2015-01-30	[OpenStack Foundation] [openstack-dev] Finding people to work on the EC2 API in Nova	16

2.2 Questions and Answers

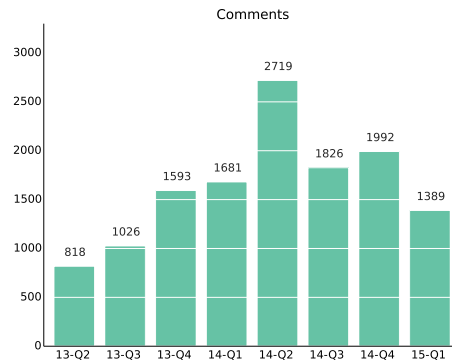
The following charts show activity in the Ask OpenStack site. Total number of questions, number of answers, number of comments and people sending questions are depicted. In addition four tables represent the hot topics activity in the Ask OpenStack site. Those show information about the top visited questions, questions with the highest number of comments, questions with the highest number of different people participating and the tags with the highest number of references.



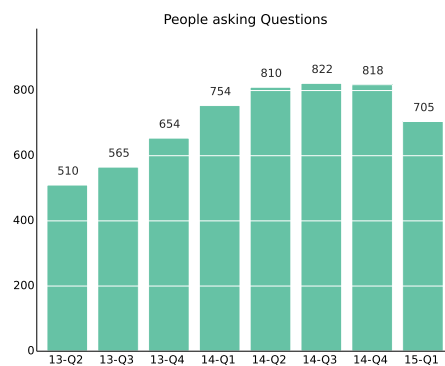
Period	Questions
13-Q2	873
13-Q3	983
13-Q4	1143
14-Q1	1302
14-Q2	1516
14-Q3	1589
14-Q4	1588
15-Q1	1272



Period	Answers
13-Q2	1562
13-Q3	1455
13-Q4	1550
14-Q1	1424
14-Q2	1579
14-Q3	1413
14-Q4	1643
15-Q1	1379



Period	Comments
13-Q2	818
13-Q3	1026
13-Q4	1593
14-Q1	1681
14-Q2	2719
14-Q3	1826
14-Q4	1992
15-Q1	1389



Period	People asking
13-Q2	510
13-Q3	565
13-Q4	654
14-Q1	754
14-Q2	810
14-Q3	822
14-Q4	818
15-Q1	705

- Top visited questions.

Question subject	Visits
failed to allocate the networks not+	585
heat scaling are the scale up+	405
adding a new datacentre swift object+	405
neutron error unable to create tunnel+	308
ubuntu 1404 all in one vm+	303
openstack instance high availabilityhow to make+	302
how to isolate tenant networks connected+	245
keystone unable to establish connection+	234
have you ever experienced anything worse+	217
attempt to reproduce installing nova docker+	210

- Top questions with more comments.

Question subject	Comments
not able to pingssh instances+	5
have you ever experienced anything worse+	5
critical keystone nosuchopterror no such option+	5
neutron router fails to access external+	5
is possible create public network without+	5
dns not working and dhcp namespace+	5
cannot access internet from external router+	5
can anyone assist with an issue+	5
heat access created vm permission denied+	5
nova list all tenants faced error+	5

- Top questions with the highest number of different people participating.

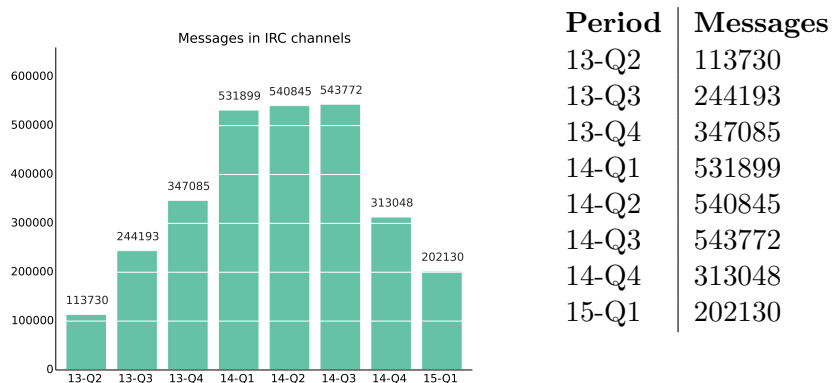
Question subject	People participating
instance error launching instance gives error+	7
instances stuck in buildspawning state+	7
icehouse on fedora21+	6
what is the difference between single+ instance and image+	6
my router both interfaces are down+	5
where does high level openstack discussion+	5
compute node error contacting glance server+	5
solvedwhere is in junos keystone pasteini+	5
cannot ssh fedora19 instance+	5

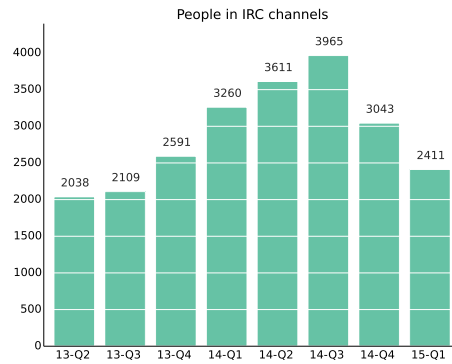
- Top tags

Tag name	Ocurrences
forum	834
OpenStack	833
community	700
Ask	668
gerrit	632
stackforge	439
cloud	434
iaas	247
ovs	197
branch	174
create	64
ad	50
soft-lockup	40
neutron-rootwrap	39
packstack	36

2.3 IRC

Finally, the community of OpenStack uses several IRC channels for asynchronous communication. This section shows information about the total number of messages sent in the community during the last 8 quarters together with the number of the several people participating in such discussions. In addition, a list with the top participants in the IRC channels is provided.





Period	People
13-Q2	2038
13-Q3	2109
13-Q4	2591
14-Q1	3260
14-Q2	3611
14-Q3	3965
14-Q4	3043
15-Q1	2411

IRC id

jroll
 clarkb
 morganfainberg
 Anita Kuno
 openstack
 dhellmann
 NoBodyCam
 Devananda
 Angus Salkeld
 Lucas Alvares Gomes
 John Dickinson
 Sam-I-Am
 Monty Taylor
 Thierry Carrez
 Jamie Lennox

Messages sent

3984
 3680
 3437
 3305
 3017
 2810
 2713
 2435
 2332
 2249
 2217
 2134
 2007
 1941
 1921

Chapter 3

Details on OpenStack Integrated and Incubated projects

Each breakdown is divided into three sections with information from the last eight quarters:

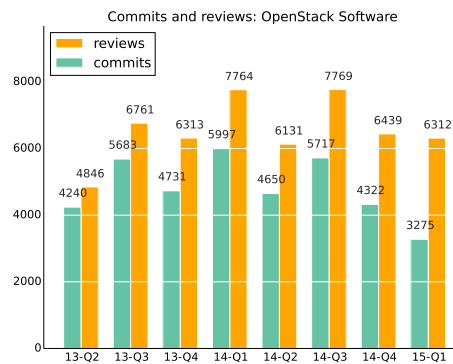
- activity: centered in the following metrics: commits from git activity, submitted, merge and abandoned reviews from the review system and opened and closed tickets from the issue tracking system.
- community: active core reviewers in gerrit, active authors in git and top ten developers and top ten organizations contributing to the development in the last quarter. of each project.
- process: efficiency closing tickets, efficiency closing changesets, Time to Merge (mean and median), number of patchsets (iterations) per changeset and study on the time waiting for a reviewer or submitter action in the patchset review process.

Details on individual OpenStack programs are provided in separate documents on git.openstack.org/cgit/openstack-infra/activity-board/tree/reports/2014-q4.

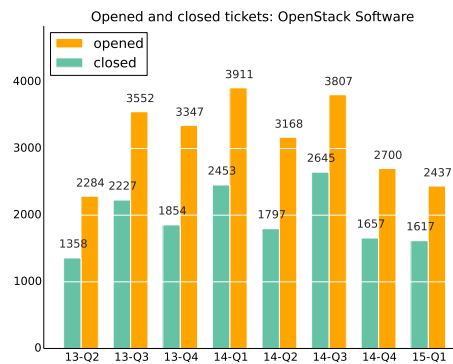
3.1 Overview of OpenStack Programs

3.2 Activity

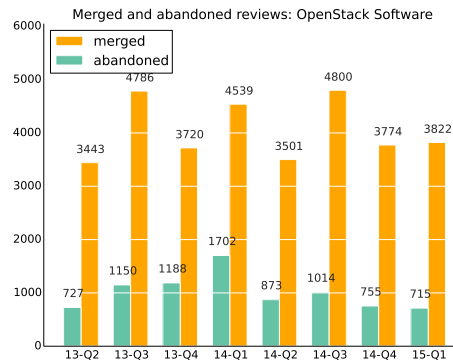
Commits in Git, submitted, merged and abandoned reviews in Gerrit and opened and closed issues in Launchpad.



Period	Commits	Reviews
13-Q2	4240	4846
13-Q3	5683	6761
13-Q4	4731	6313
14-Q1	5997	7764
14-Q2	4650	6131
14-Q3	5717	7769
14-Q4	4322	6439
15-Q1	3275	6312



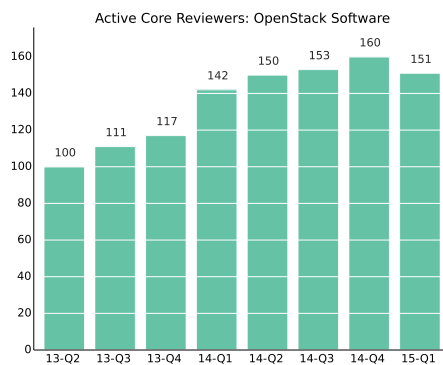
Period	Closed	Opened
13-Q2	1358	2284
13-Q3	2227	3552
13-Q4	1854	3347
14-Q1	2453	3911
14-Q2	1797	3168
14-Q3	2645	3807
14-Q4	1657	2700
15-Q1	1617	2437



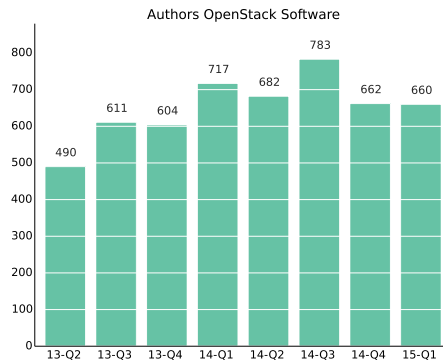
Period	Merged	Abandoned
13-Q2	3443	727
13-Q3	4786	1150
13-Q4	3720	1188
14-Q1	4539	1702
14-Q2	3501	873
14-Q3	4800	1014
14-Q4	3774	755
15-Q1	3822	715

3.3 Community

Active core reviewers in Gerrit, active authors in Git, top authors and organizations in the last quarter



Period	Active Core
13-Q2	100
13-Q3	111
13-Q4	117
14-Q1	142
14-Q2	150
14-Q3	153
14-Q4	160
15-Q1	151



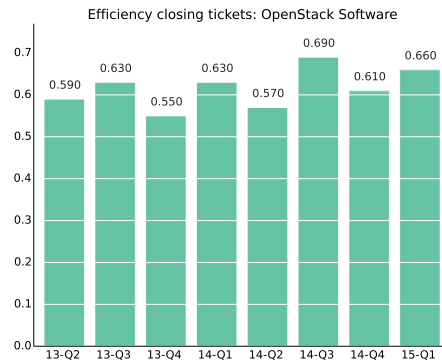
Period	Authors
13-Q2	490
13-Q3	611
13-Q4	604
14-Q1	717
14-Q2	682
14-Q3	783
14-Q4	662
15-Q1	660

Commit (s)	Author	Commit (s)	Organizations
64	Brant Knudson	564	Red Hat
63	Angus Salkeld	438	IBM
57	Ihar Hrachyshka	378	Mirantis
47	Matt Riedemann	315	HP
46	Steve Martinelli	192	Rackspace
46	Valeriy Ponomaryov	77	Huawei
45	Juan Antonio Osorio Robles	74	Cisco Systems
38	Davanum Srinivas	60	Intel
37	Kiall Mac Innes	52	VMware
36	Armando Migliaccio	49	Ericsson

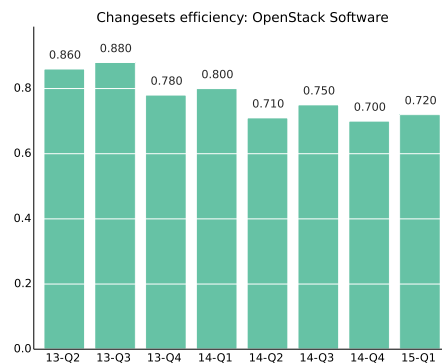
3.4 Process

Efficiency closing changesets and tickets, time to review (mean and median), number of patchsets (iterations) per changeset and study on the time waiting for a reviewer or submitter action in the patchset review process.

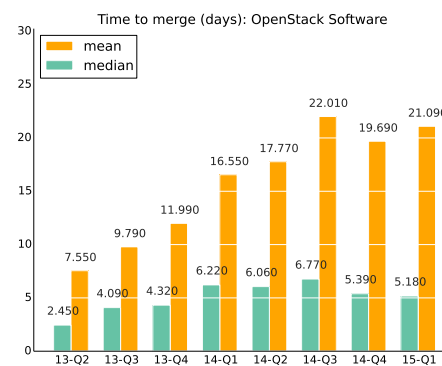
3.4. PROCESS



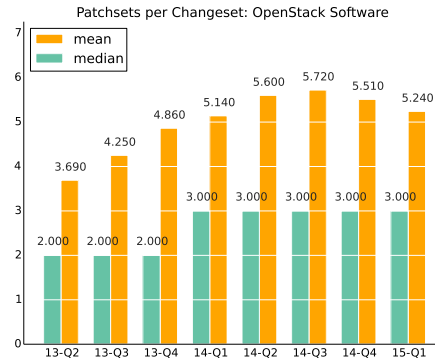
Period	Closed/Opened
13-Q2	0.59
13-Q3	0.63
13-Q4	0.55
14-Q1	0.63
14-Q2	0.57
14-Q3	0.69
14-Q4	0.61
15-Q1	0.66



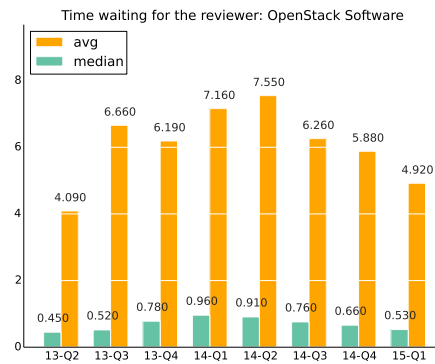
Period	(Aband. and Merg.)/Subm.
13-Q2	0.86
13-Q3	0.88
13-Q4	0.78
14-Q1	0.8
14-Q2	0.71
14-Q3	0.75
14-Q4	0.7
15-Q1	0.72



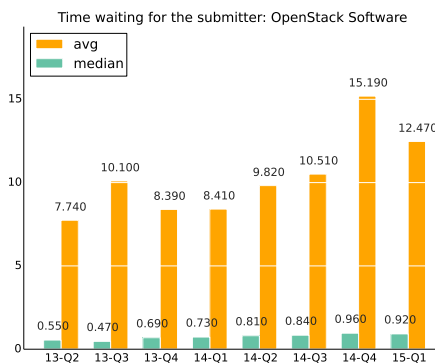
Period	Median	Mean
13-Q2	2.45	7.55
13-Q3	4.09	9.79
13-Q4	4.32	11.99
14-Q1	6.22	16.55
14-Q2	6.06	17.77
14-Q3	6.77	22.01
14-Q4	5.39	19.69
15-Q1	5.18	21.09



Period	Median	Mean
13-Q2	2.0	3.69
13-Q3	2.0	4.25
13-Q4	2.0	4.86
14-Q1	3.0	5.14
14-Q2	3.0	5.6
14-Q3	3.0	5.72
14-Q4	3.0	5.51
15-Q1	3.0	5.24



Period	Median	Mean
13-Q2	0.45	4.09
13-Q3	0.52	6.66
13-Q4	0.78	6.19
14-Q1	0.96	7.16
14-Q2	0.91	7.55
14-Q3	0.76	6.26
14-Q4	0.66	5.88
15-Q1	0.53	4.92

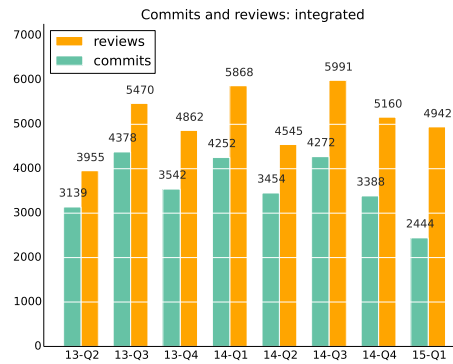


Period	Median	Mean
13-Q2	0.55	7.74
13-Q3	0.47	10.1
13-Q4	0.69	8.39
14-Q1	0.73	8.41
14-Q2	0.81	9.82
14-Q3	0.84	10.51
14-Q4	0.96	15.19
15-Q1	0.92	12.47

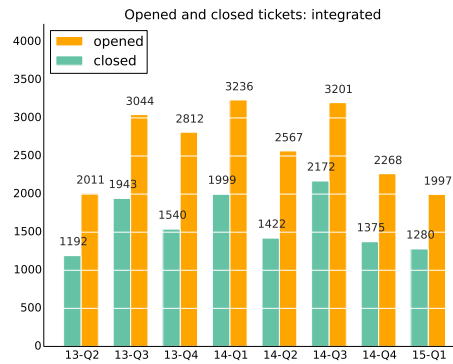
3.4.1 OpenStack Integrated Programs

3.5 Activity

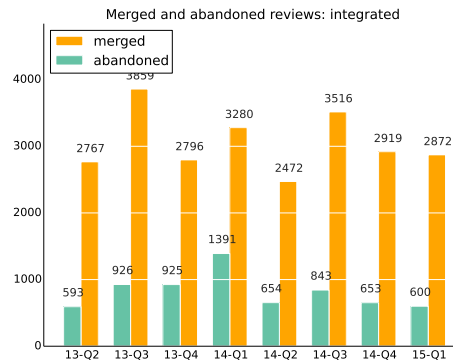
Commits in Git, submitted, merged and abandoned reviews in Gerrit and opened and closed issues in Launchpad.



Period	Commits	Reviews
13-Q2	3139	3955
13-Q3	4378	5470
13-Q4	3542	4862
14-Q1	4252	5868
14-Q2	3454	4545
14-Q3	4272	5991
14-Q4	3388	5160
15-Q1	2444	4942



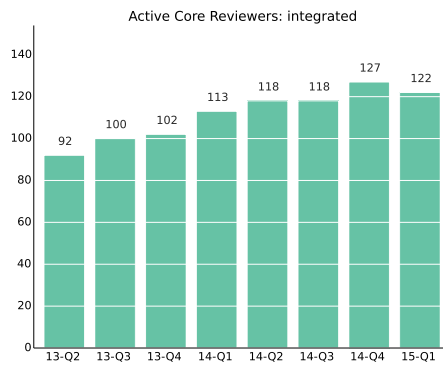
Period	Closed	Opened
13-Q2	1192	2011
13-Q3	1943	3044
13-Q4	1540	2812
14-Q1	1999	3236
14-Q2	1422	2567
14-Q3	2172	3201
14-Q4	1375	2268
15-Q1	1280	1997



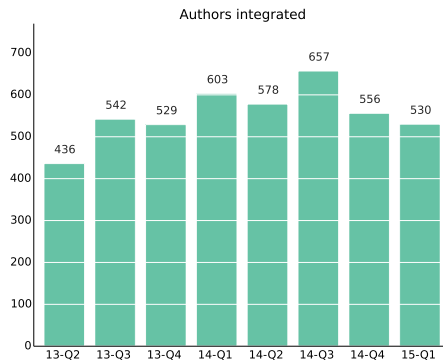
Period	Merged	Abandoned
13-Q2	2767	593
13-Q3	3859	926
13-Q4	2796	925
14-Q1	3280	1391
14-Q2	2472	654
14-Q3	3516	843
14-Q4	2919	653
15-Q1	2872	600

3.6 Community

Active core reviewers in Gerrit, active authors in Git, top authors and organizations in the last quarter



Period	Active Core
13-Q2	92
13-Q3	100
13-Q4	102
14-Q1	113
14-Q2	118
14-Q3	118
14-Q4	127
15-Q1	122



Period	Authors
13-Q2	436
13-Q3	542
13-Q4	529
14-Q1	603
14-Q2	578
14-Q3	657
14-Q4	556
15-Q1	530

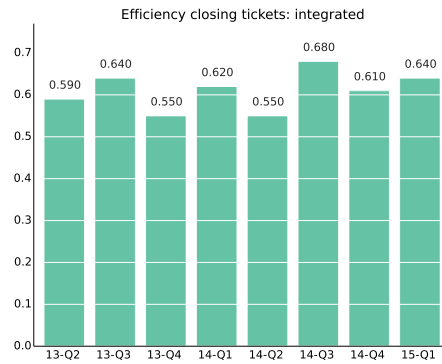
Commit (s)	Author
63	Angus Salkeld
57	Ihar Hrachyshka
52	Brant Knudson
46	Matt Riedemann
46	Steve Martinelli
38	Davanum Srinivas
36	Armando Migliaccio
33	Terry Wilson
32	Dan Smith
31	Gordon Chung

Commit (s)	Organizations
435	Red Hat
415	IBM
270	Mirantis
208	HP
113	Rackspace
66	Cisco Systems
63	Huawei
54	Intel
52	VMware
40	NEC

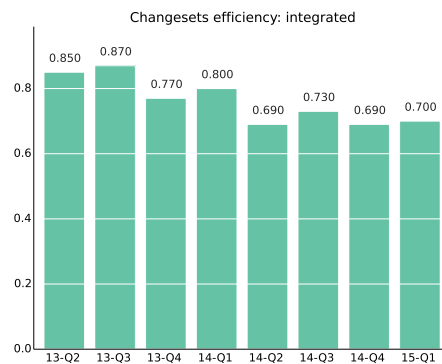
3.7 Process

Efficiency closing changesets and tickets, time to review (mean and median), number of patchsets (iterations) per changeset and study on the time waiting for a reviewer or submitter action in the patchset review process.

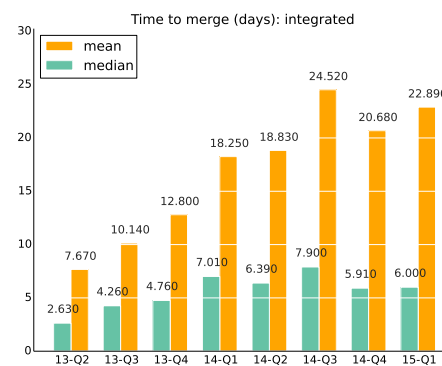
3.7. PROCESS



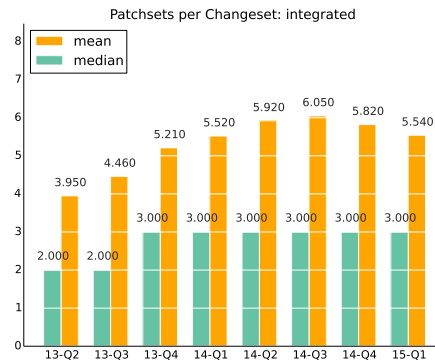
Period	Closed/Opened
13-Q2	0.59
13-Q3	0.64
13-Q4	0.55
14-Q1	0.62
14-Q2	0.55
14-Q3	0.68
14-Q4	0.61
15-Q1	0.64



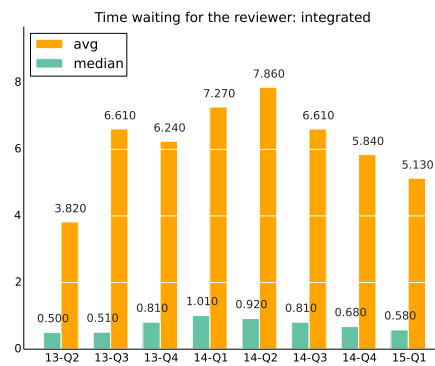
Period	(Aband. and Merg.)/Subm.
13-Q2	0.85
13-Q3	0.87
13-Q4	0.77
14-Q1	0.8
14-Q2	0.69
14-Q3	0.73
14-Q4	0.69
15-Q1	0.7



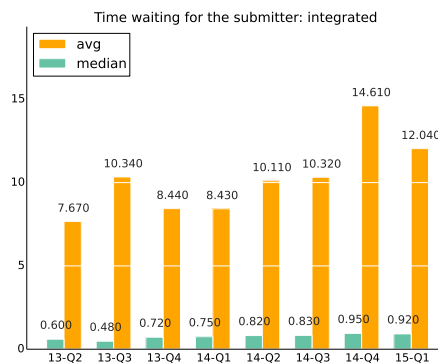
Period	Median	Mean
13-Q2	2.63	7.67
13-Q3	4.26	10.14
13-Q4	4.76	12.8
14-Q1	7.01	18.25
14-Q2	6.39	18.83
14-Q3	7.9	24.52
14-Q4	5.91	20.68
15-Q1	6.0	22.89



Period	Median	Mean
13-Q2	2.0	3.95
13-Q3	2.0	4.46
13-Q4	3.0	5.21
14-Q1	3.0	5.52
14-Q2	3.0	5.92
14-Q3	3.0	6.05
14-Q4	3.0	5.82
15-Q1	3.0	5.54



Period	Median	Mean
13-Q2	0.5	3.82
13-Q3	0.51	6.61
13-Q4	0.81	6.24
14-Q1	1.01	7.27
14-Q2	0.92	7.86
14-Q3	0.81	6.61
14-Q4	0.68	5.84
15-Q1	0.58	5.13

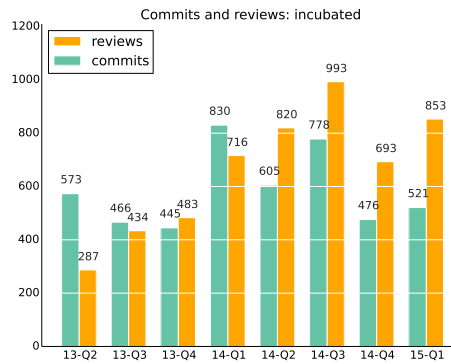


Period	Median	Mean
13-Q2	0.6	7.67
13-Q3	0.48	10.34
13-Q4	0.72	8.44
14-Q1	0.75	8.43
14-Q2	0.82	10.11
14-Q3	0.83	10.32
14-Q4	0.95	14.61
15-Q1	0.92	12.04

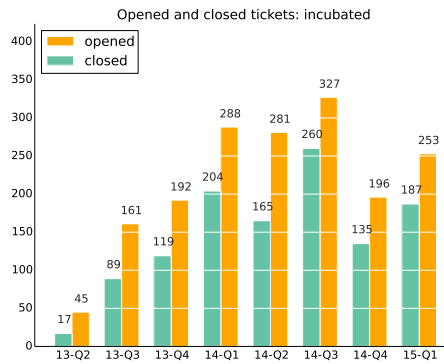
3.7.1 OpenStack Incubated Programs

3.8 Activity

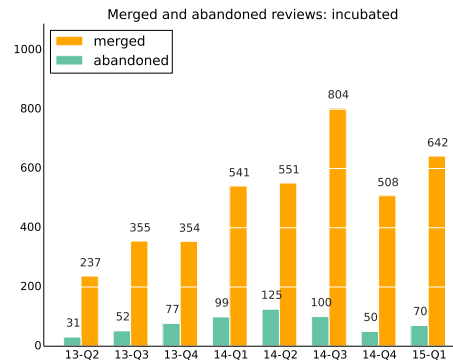
Commits in Git, submitted, merged and abandoned reviews in Gerrit and opened and closed issues in Launchpad.



Period	Commits	Reviews
13-Q2	573	287
13-Q3	466	434
13-Q4	445	483
14-Q1	830	716
14-Q2	605	820
14-Q3	778	993
14-Q4	476	693
15-Q1	521	853



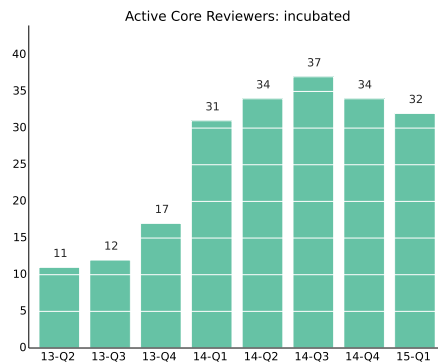
Period	Closed	Opened
13-Q2	17	45
13-Q3	89	161
13-Q4	119	192
14-Q1	204	288
14-Q2	165	281
14-Q3	260	327
14-Q4	135	196
15-Q1	187	253



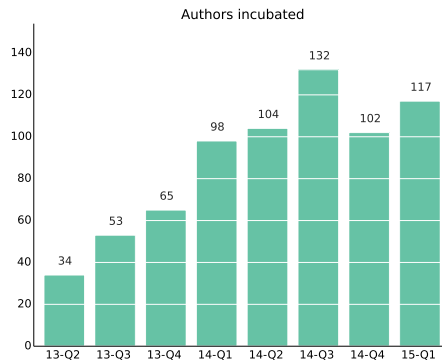
Period	Merged	Abandoned
13-Q2	237	31
13-Q3	355	52
13-Q4	354	77
14-Q1	541	99
14-Q2	551	125
14-Q3	804	100
14-Q4	508	50
15-Q1	642	70

3.9 Community

Active core reviewers in Gerrit, active authors in Git, top authors and organizations in the last quarter



Period	Active Core
13-Q2	11
13-Q3	12
13-Q4	17
14-Q1	31
14-Q2	34
14-Q3	37
14-Q4	34
15-Q1	32

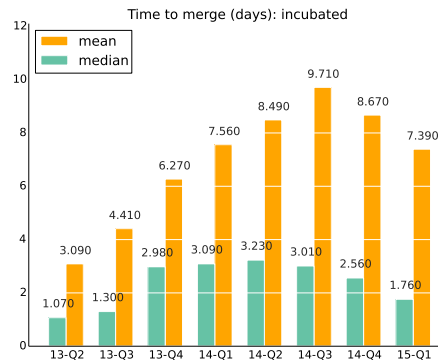


Period	Authors
13-Q2	34
13-Q3	53
13-Q4	65
14-Q1	98
14-Q2	104
14-Q3	132
14-Q4	102
15-Q1	117

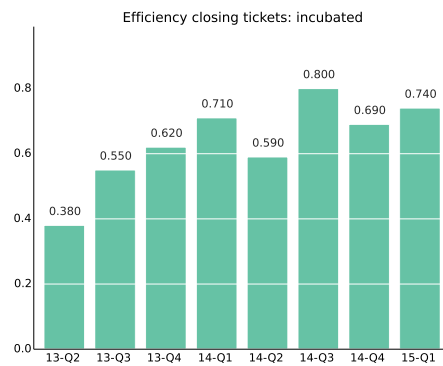
Commit (s)	Author	Commit (s)	Organizations
46	Valeriy Ponomaryov	74	HP
45	Juan Antonio Osorio Robles	67	Rackspace
37	Kiall Mac Innes	64	Mirantis
20	Lucas Alvares Gomes	45	Ericsson
18	John Vrbanc	34	Red Hat
17	Jim Rollenhagen	16	Yahoo!
17	Vinod Mangalpally	14	NetApp
13	Ruby Loo	13	Fujitsu
12	Devananda	10	eBay
12	Naohiro Tamura	7	IBM

3.10 Process

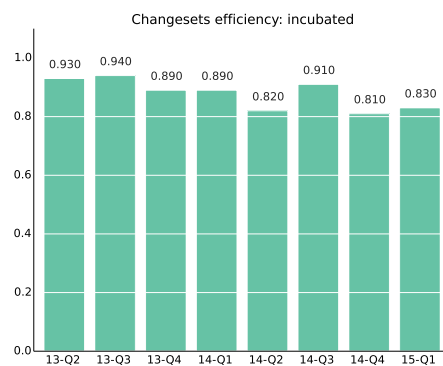
Efficiency closing changesets and tickets, time to review (mean and median), number of patchsets (iterations) per changeset and study on the time waiting for a reviewer or submitter action in the patchset review process.



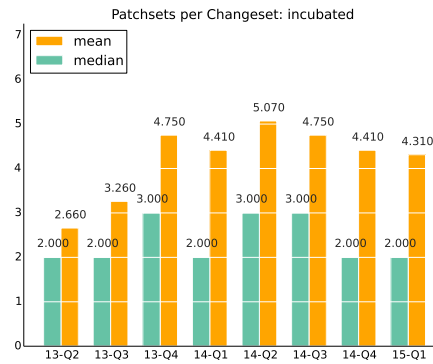
Period	Median	Mean
13-Q2	1.07	3.09
13-Q3	1.3	4.41
13-Q4	2.98	6.27
14-Q1	3.09	7.56
14-Q2	3.23	8.49
14-Q3	3.01	9.71
14-Q4	2.56	8.67
15-Q1	1.76	7.39



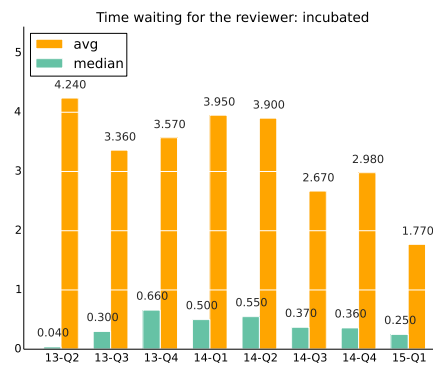
Period	Closed/Opened
13-Q2	0.38
13-Q3	0.55
13-Q4	0.62
14-Q1	0.71
14-Q2	0.59
14-Q3	0.8
14-Q4	0.69
15-Q1	0.74



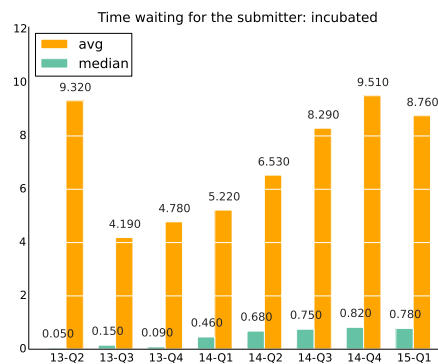
Period	(Aband. and Merg.)/Subm.
13-Q2	0.93
13-Q3	0.94
13-Q4	0.89
14-Q1	0.89
14-Q2	0.82
14-Q3	0.91
14-Q4	0.81
15-Q1	0.83



Period	Median	Mean
13-Q2	2.0	2.66
13-Q3	2.0	3.26
13-Q4	3.0	4.75
14-Q1	2.0	4.41
14-Q2	3.0	5.07
14-Q3	3.0	4.75
14-Q4	2.0	4.41
15-Q1	2.0	4.31



Period	Median	Mean
13-Q2	0.04	4.24
13-Q3	0.3	3.36
13-Q4	0.66	3.57
14-Q1	0.5	3.95
14-Q2	0.55	3.9
14-Q3	0.37	2.67
14-Q4	0.36	2.98
15-Q1	0.25	1.77



Period	Median	Mean
13-Q2	0.05	9.32
13-Q3	0.15	4.19
13-Q4	0.09	4.78
14-Q1	0.46	5.22
14-Q2	0.68	6.53
14-Q3	0.75	8.29
14-Q4	0.82	9.51
15-Q1	0.78	8.76

Appendix A

Metrics Definitions

Metrics measured in each OpenStack program:

- Commit: this is defined as the action(s) that performs a change in the source code. Bots, merges and other type of automatic activity is removed from the records. In addition, when aggregating several git repositories, this metric only counts unique revisions (unique hashes found in the git repositories). Finally, all branches are aggregated to the analysis.
- Submitted changeset: a changeset is the process of peer reviewing source code changes. A commit is not merged to the master code of a given project till this is approved for at least one core reviewer of such project. A submitted changeset is defined as any changeset submitted to the Gerrit system. However, given the limitations of the current version of the tool, with at least 5,900 changesets detected as having an erroneous creation date, this metric counts the first patchset upload action.
- Merged and abandoned changsets: a merge is defined as the patchset that was finally submitted to the source code. An abandoned changeset is a potential merge that was finally dismissed by developers as being part of the source code. This status is found in the status of the final patchset. However, although a patchset can be merged or abandoned, this action can be reverted. If a patchset presents several of these changes in the same period of time, only one of them is counted (the very last one). On the other hand, if those changes take place in different periods of analysis, both status would be counted.

- Open and closed ticket: a ticket in Launchpad is counted as closed if the status of such ticket is defined as 'Fix Released'. The rest of the tickets are counted as opened tickets.
- Active Core Reviewer: a core reviewer has the possibility to use +2 or -2 actions when reviewing the code. However, if there are developers that for some period do not use those actions, those can not be measured as core reviewer. Thus, this metric provides information about 'active' core reviewers. This can be also defined as those developers that actively have used the +2 or -2 review action. This metric is also filtered by branch of activity, only using 'master'. This helps to detect actual core reviewers in each of the projects.
- Authors: a developer is defined as author if she is the owner of the patchset sent for reviewing and this is merged into the source code. As previously indicated, automatic commits such bot's are removed from this analysis.
- Efficiency closing issues: this metric is a derivation of the Backlog Management Index (BMI) that measures the number of closed tickets out of the opened tickets in a period of time. Values under 1.0 indicates that the number of closing issues is lower than the number of opened issues arriving. On the contrary, higher charts would indicate better maintenance effort by the community.
- Efficiency closing changesets: this metric is a derivation of the Backlog Management Index as it is named as Review efficiency index (REI). As similarly used in the BMI index, this metrics measures the number of closed changesets (merged or abandoned) out of the total number of new changesets.
- Time to Merge: this time consists of the time between the first upload of the first patchset (as defined as a submitted changeset) till the last patchset of the changeset is merged into the code and this is indicated in the comments side of the Gerrit tool. This metric is provided in number of days.
- Patchsets per changeset: this metric calculates the total number of iterations in a changeset till this is abandoned or merged.
- Time waiting for the reviewer or the submitter: a changeset is waiting for a reviewer action if a new patchset upload or a new changset arrives

to the system. On the other hand, a submitter action is required when a specific negative verification or reviewing action takes place (Verified -1/-2 or Code-Review -1/-2). In addition, when a Code-Review +2 action takes place, it is assumed that the changset is closing and no more times are registered either for the reviewer or the submitter. For this analysis, those patchsets flagged as work in progress are ignored.

Metrics measured in the general overview:

- Community structure, core, regular and casual developers: developers are ordered in descendant order by the number of commits authored for a given period. Core developers are defined as the list of developers that reach 80% of the total commits. Regular is the set of developers that are between that 80% and 95% of the commits. Casual developers are found in the rest of the 5%. Bots are ignored in this list of developers.
- Developer per month: average of developers per month ignoring bots.
- Emails sent: number of emails sent by people to the several mailing lists. Bots are not registered.
- People sending emails: number of people sending those emails ignoring bots.
- People initiating threads: a thread is defined as a list of emails that has the same root. There may exist threads of one email.
- Top threads: this list provides the longest threads in terms of number of emails that have a common root email.
- Questions, answers and comments in Askbot.
- People asking questions in Askbot: number of people sending a new question.
- Top visited questions.
- Top tags: each of the questions has a list of associated tags. The top tags are those with the highest number of repetitions aggregating all of the questions.
- Messages and people in IRC: this analysis ignores as a message those entries in the IRC channels that provide information about people entering or leaving the system.

Appendix B

Source Code and Data Sources

The data source used to provide the data of this analysis can be found at the GrimoireLib library. Specifically the `openstack_report.py` file¹.

With respect to the list of analyzed repositories per project, the following table lists all of them. There are three data sources: git activity (scm), tickets activity (its) and review activity (scr). This information is based on the information listed in the yaml organizational file² provided by the OpenStack Foundation.

Program	Data source	Repository
barbican	its	https://bugs.launchpad.net/barbican
barbican	scm	git://git.openstack.org/openstack/barbican
barbican	scm	git://git.openstack.org/openstack/castellan
barbican	scm	git://git.openstack.org/openstack/kite
barbican	scr	review.openstack.org_openstack/barbican
barbican	scr	review.openstack.org_openstack/castellan
barbican	scr	review.openstack.org_openstack/kite
ceilometer	its	https://bugs.launchpad.net/ceilometer
ceilometer	scm	https://github.com/openstack/ceilometer.git
ceilometer	scr	review.openstack.org_openstack/ceilometer
cinder	its	https://bugs.launchpad.net/cinder

¹https://github.com/VizGrimoire/GrimoireLib/blob/master/vizGrimoireJS/openstack_report.py. Commit identified with the hash `60230d0fe8b4628e091736f902a9e230506a6297`

²<http://git.openstack.org/cgit/openstack/governance/tree/reference/programs.yaml>

cinder	scm	https://github.com/openstack/cinder.git
cinder	scr	review.openstack.org_openstack/cinder
clients	its	https://bugs.launchpad.net/python-ceilometerclient
clients	its	https://bugs.launchpad.net/python-cinderclient
clients	its	https://bugs.launchpad.net/python-designateclient
clients	its	https://bugs.launchpad.net/python-glanceclient
clients	its	https://bugs.launchpad.net/python-heatclient
clients	its	https://bugs.launchpad.net/python-keystoneclient
clients	its	https://bugs.launchpad.net/python-neutronclient
clients	its	https://bugs.launchpad.net/python-novaclient
clients	its	https://bugs.launchpad.net/python-saharaclient
clients	its	https://bugs.launchpad.net/python-swiftclient
clients	its	https://bugs.launchpad.net/python-zaqarclient
clients	scm	git://git.openstack.org/openstack-dev/heat-cfnclient
clients	scm	git://git.openstack.org/openstack/python-kiteclient
clients	scm	git://git.openstack.org/openstack/python-saharaclient
clients	scm	git://git.openstack.org/openstack/python-zaqarclient
clients	scm	https://github.com/openstack/python-ceilometerclient.git
clients	scm	https://github.com/openstack/python-cinderclient.git
clients	scm	https://github.com/openstack/python-glanceclient.git
clients	scm	https://github.com/openstack/python-heatclient.git
clients	scm	https://github.com/openstack/python-ironicclient.git
clients	scm	https://github.com/openstack/python-keystoneclient.git
clients	scm	https://github.com/openstack/python-neutronclient.git
clients	scm	https://github.com/openstack/python-novaclient.git
clients	scm	https://github.com/openstack/python-swiftclient.git
clients	scm	https://github.com/openstack/python-troveclient.git
clients	scr	review.openstack.org_openstack/python-ceilometerclient
clients	scr	review.openstack.org_openstack/python-cinderclient
clients	scr	review.openstack.org_openstack/python-glanceclient
clients	scr	review.openstack.org_openstack/python-heatclient
clients	scr	review.openstack.org_openstack/python-ironicclient
clients	scr	review.openstack.org_openstack/python-keystoneclient
clients	scr	review.openstack.org_openstack/python-kiteclient
clients	scr	review.openstack.org_openstack/python-neutronclient
clients	scr	review.openstack.org_openstack/python-novaclient
clients	scr	review.openstack.org_openstack/python-saharaclient
clients	scr	review.openstack.org_openstack/python-swiftclient
clients	scr	review.openstack.org_openstack/python-troveclient
clients	scr	review.openstack.org_openstack/python-zaqarclient

clients	scr	review.openstack.org_stackforge/python-designateclient
Common Libraries	its	https://bugs.launchpad.net/hacking
Common Libraries	its	https://bugs.launchpad.net/oslo.messaging
Common Libraries	its	https://bugs.launchpad.net/pbr
Common Libraries	its	https://bugs.launchpad.net/taskflow
Common Libraries	scm	git://git.openstack.org/openstack-dev/oslo-cookiecutter
Common Libraries	scm	git://git.openstack.org/openstack/oslo.concurrency
Common Libraries	scm	git://git.openstack.org/openstack/oslo.context
Common Libraries	scm	git://git.openstack.org/openstack/oslo.db
Common Libraries	scm	git://git.openstack.org/openstack/oslo.i18n
Common Libraries	scm	git://git.openstack.org/openstack/oslo.rootwrap
Common Libraries	scm	git://git.openstack.org/openstack/oslo.vmware
Common Libraries	scm	git://git.openstack.org/openstack/oslosphinx
Common Libraries	scm	git://git.openstack.org/openstack/pycadf
Common Libraries	scm	git://git.openstack.org/openstack/stevedore
Common Libraries	scm	git://git.openstack.org/openstack/taskflow
Common Libraries	scm	git://git.openstack.org/openstack/tooz
Common Libraries	scm	https://github.com/openstack/oslo-incubator.git
Common Libraries	scm	https://github.com/openstack/oslo.config.git
Common Libraries	scm	https://github.com/openstack/oslo.messaging.git
Common Libraries	scm	https://github.com/openstack/oslo.version.git
Common Libraries	scr	review.openstack.org_openstack-dev/hacking
Common Libraries	scr	review.openstack.org_openstack-dev/pbr
Common Libraries	scr	review.openstack.org_openstack/oslo-incubator
Common Libraries	scr	review.openstack.org_openstack/oslo.concurrency
Common Libraries	scr	review.openstack.org_openstack/oslo.config
Common Libraries	scr	review.openstack.org_openstack/oslo.context
Common Libraries	scr	review.openstack.org_openstack/oslo.db
Common Libraries	scr	review.openstack.org_openstack/oslo.i18n
Common Libraries	scr	review.openstack.org_openstack/tooz
Deployment	its	https://bugs.launchpad.net/python-tuskarclient
Deployment	its	https://bugs.launchpad.net/tuskar
Deployment	scm	git://git.openstack.org/openstack/os-apply-config
Deployment	scm	git://git.openstack.org/openstack/os-cloud-config
Deployment	scm	git://git.openstack.org/openstack/os-collect-config
Deployment	scm	git://git.openstack.org/openstack/os-refresh-config
Deployment	scm	git://git.openstack.org/openstack/python-tuskarclient
Deployment	scm	git://git.openstack.org/openstack/tripleo-puppet-elements
Deployment	scm	git://git.openstack.org/openstack/tuskar
Deployment	scm	https://github.com/openstack/tripleo-heat-templates.git

Deployment	scm	https://github.com/openstack/tripleo-image-elements.git
Deployment	scm	https://github.com/openstack/tripleo-incubator.git
Deployment	scr	review.openstack.org_openstack/diskimage-builder
Deployment	scr	review.openstack.org_openstack/os-apply-config
Deployment	scr	review.openstack.org_openstack/os-cloud-config
Deployment	scr	review.openstack.org_openstack/os-collect-config
Deployment	scr	review.openstack.org_openstack/os-refresh-config
Deployment	scr	review.openstack.org_openstack/python-tuskarclient
Deployment	scr	review.openstack.org_openstack/tripleo-heat-templates
Deployment	scr	review.openstack.org_openstack/tripleo-image-elements
Deployment	scr	review.openstack.org_openstack/tripleo-incubator
Deployment	scr	review.openstack.org_openstack/tripleo-puppet-elements
Deployment	scr	review.openstack.org_openstack/tuskar
designate	its	https://bugs.launchpad.net/designate
designate	scm	git://git.openstack.org/openstack/designate
designate	scr	review.openstack.org_openstack/designate
Documentation	its	https://bugs.launchpad.net/openstack-api-site
Documentation	its	https://bugs.launchpad.net/openstack-manuals
Documentation	scm	git://git.openstack.org/openstack/ha-guide
Documentation	scm	git://git.openstack.org/openstack/openstack-doc-tools
Documentation	scm	git://git.openstack.org/openstack/operations-guide
Documentation	scm	git://git.openstack.org/openstack/security-doc
Documentation	scm	git://git.openstack.org/openstack/training-guides
Documentation	scm	https://github.com/openstack/api-site.git
Documentation	scm	https://github.com/openstack/compute-api.git
Documentation	scm	https://github.com/openstack/identity-api.git
Documentation	scm	https://github.com/openstack/image-api.git
Documentation	scm	https://github.com/openstack/netconn-api.git
Documentation	scm	https://github.com/openstack/object-api.git
Documentation	scm	https://github.com/openstack/openstack-manuals.git
Documentation	scm	https://github.com/openstack/volume-api.git
Documentation	scr	review.openstack.org_openstack/api-site
Documentation	scr	review.openstack.org_openstack/compute-api
Documentation	scr	review.openstack.org_openstack/ha-guide
Documentation	scr	review.openstack.org_openstack/identity-api
Documentation	scr	review.openstack.org_openstack/image-api
Documentation	scr	review.openstack.org_openstack/netconn-api
Documentation	scr	review.openstack.org_openstack/object-api
Documentation	scr	review.openstack.org_openstack/openstack-doc-tools
Documentation	scr	review.openstack.org_openstack/openstack-manuals

Documentation	scr	review.openstack.org_openstack/operations-guide
Documentation	scr	review.openstack.org_openstack/security-doc
Documentation	scr	review.openstack.org_openstack/training-guides
Documentation	scr	review.openstack.org_openstack/volume-api
glance	its	https://bugs.launchpad.net/glance
glance	scm	git://git.openstack.org/openstack/glance_store
glance	scm	https://github.com/openstack/glance.git
glance	scr	review.openstack.org_openstack/glance
glance	scr	review.openstack.org_openstack/glance_store
heat	its	https://bugs.launchpad.net/heat
heat	scm	git://git.openstack.org/openstack/heat-translator
heat	scm	https://github.com/openstack/heat.git
heat	scr	review.openstack.org_openstack/heat
heat	scr	review.openstack.org_openstack/heat-translator
horizon	its	https://bugs.launchpad.net/horizon
horizon	scm	https://github.com/openstack/horizon.git
horizon	scr	review.openstack.org_openstack/horizon
Infrastructure	its	https://bugs.launchpad.net/openstack-ci
Infrastructure	scm	git://git.openstack.org/openstack-dev/openstack-nose
Infrastructure	scm	git://git.openstack.org/openstack-infra/activity-board
Infrastructure	scm	git://git.openstack.org/openstack-infra/elastic-recheck
Infrastructure	scm	git://git.openstack.org/openstack-infra/groups
Infrastructure	scm	git://git.openstack.org/openstack-infra/irc-meetings
Infrastructure	scm	git://git.openstack.org/openstack-infra/nodepool
Infrastructure	scm	git://git.openstack.org/openstack-infra/odsreg
Infrastructure	scm	git://git.openstack.org/openstack-infra/os-loganalyze
Infrastructure	scm	git://git.openstack.org/openstack-infra/project-config
Infrastructure	scm	git://git.openstack.org/openstack-infra/storyboard
Infrastructure	scm	git://git.openstack.org/openstack-infra/storyboard-webclient
Infrastructure	scm	git://git.openstack.org/openstack-infra/subunit2sql
Infrastructure	scm	git://git.openstack.org/openstack-infra/tripleo-ci
Infrastructure	scm	git://git.openstack.org/openstack-infra/zuul-packaging
Infrastructure	scm	https://github.com/openstack-infra/askbot-theme.git
Infrastructure	scm	https://github.com/openstack-infra/config.git
Infrastructure	scm	https://github.com/openstack-infra/devstack-gate.git
Infrastructure	scm	https://github.com/openstack-infra/gear.git
Infrastructure	scm	https://github.com/openstack-infra/gearman-plugin.git
Infrastructure	scm	https://github.com/openstack-infra/gerritbot.git
Infrastructure	scm	https://github.com/openstack-infra/gerritlib.git

Infrastructure	scm	https://github.com/openstack-infra/git-review.git
Infrastructure	scm	https://github.com/openstack-infra/jeepyb.git
Infrastructure	scm	https://github.com/openstack-infra/jenkins-job-builder.git
Infrastructure	scm	https://github.com/openstack-infra/nose-html-output.git
Infrastructure	scm	https://github.com/openstack-infra/releasestatus.git
Infrastructure	scm	https://github.com/openstack-infra/reviewday.git
Infrastructure	scm	https://github.com/openstack-infra/statusbot.git
Infrastructure	scm	https://github.com/openstack-infra/zmq-event-publisher.git
Infrastructure	scm	https://github.com/openstack-infra/zuul.git
Infrastructure	scm	https://github.com/openstack/openstack-planet.git
Infrastructure	scr	review.openstack.org_openstack-dev/openstack-nose
Infrastructure	scr	review.openstack.org_openstack-infra/askbot-theme
Infrastructure	scr	review.openstack.org_openstack-infra/config
Infrastructure	scr	review.openstack.org_openstack-infra/devstack-gate
Infrastructure	scr	review.openstack.org_openstack-infra/gear
Infrastructure	scr	review.openstack.org_openstack-infra/gearman-plugin
Infrastructure	scr	review.openstack.org_openstack-infra/gerrit
Infrastructure	scr	review.openstack.org_openstack-infra/gerritbot
Infrastructure	scr	review.openstack.org_openstack-infra/gerritlib
Infrastructure	scr	review.openstack.org_openstack-infra/git-review
Infrastructure	scr	review.openstack.org_openstack-infra/gitdm
Infrastructure	scr	review.openstack.org_openstack-infra/irc-meetings
Infrastructure	scr	review.openstack.org_openstack-infra/jeepyb
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Infrastructure	scr	review.openstack.org_openstack-infra/odsreg
Infrastructure	scr	review.openstack.org_openstack-infra/project-config
Infrastructure	scr	review.openstack.org_openstack-infra/publications
Infrastructure	scr	review.openstack.org_openstack-infra/puppet-apparmor
Infrastructure	scr	review.openstack.org_openstack-infra/puppet-dashboard
Infrastructure	scr	review.openstack.org_openstack-infra/puppet-vcsrepo
Infrastructure	scr	review.openstack.org_openstack-infra/pypi-mirror
Infrastructure	scr	review.openstack.org_openstack-infra/releasestatus
Infrastructure	scr	review.openstack.org_openstack-infra/reviewday
Infrastructure	scr	review.openstack.org_openstack-infra/statusbot
Infrastructure	scr	review.openstack.org_openstack-infra/subunit2sql
Infrastructure	scr	review.openstack.org_openstack-infra/zmq-event-publisher

Infrastructure	scr	review.openstack.org_openstack-infra/zuul
Infrastructure	scr	review.openstack.org_openstack/planet
ironic	its	https://bugs.launchpad.net/ironic
ironic	scm	git://git.openstack.org/openstack/ironic-python-agent
ironic	scm	https://github.com/openstack/ironic.git
ironic	scr	review.openstack.org_openstack/ironic
ironic	scr	review.openstack.org_openstack/ironic-python-agent
keystone	its	https://bugs.launchpad.net/keystone
keystone	scm	git://git.openstack.org/openstack/keystonemiddleware
keystone	scm	git://git.openstack.org/openstack/keystonemiddleware
keystone	scm	git://git.openstack.org/openstack/python-keystoneclient-federation
keystone	scm	git://git.openstack.org/openstack/python-keystoneclient-kerberos
keystone	scm	https://github.com/openstack/keystone.git
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keystone	scr	review.openstack.org_openstack/keystonemiddleware
keystone	scr	review.openstack.org_openstack/python-keystoneclient-federation
keystone	scr	review.openstack.org_openstack/python-keystoneclient-kerberos
manila	its	https://bugs.launchpad.net/manila
manila	scm	git://git.openstack.org/openstack/manila
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neutron	its	https://bugs.launchpad.net/neutron
neutron	scm	git://git.openstack.org/openstack/neutron-fwaas
neutron	scm	git://git.openstack.org/openstack/neutron-lbaas
neutron	scm	git://git.openstack.org/openstack/neutron-vpnaas
neutron	scm	https://github.com/openstack/neutron.git
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neutron	scr	review.openstack.org_openstack/neutron-fwaas
neutron	scr	review.openstack.org_openstack/neutron-lbaas
neutron	scr	review.openstack.org_openstack/neutron-vpnaas
nova	its	https://bugs.launchpad.net/nova
nova	scm	https://github.com/openstack/nova.git
nova	scr	review.openstack.org_openstack/nova
others	its	https://bugs.launchpad.net/django-openstack-auth
others	its	https://bugs.launchpad.net/heat-cfnutils
others	its	https://bugs.launchpad.net/heat-templates
others	its	https://bugs.launchpad.net/swift-bench

others	its	https://bugs.launchpad.net/tuskar-ui
others	scm	git://git.openstack.org/openstack/django_openstack_auth
others	scm	git://git.openstack.org/openstack/heat-cfnutils
others	scm	git://git.openstack.org/openstack/sahara-dashboard
others	scm	git://git.openstack.org/openstack/sahara-extra
others	scm	git://git.openstack.org/openstack/sahara-image-elements
others	scm	git://git.openstack.org/openstack/swift-bench
others	scm	git://git.openstack.org/openstack/trove-integration
others	scm	git://git.openstack.org/openstack/tuskar-ui
others	scr	review.openstack.org_openstack/heat-cfnutils
others	scr	review.openstack.org_openstack/heat-templates
others	scr	review.openstack.org_openstack/sahara-dashboard
others	scr	review.openstack.org_openstack/sahara-extra
others	scr	review.openstack.org_openstack/sahara-image-elements
others	scr	review.openstack.org_openstack/trove-integration
Quality Assurance	its	https://bugs.launchpad.net/devstack
Quality Assurance	its	https://bugs.launchpad.net/tempest
Quality Assurance	scm	git://git.openstack.org/openstack-dev/devstack
Quality Assurance	scm	git://git.openstack.org/openstack-dev/grenade
Quality Assurance	scm	git://git.openstack.org/openstack/tempest-lib
Quality Assurance	scm	https://github.com/openstack/tempest.git
Quality Assurance	scr	review.openstack.org_openstack-dev/devstack
Quality Assurance	scr	review.openstack.org_openstack-dev/grenade
Quality Assurance	scr	review.openstack.org_openstack/tempest
Quality Assurance	scr	review.openstack.org_openstack/tempest-lib
Release cycle management	scm	git://git.openstack.org/openstack-infra/release-tools
Release cycle management	scm	git://git.openstack.org/openstack/requirements
Release cycle management	scr	review.openstack.org_openstack/requirements
sahara	its	https://bugs.launchpad.net/sahara
sahara	scm	git://git.openstack.org/openstack/sahara
sahara	scr	review.openstack.org_openstack/sahara
swift	its	https://bugs.launchpad.net/swift
swift	scm	https://github.com/openstack/swift.git
swift	scr	review.openstack.org_openstack/swift
trove	its	https://bugs.launchpad.net/trove
trove	scm	https://github.com/openstack/trove.git
trove	scr	review.openstack.org_openstack/trove

zaqar	its	https://bugs.launchpad.net/zaqar
zaqar	scm	git://git.openstack.org/openstack/zaqar
zaqar	scr	review.openstack.org_openstack/zaqar