2023 ROS Metrics Report

Katherine Scott & Tully Foote

ROS™

Contents

- ROS.org Metrics
- External Website Metrics
- Distro Metrics
- Code & Academic Metrics

1.

ROS.org Metrics

ROS community websites that are hosted by the OSRF and support our open source community.

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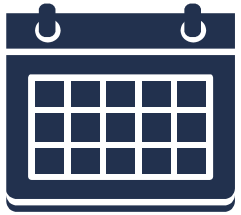

ROS.org Metrics

- We usually use October as our benchmark month for ROS data.
- Some metrics use the most recent data available.
- Where possible we show annual data and year over year data.

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A Note on Website Metrics

- In April of 2023 Google Analytics, our primary website analytics platform, had a major upgrade to a system called “Google Analytics 4”, or “GA4”.
- The new and old versions of Google Analytics are not compatible, and direct comparisons between data stored in each system are difficult. We’ve included the GA4 metrics and where possible tried to compare the year on year changes.

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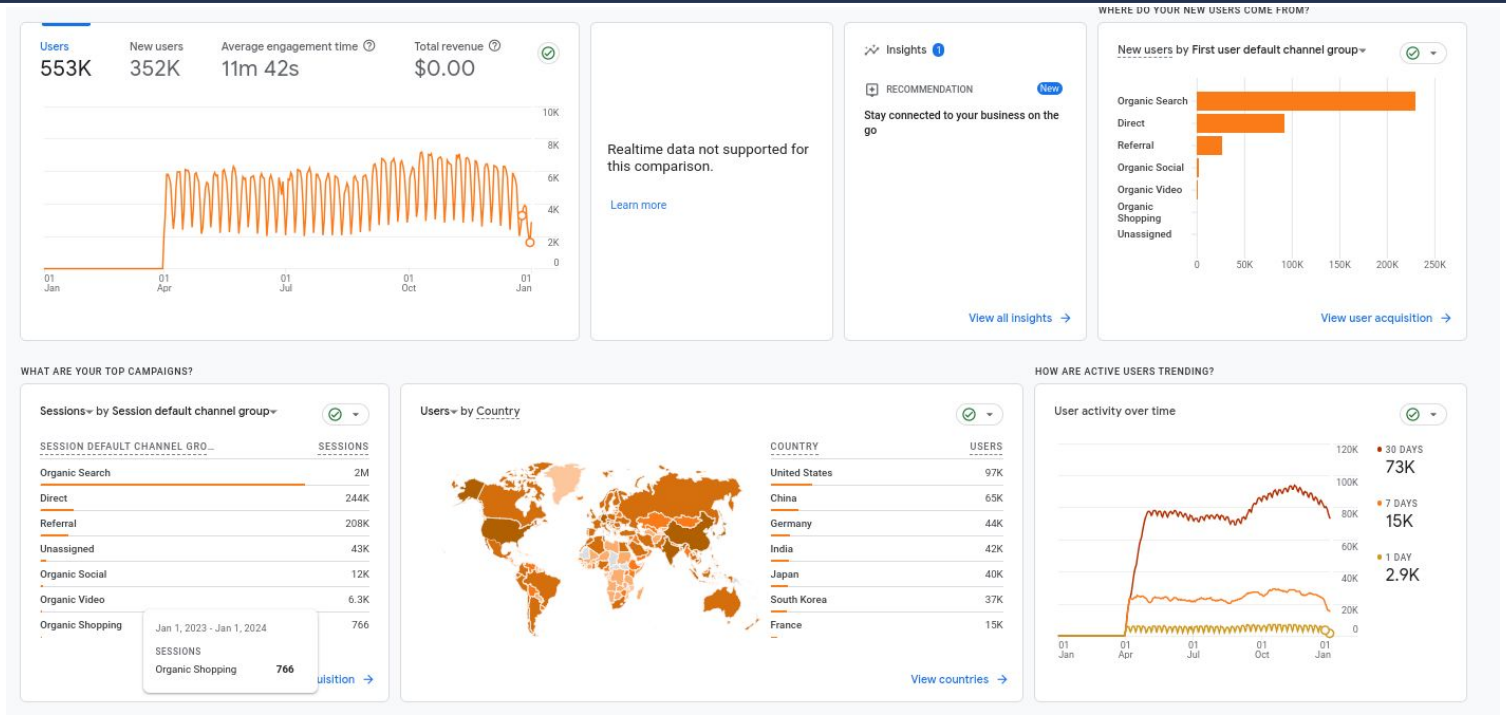

docs.ros.org

Google Analytics 4 results for 2023

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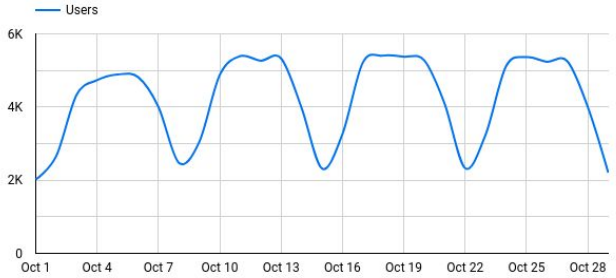

	UA DATE	users
1.	Oct 1, 2022	2,018
2.	Oct 2, 2022	2,656
3.	Oct 3, 2022	4,334
4.	Oct 4, 2022	4,733
5.	Oct 5, 2022	4,888
6.	Oct 6, 2022	4,820
7.	Oct 7, 2022	4,004
8.	Oct 8, 2022	2,476
	Grand total	**65,294**

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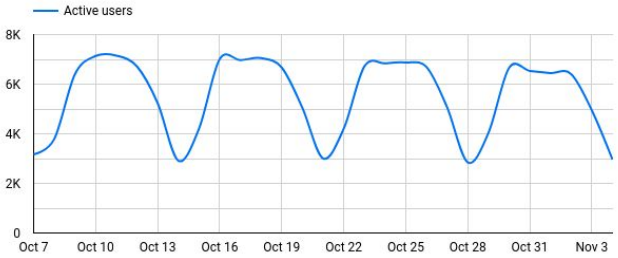
Users
65,294



	G4 DATE	Active users
1.	Nov 4, 2023	2,960
2.	Nov 3, 2023	4,948
3.	Nov 2, 2023	6,409
4.	Nov 1, 2023	6,452
5.	Oct 31, 2023	6,536
6.	Oct 30, 2023	6,661
7.	Oct 29, 2023	4,035
	Grand total	**87,683**

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Active users
87,683

docs.ros.org

ROS 2 documentation users increased by **34.29%**

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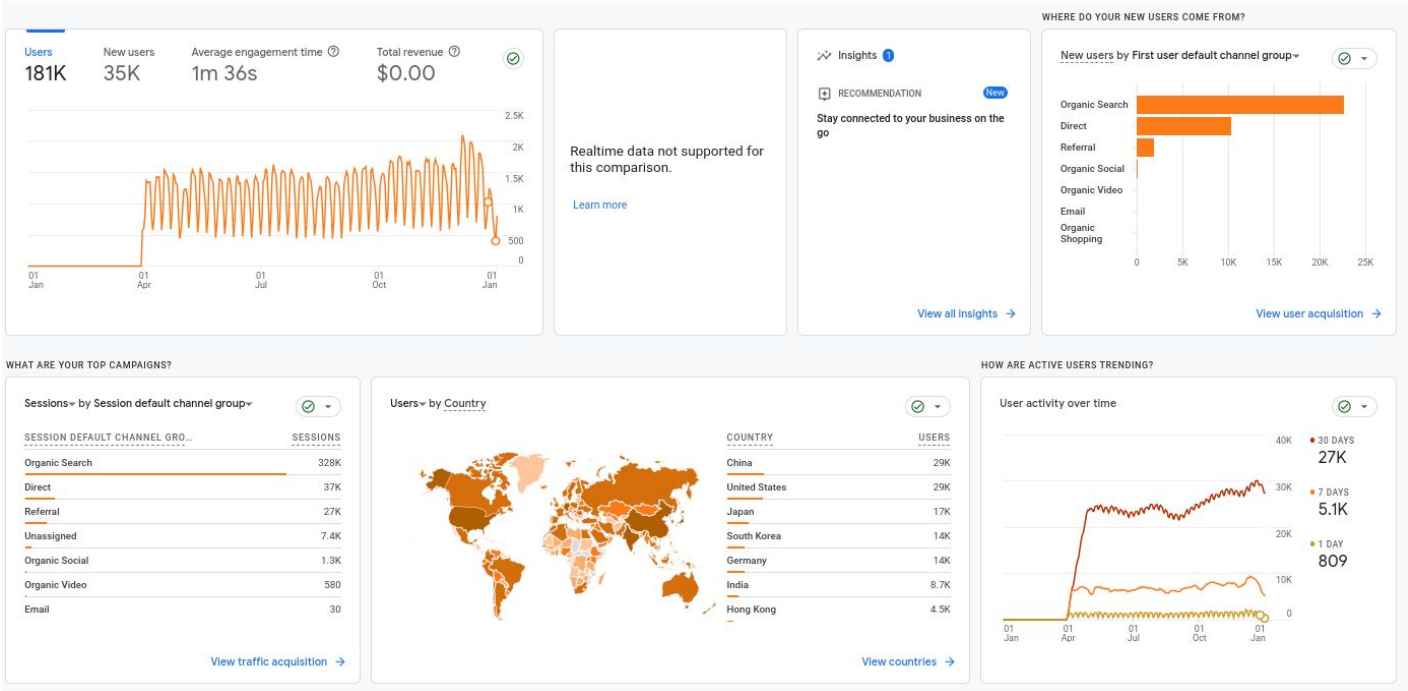

index.ros.org

Google Analytics Results for 2023

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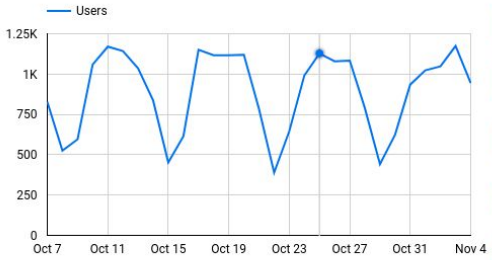

	Date	Users
1.	Oct 7, 2022	828
2.	Oct 8, 2022	525
3.	Oct 9, 2022	595
4.	Oct 10, 2022	1,059
5.	Oct 11, 2022	1,170
6.	Oct 12, 2022	1,143
7.	Oct 13, 2022	1,036
8.	Oct 14, 2022	836

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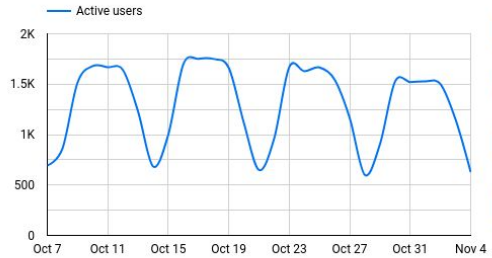
Users
18,926
No data



	G4 DATE	Active users
1.	Oct 6, 2023	1,258
2.	Oct 7, 2023	694
3.	Oct 8, 2023	860
4.	Oct 9, 2023	1,515
5.	Oct 10, 2023	1,680
6.	Oct 11, 2023	1,669
7.	Oct 12, 2023	1,641
	Grand total	26,516

1 - 29 / 29

Active users
26,184

index.ros.org

ROS Index users increased by **38.35%**

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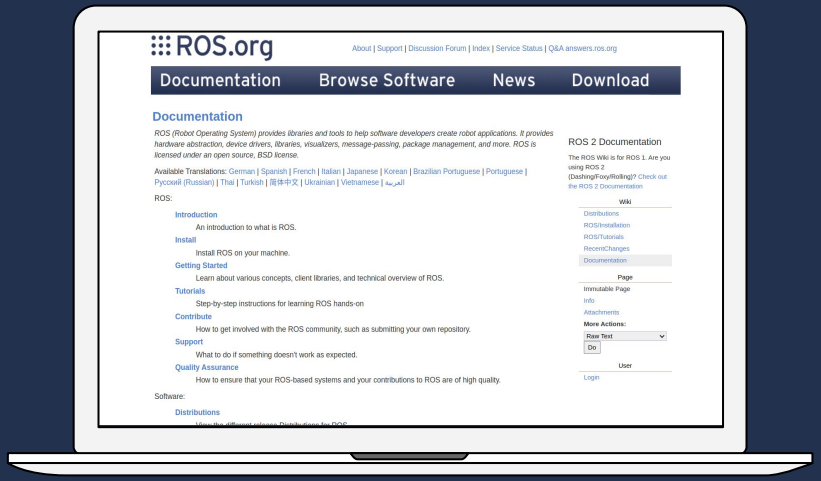
ROS Wiki

Knowledge base for ROS 1 information



16,769 Wiki Pages

As of 1/08/2024. -5.9% since 1/28/2022

3.6 Wiki Edits Per Day

As of July 2023 vs 7.5 in July 2022, -52%

10M+ Page Views in 2023

Due to Google Analytics changes we only have data from April 1st, 2023 until the end of the year

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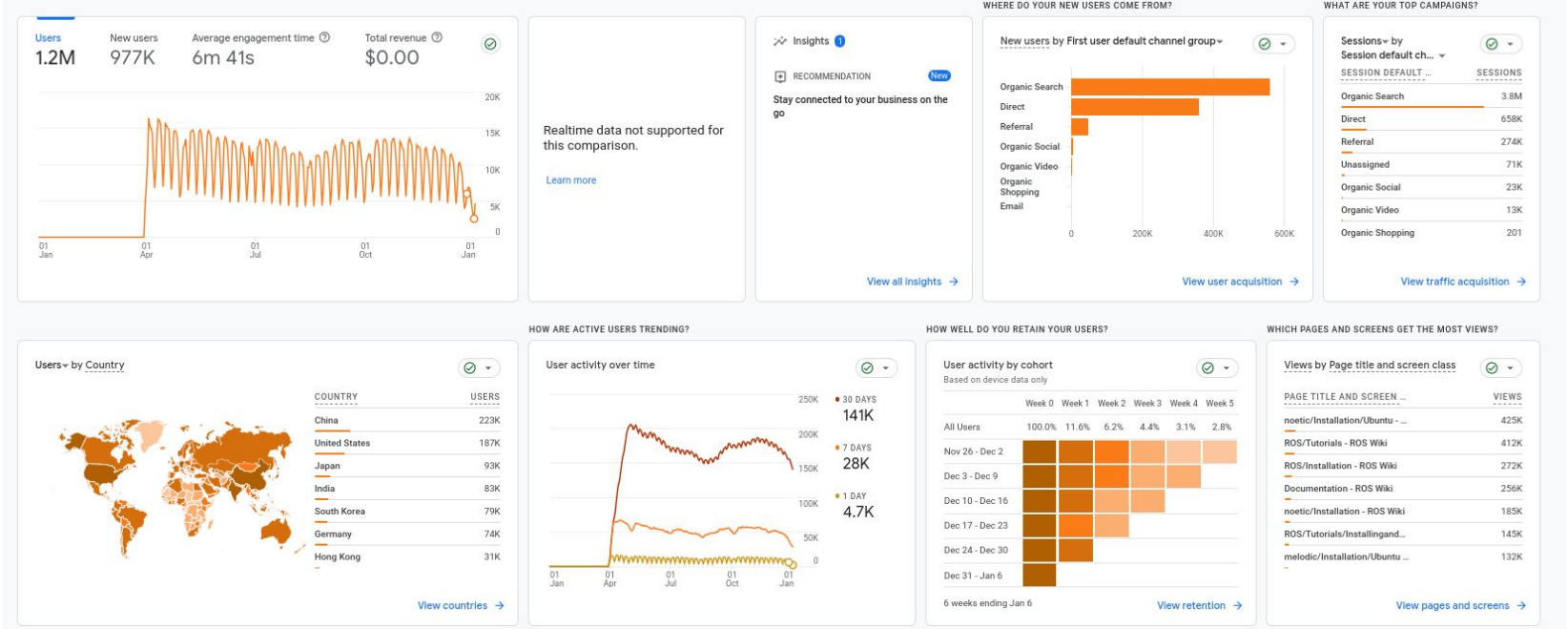

wiki.ros.org

Google Analytics 4 results for April until December 2023

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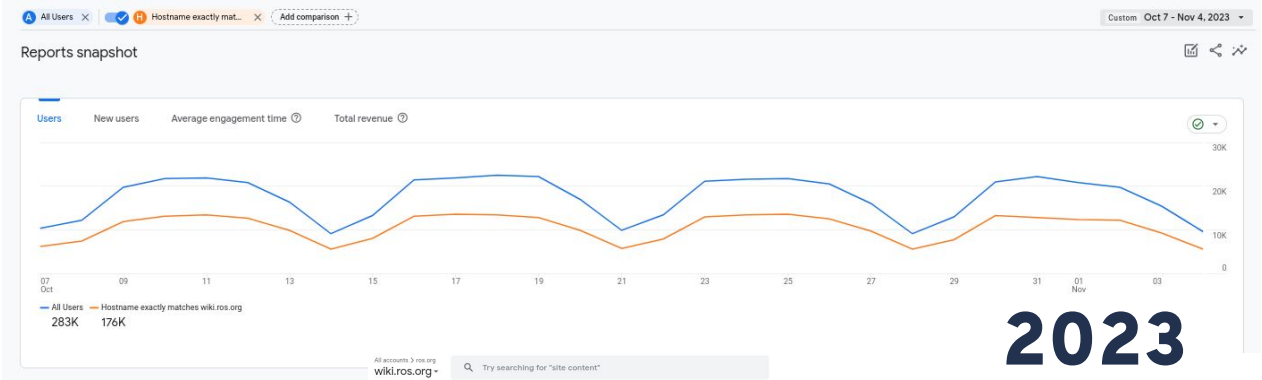

2023

2022

wiki.ros.org

Due to discrepancies between GA4 and Google Analytics we cannot report the change in viewership between 2022 and 2023

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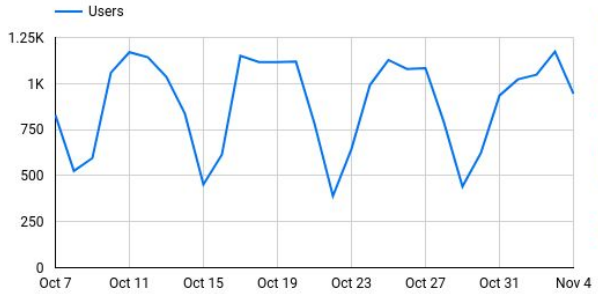

	Date	Users	Users
1.	Oct 7, 2022	828	828
2.	Oct 8, 2022	525	525
3.	Oct 9, 2022	595	595
4.	Oct 10, 2022	1,059	1,059
5.	Oct 11, 2022	1,170	1,170
6.	Oct 12, 2022	1,143	1,143
7.	Oct 13, 2022	1,036	1,036
	Grand total	18,926	18,926

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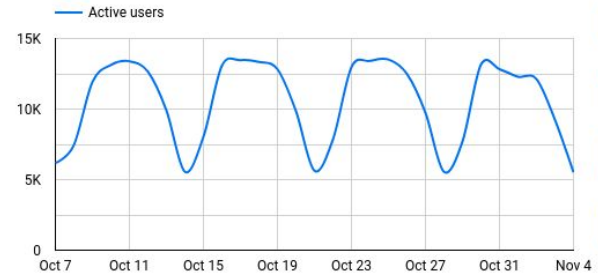
Users
18,926
No data



	G4 DATE	Active users
1.	Oct 25, 2023	13,517
2.	Oct 17, 2023	13,464
3.	Oct 24, 2023	13,415
4.	Oct 11, 2023	13,391
5.	Oct 18, 2023	13,342
6.	Oct 30, 2023	13,158
7.	Oct 10, 2023	13,127
	Grand total	178,380

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Active users
176,491

wiki.ros.org

Due to discrepancies between GA4 and Google Analytics we can not report the change in viewership between 2022 and 2023

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wiki.ros.org

Traffic volume by country

	Country	Users	New users
		178,380 62.48% of total	102,471 48.37% of total
1	China	29,232	17,705
2	United States	29,045	15,770
3	Japan	14,241	7,171
4	India	11,916	6,782
5	Germany	11,702	6,169
6	South Korea	10,909	5,870
7	United Kingdom	4,953	2,869
8	Hong Kong	4,591	2,043
9	Taiwan	4,237	2,222
10	Singapore	4,048	1,953
11	Italy	3,999	2,184
12	Russia	3,934	2,358
13	France	3,843	2,043
14	Canada	3,746	2,069
15	Türkiye	3,473	2,107
16	Spain	3,075	1,517
17	Australia	2,480	1,240
18	Vietnam	2,353	1,311
19	Brazil	2,055	1,052
20	Netherlands	1,994	994

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Public Wiki Mirrors Not Included

Asia

Singapore, China, Tokyo, Japan, Ho Chi Minh, Vietnam

Europe

Ireland, Freiburg, Germany, Barcelona, Catalonia

North America

College Park, Maryland, Saint Louis, Massachusetts, Potsdam, New York

South America

Sao Paulo, Brazil

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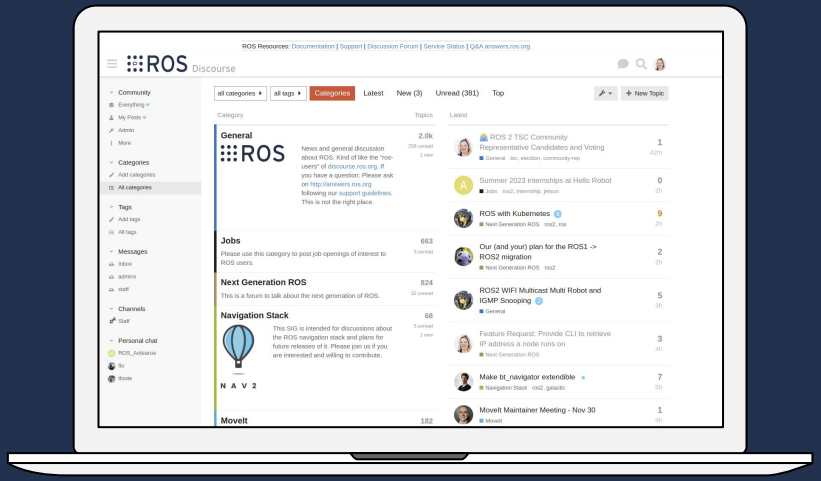
ROS Discourse

ROS Community Discussion Forum



ROS Discourse User Metrics

2022-12-12

	Last 24 hours	Last 7 days	Last 30 days	All Time
Topics	3	22	103	7.1k
Posts	18	166	917	64.6k
Sign-Ups	3	37	172	8.3k
Active Users	200	501	930	—
Likes	14	139	653	37.5k
Chat Messages	3	10	41	216

2024-01-04

	24 hours	7 days	30 days	All time
Topics	8	28	82	8.3k
Posts	71	224	913	76.9k
Sign-ups	21	59	238	9.8k
Active users	224	472	1.0k	—
Likes	23	89	460	44.9k
Chat messages	0	1	34	1.0k

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ROS Discourse

	Dec 2022	Jan 2024	Change
Total Topics	**7,100**	**8,300**	**+16.9%**
Total Posts	**64,600**	**76,900**	**+19.0%**
Active Users	**930**	**1000**	**+7.5%**
Total Likes	**37,500**	**44,900**	**+19.7%**

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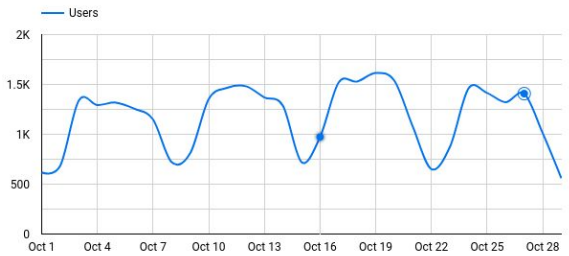

	UA DATE	users
1.	Oct 1, 2022	618
2.	Oct 2, 2022	685
3.	Oct 3, 2022	1,339
4.	Oct 4, 2022	1,294
5.	Oct 5, 2022	1,318
6.	Oct 6, 2022	1,256
7.	Oct 7, 2022	1,149
8.	Oct 8, 2022	721
	Grand total	**24,539**

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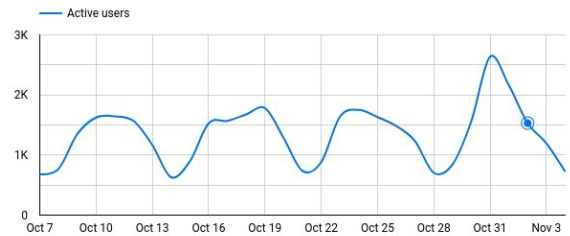
Users
24,539



	G4 DATE	Active users
1.	Oct 6, 2023	1,198
2.	Oct 7, 2023	681
3.	Oct 8, 2023	769
4.	Oct 9, 2023	1,350
5.	Oct 10, 2023	1,624
6.	Oct 11, 2023	1,645
7.	Oct 12, 2023	1,567
	Grand total	**29,023**

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Active users
29,023

discourse.ros.org

According to Google Analytics ROS Discourse users grew by **+18.27%**

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2.

External Website Metrics

The ROS Community can be found participating in numerous communities across the web.

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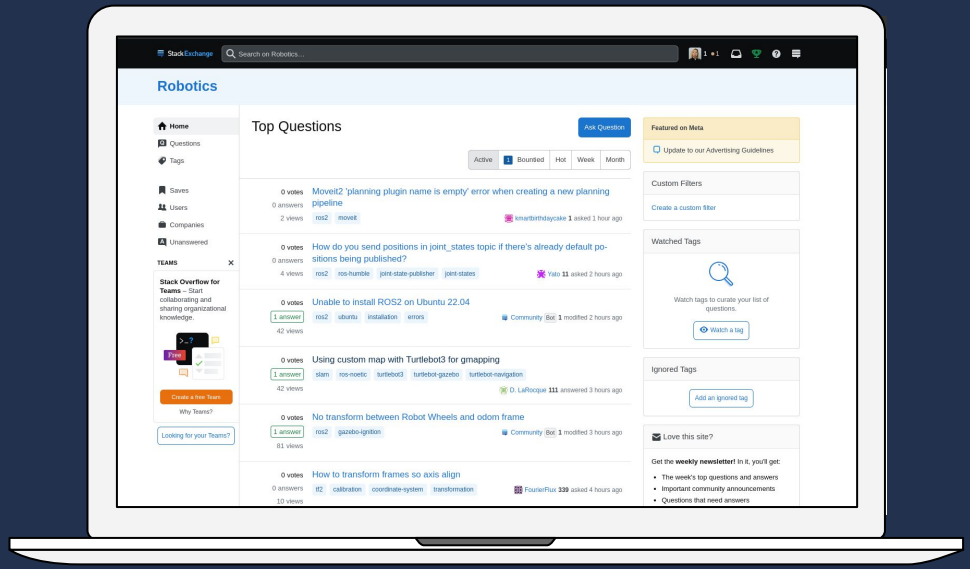
Robotics Stack Exchange

In 2023 we moved from ROS Answers to Robotics Stack Exchange



2836 ROS Questions Asked

On Robotics S.E. in 2023, a +32.9% increase over 2022

86.67% of Question are about ROS 2

2458 questions tagged "ros2" vs 378 tagged "ros"

49.79% of Questions were Answered

In 2023 there were 2836 questions and 2134 answers (*questions can have multiple answers, or not be marked as "Answered"*).*

* RSE bots prune unanswered questions after one year, so this number will change.

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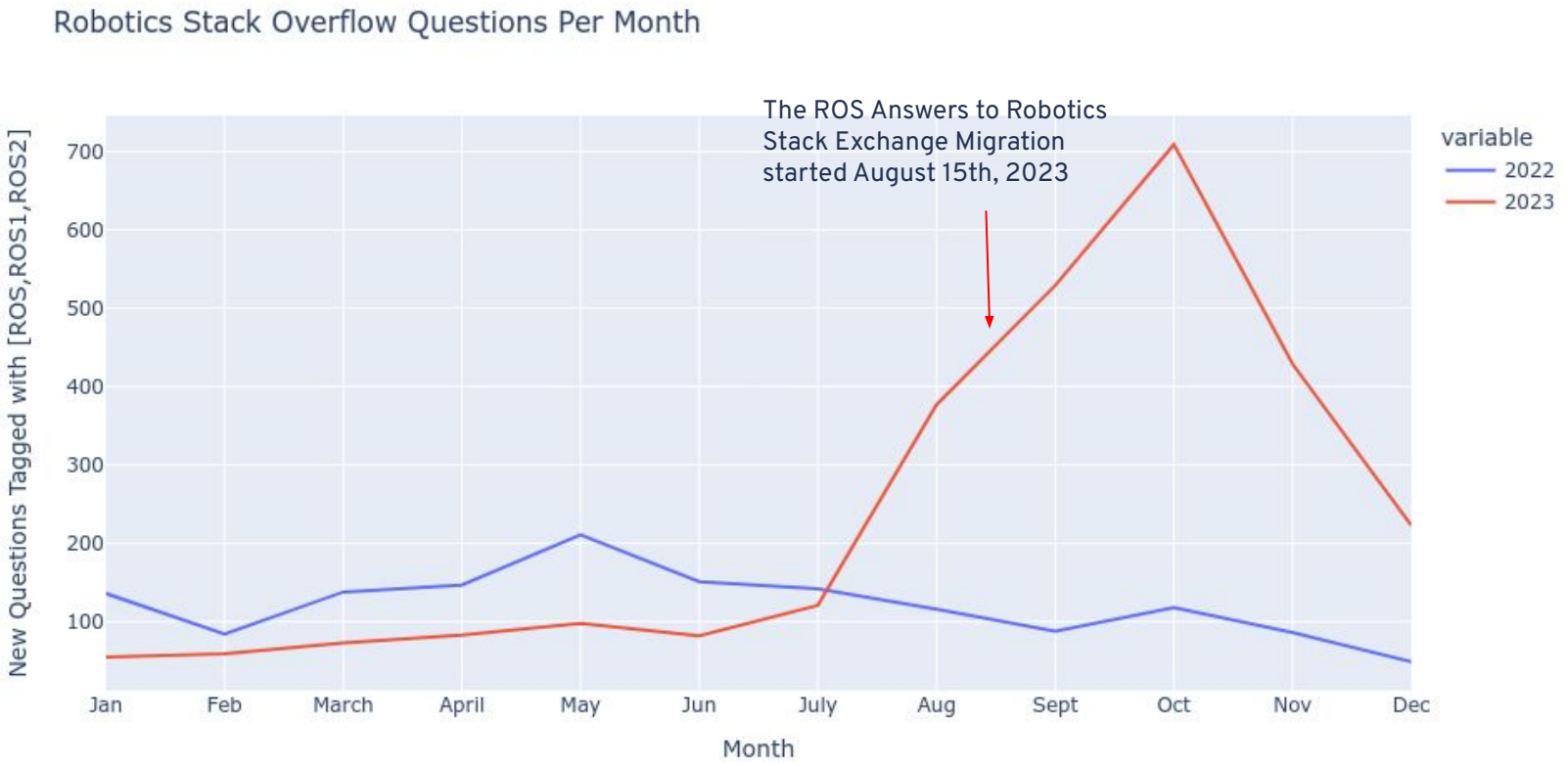
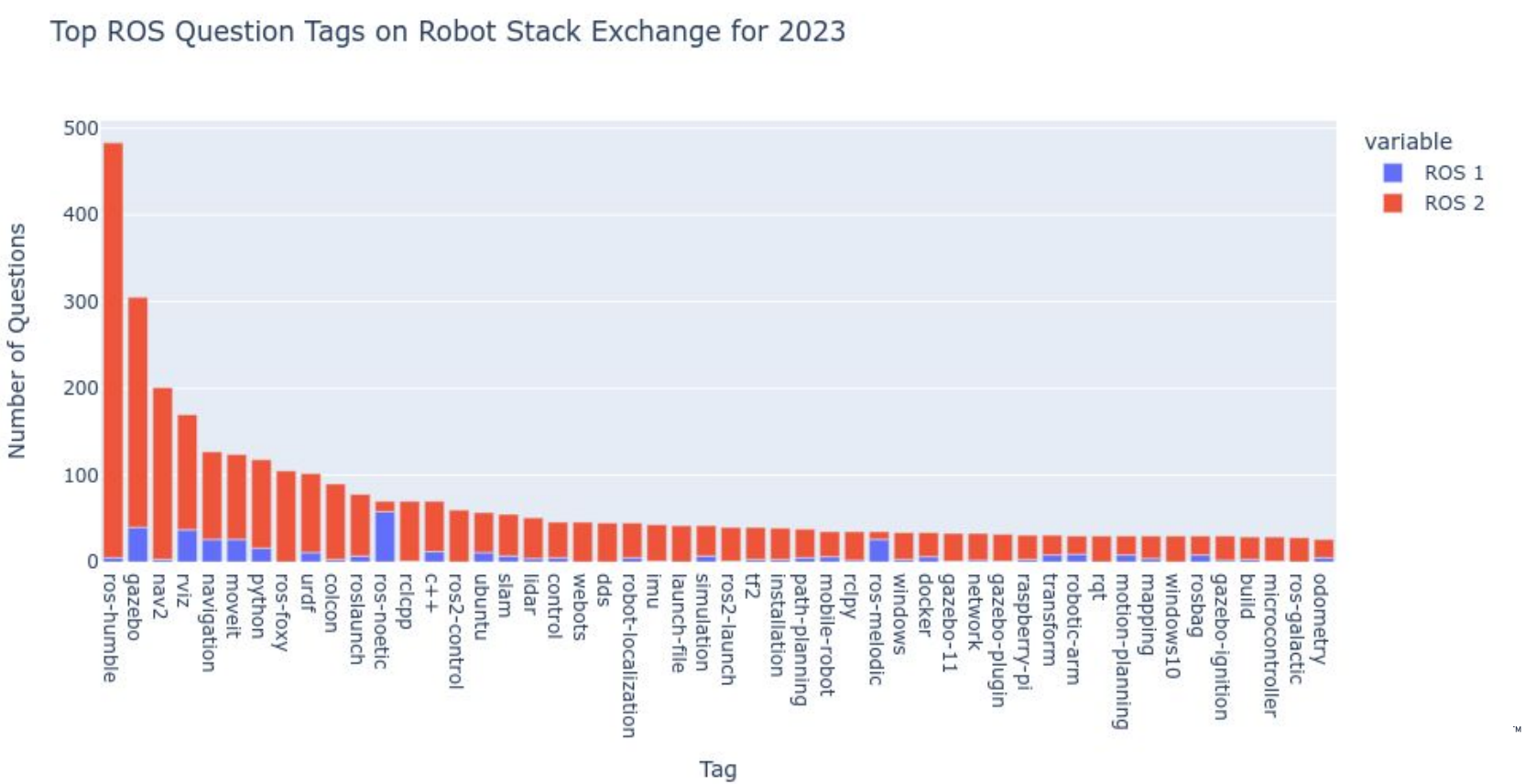
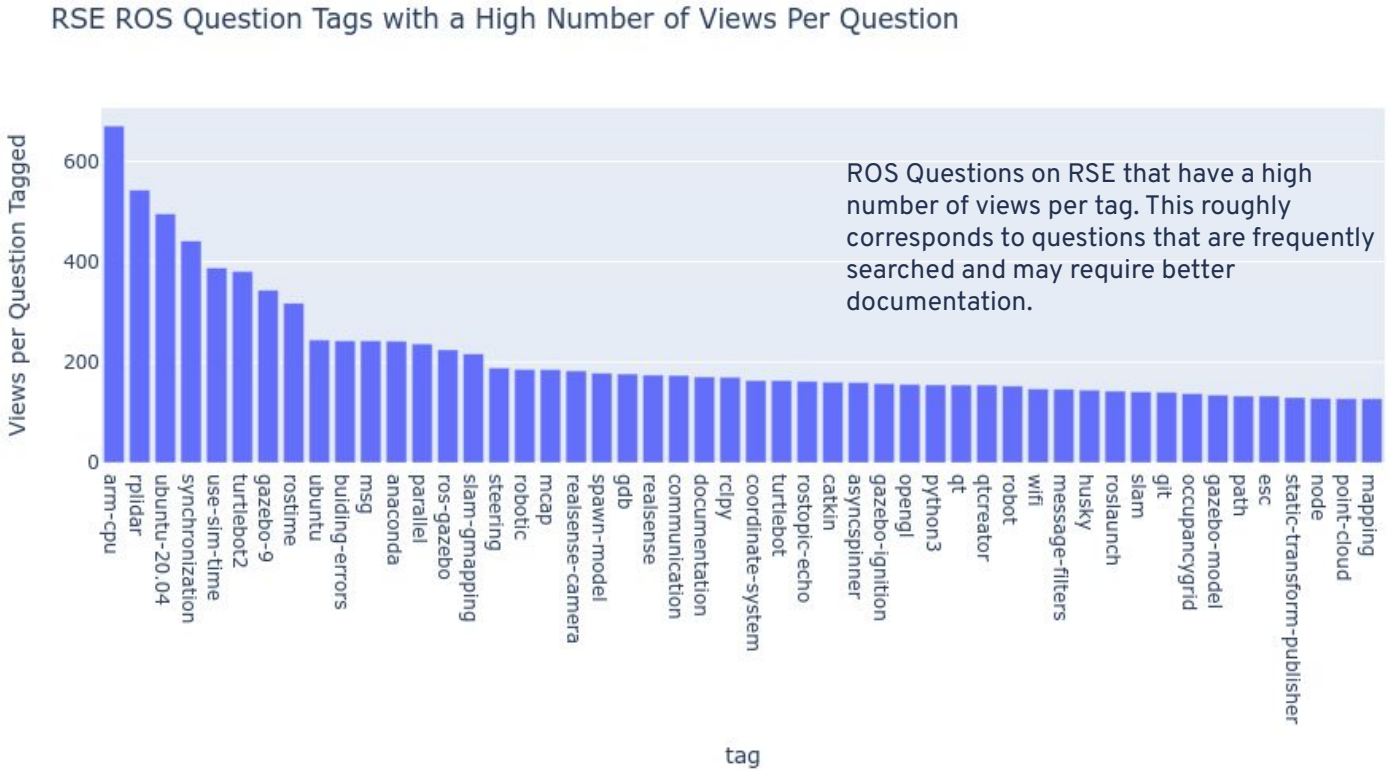

Robotics Stack Overflow Questions Per Month
The ROS Answers to Robotics Stack Exchange Migration started August 15th, 2023
New Questions Tagged with [ROS,ROS1,ROS2]
700
600
500
400
300
200
100
Jan
Feb
March
April
May
Jun
July
Aug
Sept
Oct
Nov
Dec
Month
variable
2022
2023


Top ROS Question Tags on Robot Stack Exchange for 2023
Number of Questions
500
400
300
200
100
0
variable
ROS 1
ROS 2
ros-humble
gazebo
nav2
rviz
navigation
moveit
python
ros-foxy
urdf
colcon
roslaunch
ros-noetic
rclcpp
c++
ros2-control
ubuntu
slam
lidar
control
webots
dds
robot-localization
imu
launch-file
simulation
ros2-launch
tf2
installation
path-planning
mobile-robot
rclpy
ros-melodic
windows
docker
gazebo-11
network
gazebo-plugin
raspberry-pi
transform
robotic-arm
rqt
motion-planning
mapping
windows10
rosbag
gazebo-ignition
build
microcontroller
ros-galactic
odometry
Tag


RSE ROS Question Tags with a High Number of Views Per Question
Views per Question Tagged
0
200
400
600
ROS Questions on RSE that have a high number of views per tag. This roughly corresponds to questions that are frequently searched and may require better documentation.
arm-cpu
rplidar
ubuntu-20.04
synchronization
use-sim-time
turtlebot2
gazebo-9
rostime
ubuntu
buiding-errors
msg
anaconda
parallel
ros-gazebo
slam-gmapping
steering
robotic
rncap
realsense-camera
spawn-model
gdb
realsense
communication
documentation
rclpy
coordinate-system
turtlebot
rostopic-echo
catkin
asyncspinner
gazebo-ignition
opengl
python3
qt
qtcreator
robot
wifi
message-filters
husky
roslaunch
slam
git
occupancygrid
gazebo-model
path
esc
static-transform-publisher
node
point-cloud
mapping
tag

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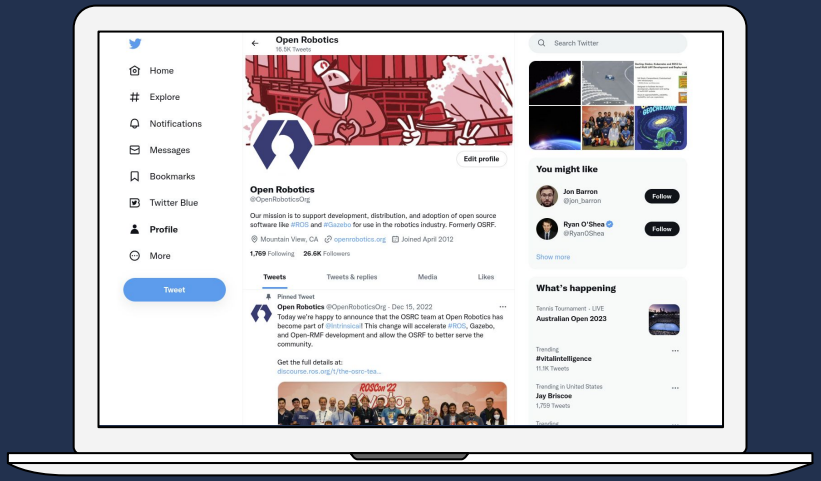
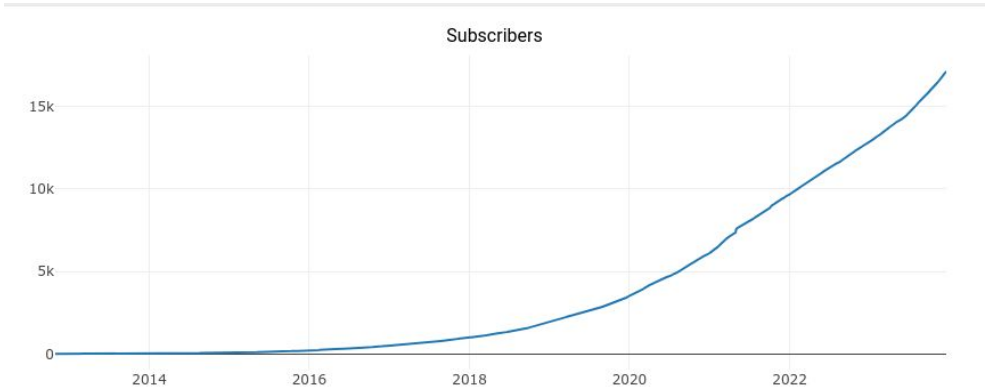
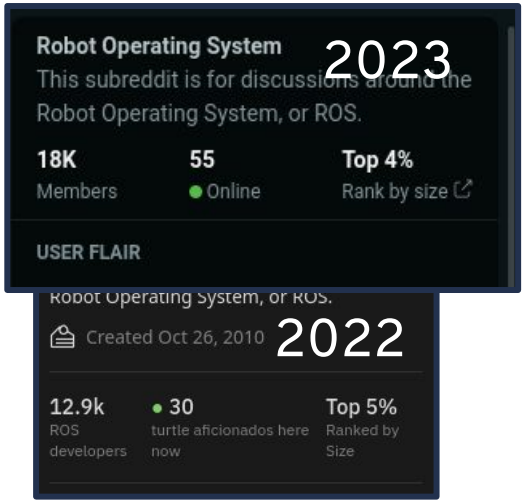
ROS on Social Media

Spreading awareness of the project.







reddit.com/r/ROS

Meeting community where they're at. Taken 1/4/2024. Graph from socialrise.com.

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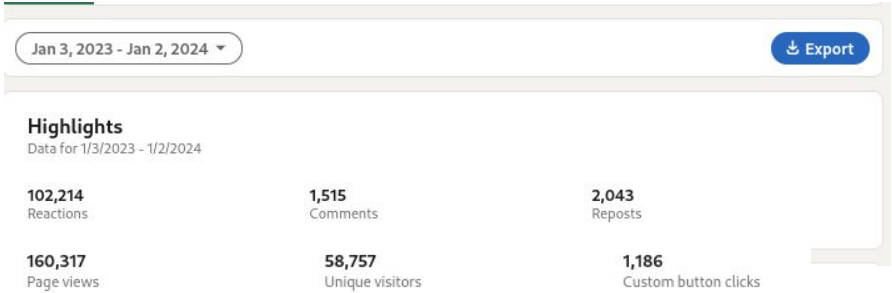
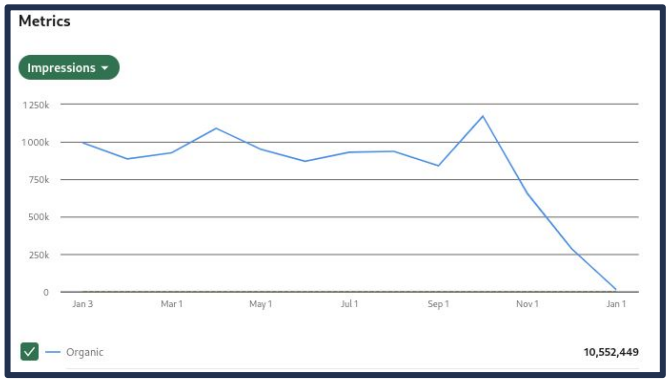
LinkedIn





~112,000 Followers

As of 1/2024. In Dec 2022 it was 70,000. An increase of 60%!

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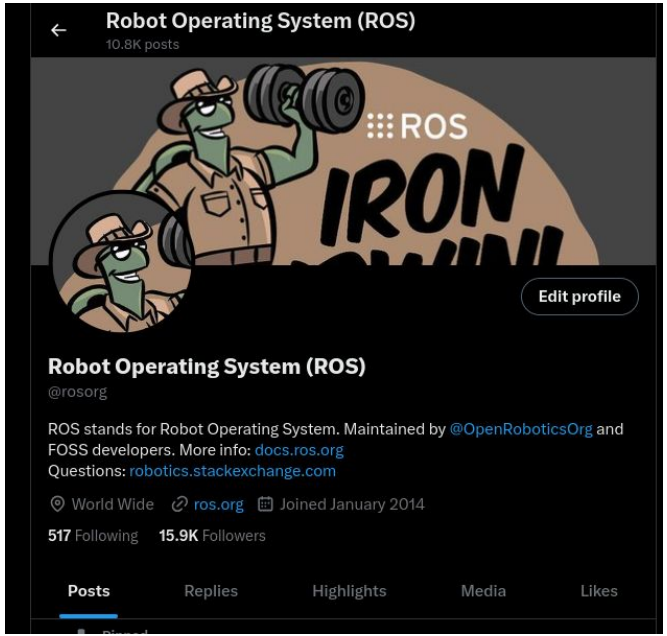
@ROSOrg Twitter



~15,900 Followers

As of January 2024, an increase of 16.9% (in 2023 it was 13,600)

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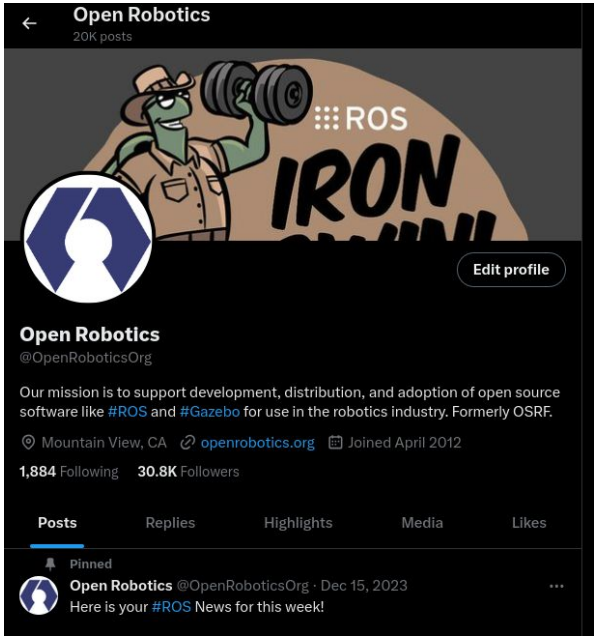
@OpenRobotics Twitter



~30,800 Followers

As of January 2024 an increase of 15.8% (in 2023 it was 26,600)

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3.

Distro, Package, and Download Metrics

What packages, distros, and chip architectures are downloaded most by the ROS community?

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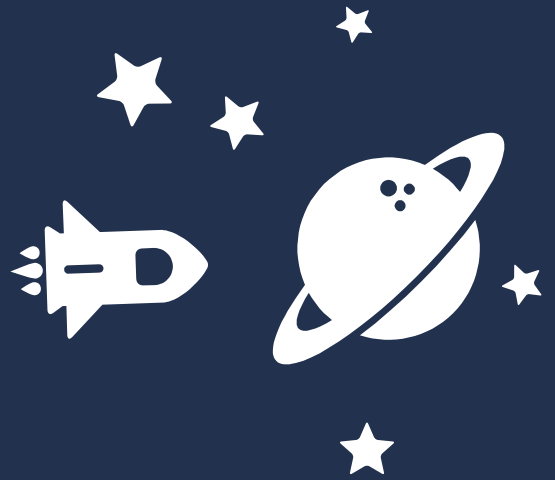
ROS Package Downloads

Every year we sample download data from our servers at Oregon State University.



October 2023

Debs Downloads, Visitors, Packages

	October 2022	October 2023	YoY Change
Total Unique Packages (packages across versions, distros, syncs, etc)	**146,745**	**156,232**	**+6.46**
Different Packages	**23,614**	**26,931**	**+14.05%**
Deb Downloads	**49,078,176**	**48,510,685**	**-1.15%**
Unique Visitors	**838,883**	**845,884**	**+0.83%**

https://awstats.osuosl.org/reports/packages.ros.org/2023/10/awstats.packages.ros.org.html

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2023 Total Debs Downloads, Data, Packages

	2022	2023	YoY Change
Total Packages (packages across versions, distros, rebuilds, syncs, etc)	**434,629**	**391,312**	**-9.97%***
Different Packages	**24,069**	**27,773**	**+15.39%**
Deb Downloads	**501,333,806**	**550,365,601**	**+9.78%**
Data Served (TB)	**173.35**	**165.29**	**-4.65%**

*** The frequency of syncs / updates declined in 2022, accordingly the total number of different packages is slightly lower.**

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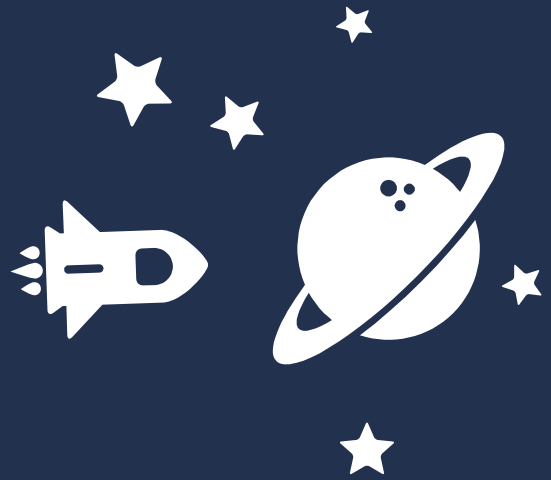

Distro Data

ROS usage data by version

Distros by Year / Percentage

Distro	October 2023	October 2022	YoY Change
Kinetic	1.14%	2.12%	-0.98
Melodic	5.66%	17.19%	-11.53
Noetic	30.51%	34.8%	-4.29
Foxy	6.37%	13.59%	-7.22
Galactic	2.33%	8.12%	-5.79
Humble	32.79%	10.04%	+22.75
Iron	4.97%	0%	+4.97
Rolling	4.82%	3.38%	+1.44

Package downloads, by distro, as a percentage of all downloads from the ROS servers in October of 2022, and 2023.

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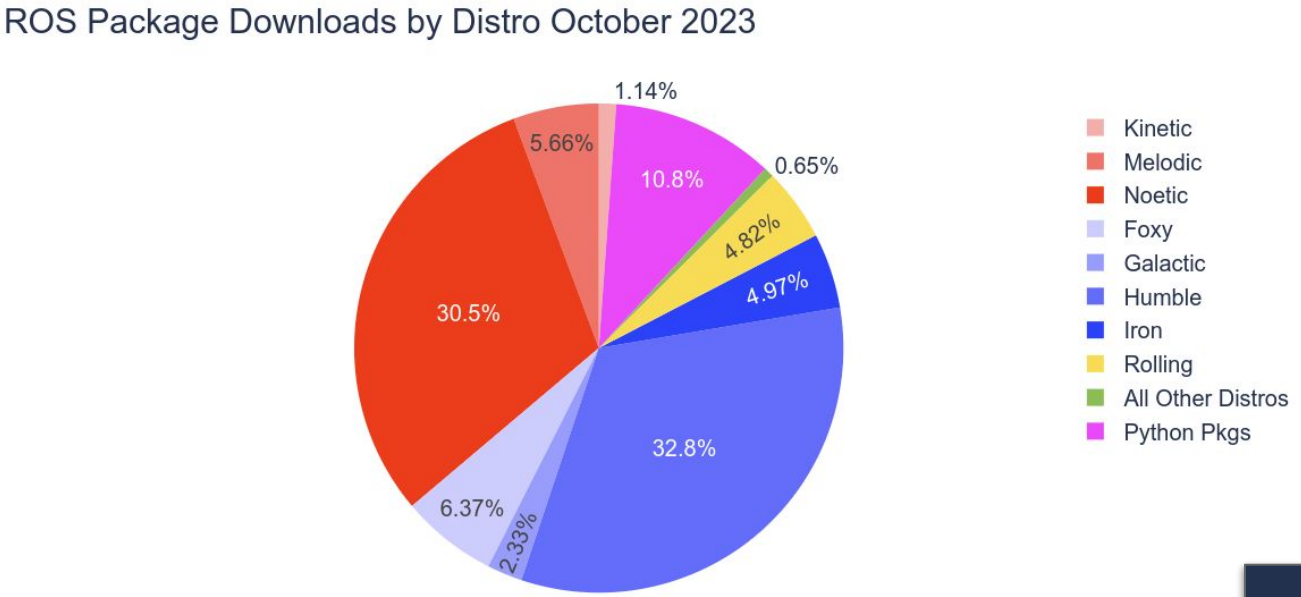
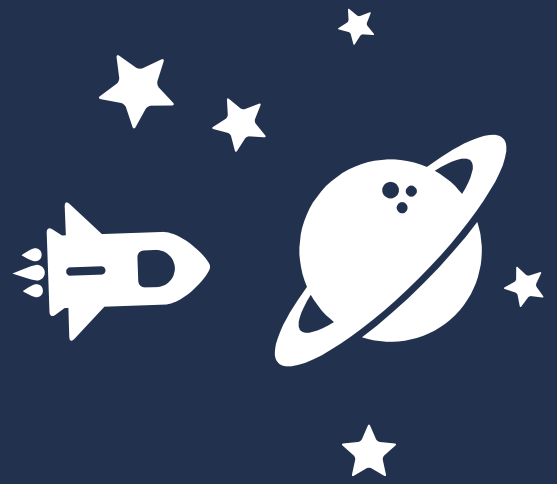
Composition of Distro Downloads



ROS.org metrics only.
Does not include mirrors



ROS by Version

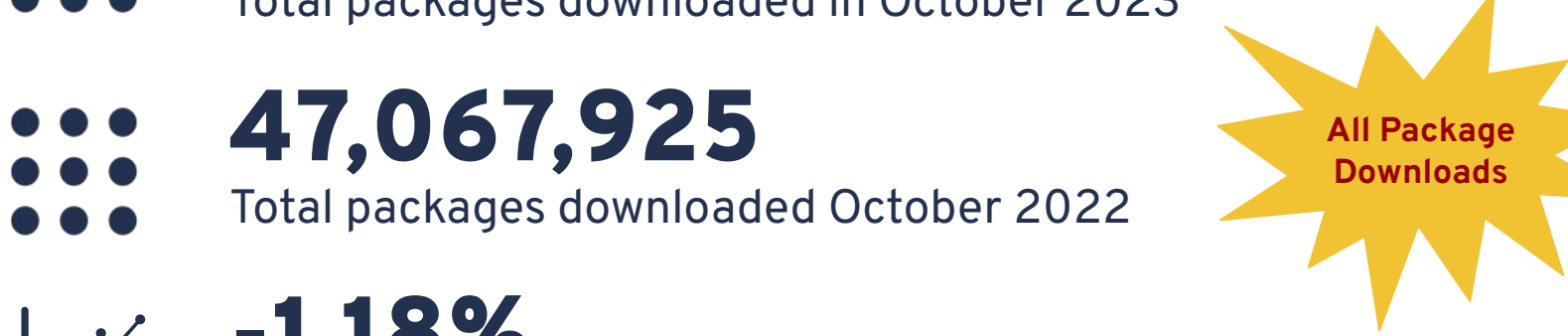
ROS vs ROS 2 downloads and overall downloads.

46,510,788

Total packages downloaded in October 2023

47,067,925

Total packages downloaded October 2022



-1.18%

Decrease in total package downloads for October*

* We believe Docker installs are starting to impact over binary package installs.

550,365,601

Total downloads in all of 2023, **up +9.97% overall**

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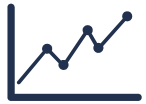
17,720,181

ROS 2 packages downloaded in October 2022

25,057,278

ROS 2 packages downloaded October 2023



+41.41%

Increase in ROS 2 packages downloaded year over year

300,700,000

Estimated number of ROS 2 packages downloaded in all of 2023

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18,232,926

ROS 1 packages downloaded in October 2023

25,057,278

ROS 2 packages downloaded in October 2023

57.88%

Percent of ROS downloads that are ROS 2

+18.05%

Increase in ROS 2 downloads over the previous year!
ROS 2 was 39.82% in October 2022

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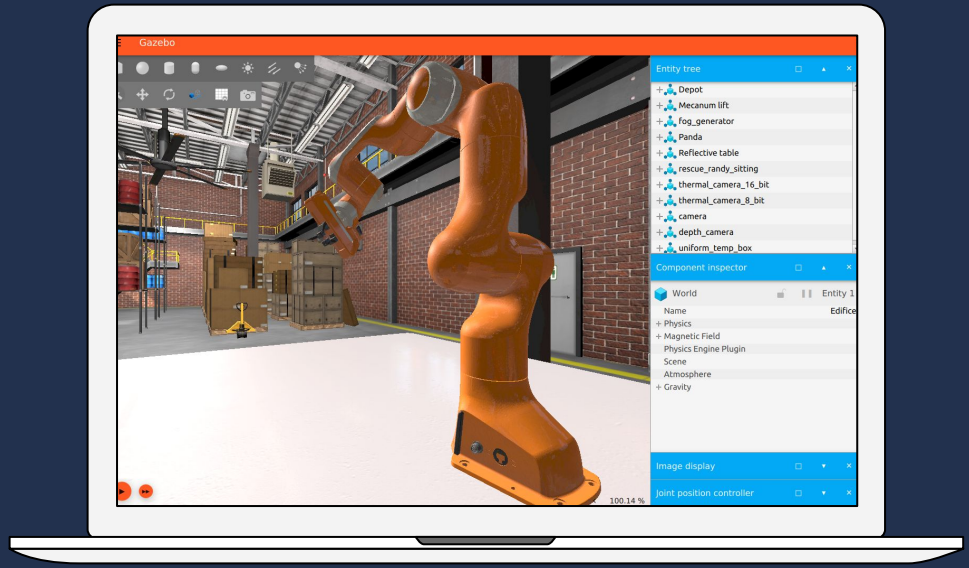
Gazebo Metrics

For 2023 we've calculated some metrics for Gazebo!



Gazebo Considerations

- There are presently two major versions of the Gazebo simulator: Gazebo Classic, denoted by release numbers, and Gazebo, formerly Ignition, denoted by alphabetic release names.
- Gazebo Classic is distributed as a monolithic binary with a handful of supporting libraries. Modern Gazebo consists of dozens of independent binary packages per installation. As such, it is difficult to report an estimated number of installations for each version.
- OSRF hosts Gazebo binaries in two locations: the Oregon State University Open Source Lab (OSU-OSL, packages.ros.org), and the OSRF Amazon Web Services account (packages.osrfoundation.org). We report download data from these servers only. We do not report download data from mirrors and other sources (e.g. upstream Ubuntu).

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1,531,399

Total Gazebo packages downloaded in November 2023

978,293

New Gazebo (Ignition) Packages downloaded in Nov. 2023

63.88%

Percent of Gazebo Downloads that are New Gazebo (Ignition)

~18,380,000

Estimated number of Gazebo downloads in 2023

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Total Gazebo Downloads

	Nov 2022	Nov 2023	Change
OSRF AWS Server	**N/A**	**776,227**	**N/A**
OSU OSL Server	**755,761**	**755,172**	**-0.08%**
Total	**N/A**	**1,531,399**	**N/A**

Gazebo has two primary servers, the OSU OSL (packages.ros.org) server that serve ROS packages like ros-desktop-full, and the OSRF AWS server (packages.osrfoundation.org) that is primarily used for desktop installs of stand-alone Gazebo. We do not have historical data for the OSRF AWS Server.

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Gazebo Downloads By Version (November 2023)

	Gazebo Classic	New Gazebo	Total
OSRF AWS Server	**28,732**	**747,495**	**776,227**
OSU OSL Server	**524,374**	**230,798**	**755,172**
Total	**553,106**	**978,293**	**1,531,399**
Percentage	**36.12%**	**63.88%***	

** Modern Gazebo consists of multiple packages per install. We report the ratio of downloads, not the ratio of installs (i.e New Gazebo does not make up 64% of the community, at least not yet!).*

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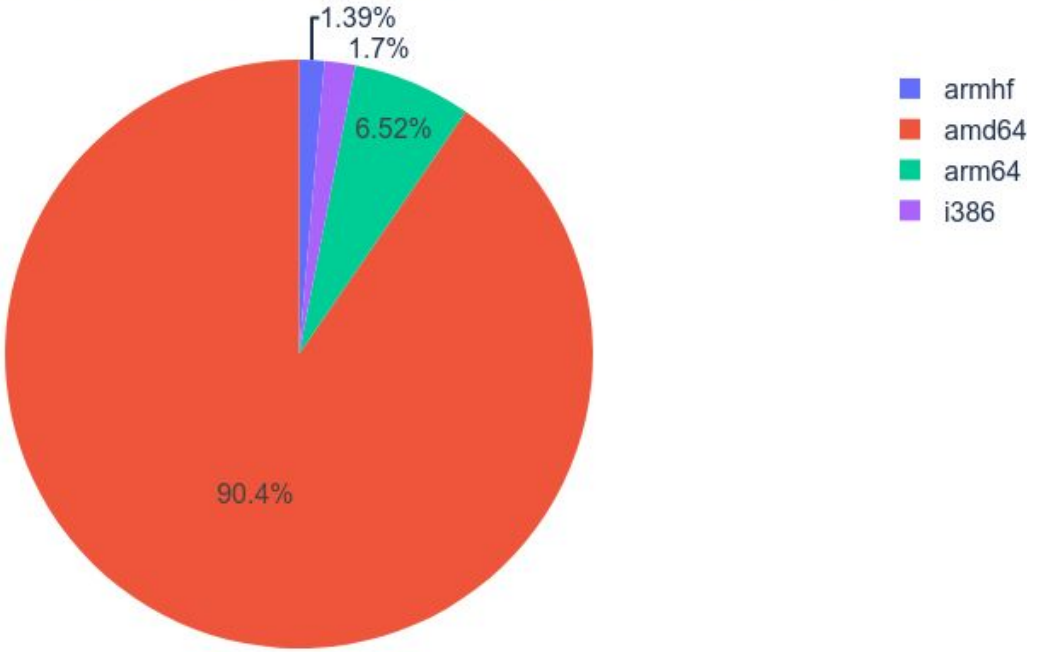
packages.osrfoundation.org Gazebo Downloads By Arch (November 2023)



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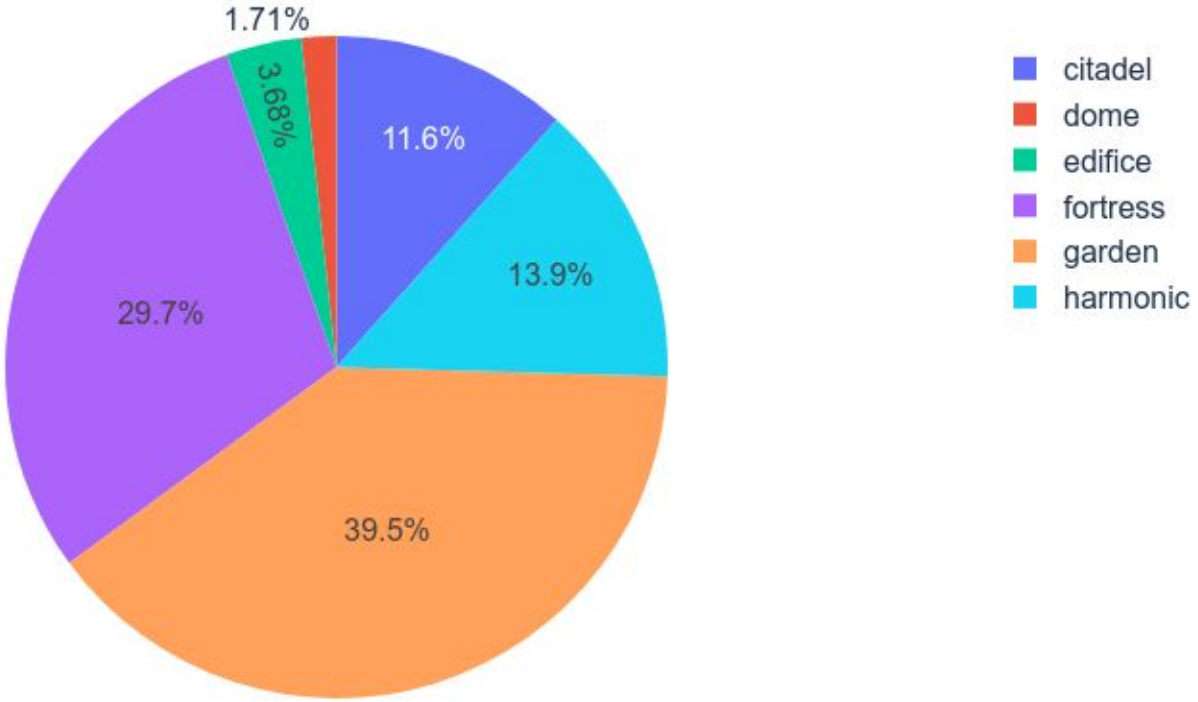
packages.osrfoundation.org Downloads of Gazebo by Release November 2023



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4.

Source Code & Academic Metrics

Source code and citations

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11,701

Citations of “ROS: an open-source Robot Operating System” (Quigley et al., 2009) on 2023-11-14.

There were 10,467 citations on 12/12/22, an increase of 11.8%

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302

Citations of “Robot Operating System 2: Design, architecture, and uses in the wild” (Macenski et al., 2022) there were 48 citations on 2022-12-12, an increase of 529.16%!

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910+

Companies Using ROS

Open Robotics maintains a list of companies using ROS culled from job listings, ROS Discourse posts, and other sources. This isn't a definitive list, it is simply the companies we know about!

At the end of 2022 we knew 740 companies, an increase of 22.9%!

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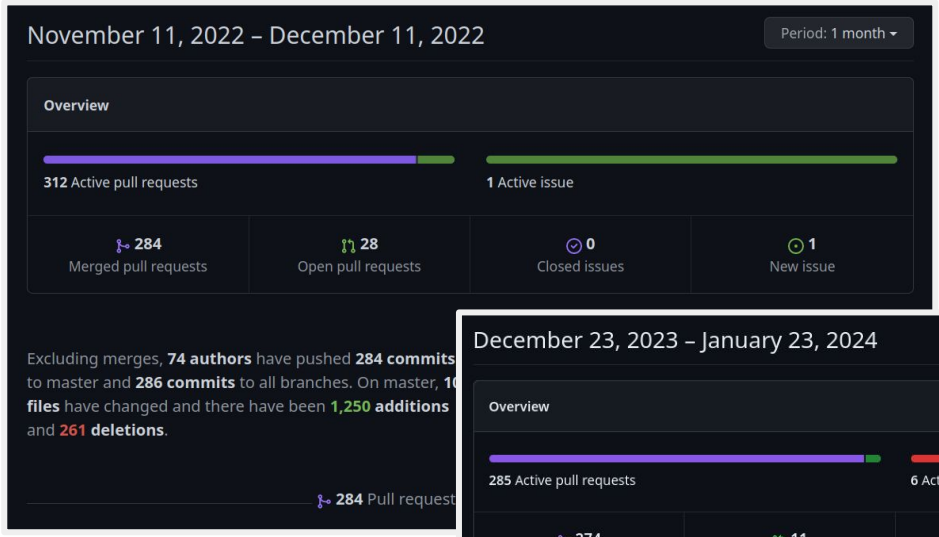

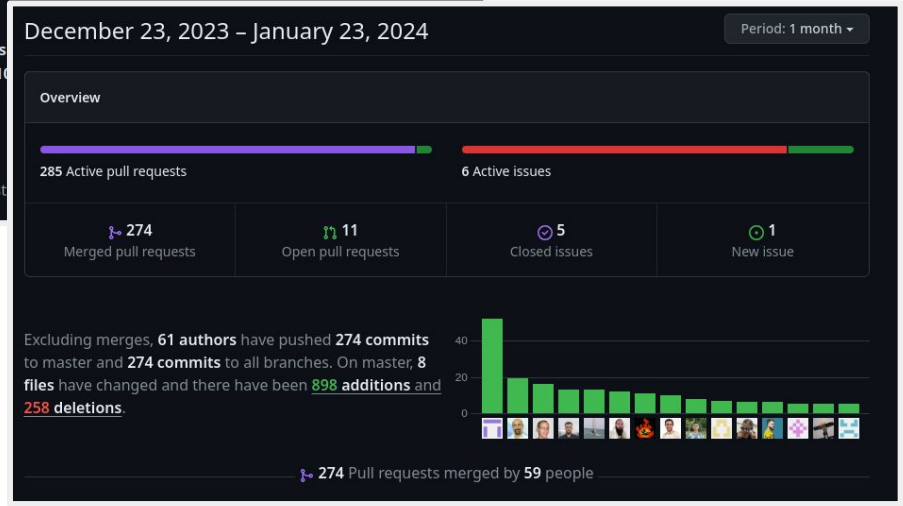

The rosdistro is the repository where releases are managed and the main index of publicly announced ROS packages. Most pull requests on this repository are requests for indexing or packaging of ROS packages.

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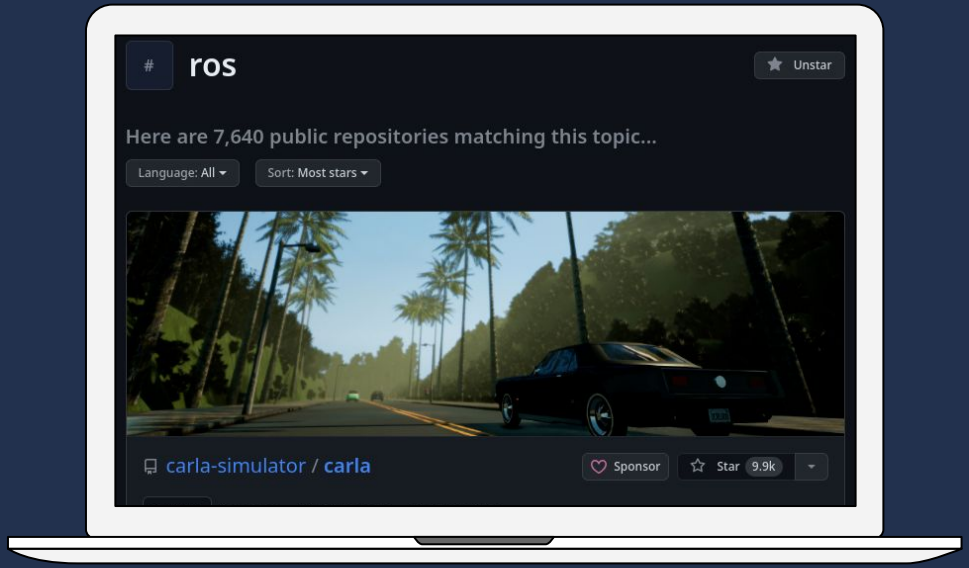
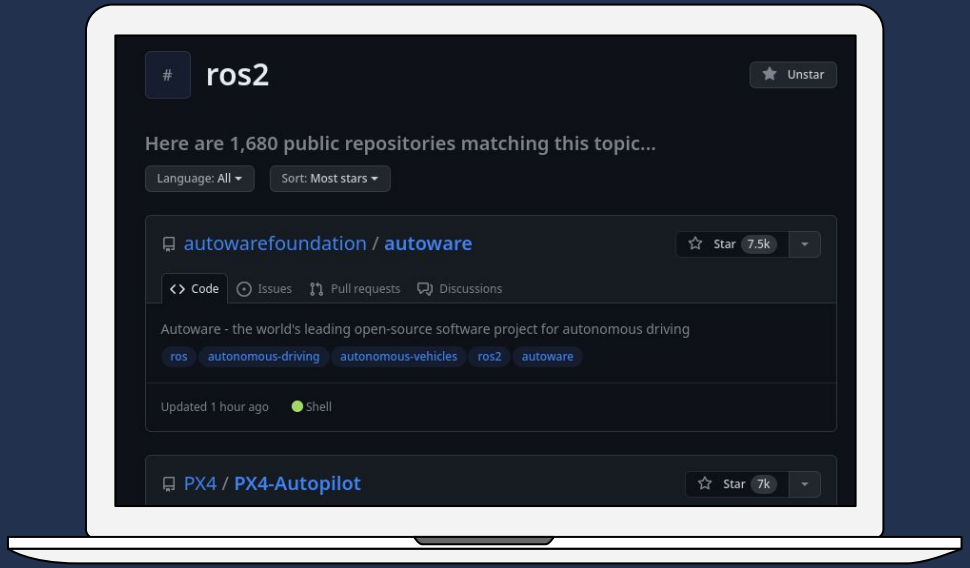
7,640

Number of Github repositories tagged with #ROS on 2023-11-14

On 2022-12-12 there were 6,664, an increase of 16.4%



1,680

Number of Github repositories tagged with #ROS2 on 2023-11-14.

There were 1,040 repositories tagged #ROS2 on 2022-12-12, an increase of 61.5%