



XRootD

XRootD Development Update

G. Amadio

EOS Workshop 2023

27 Apr 2023

XRootD Development Team (2022)

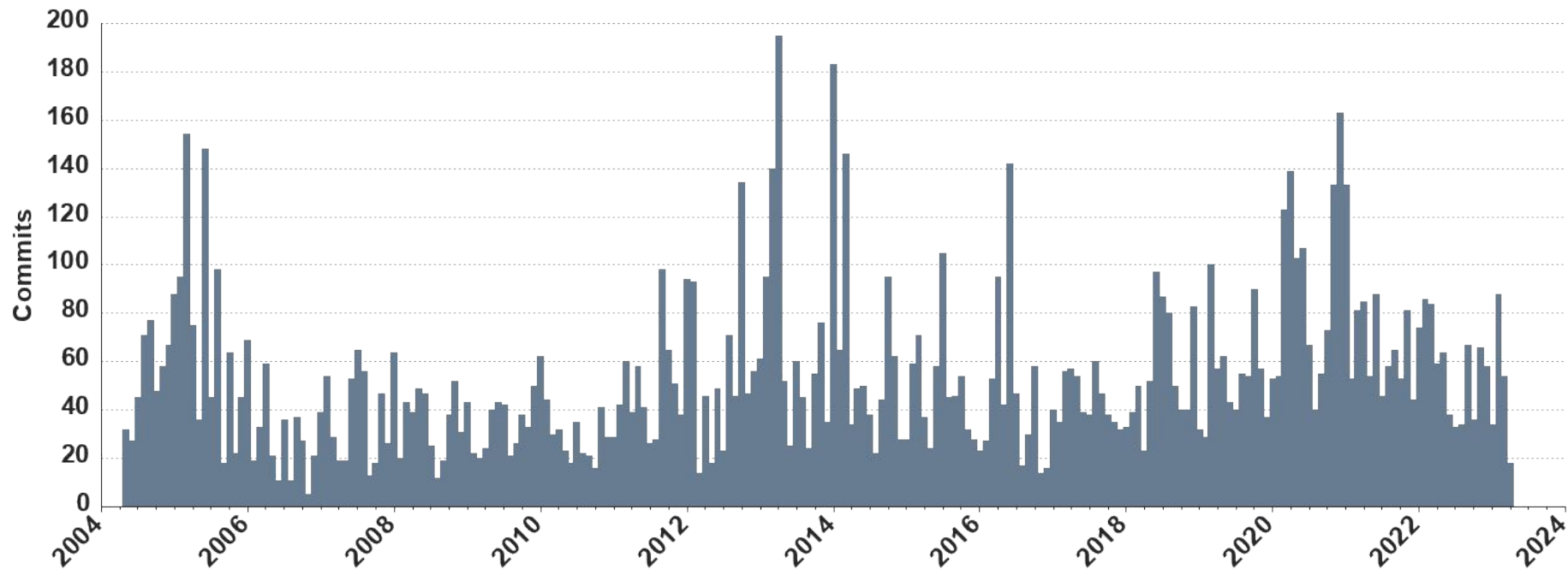
- ▶ Server / OFS / OSS
 - David Smith
 - Andrew B. Hanushevsky
- ▶ Client / EC / Python
 - David Smith
 - Michał K. Simon
- ▶ CMake / Packaging / CI
 - Michał K. Simon
- ▶ TLS
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- ▶ XCache
 - Matevž Tadel
- ▶ HTTP Protocol Plugin
 - Cedric Caffy
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- ▶ HTTP Third-Party Copy (TPC) Plugin
 - Brian Bockelmann
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 - Elvin A. Sindrilaru
- ▶ GSI Authentication Plugin
 - Gerardo Ganis
 - Michał K. Simon
- ▶ XrdOssCsi
 - David Smith
- ▶ SciTokens Plugin
 - Derek Weitzel
- ▶ xrootdfs command-line utility
 - Wei Yang
- ▶ EPEL / Debian Packaging
 - Mattias Ellert

Thank you, Michał, for all your contributions!

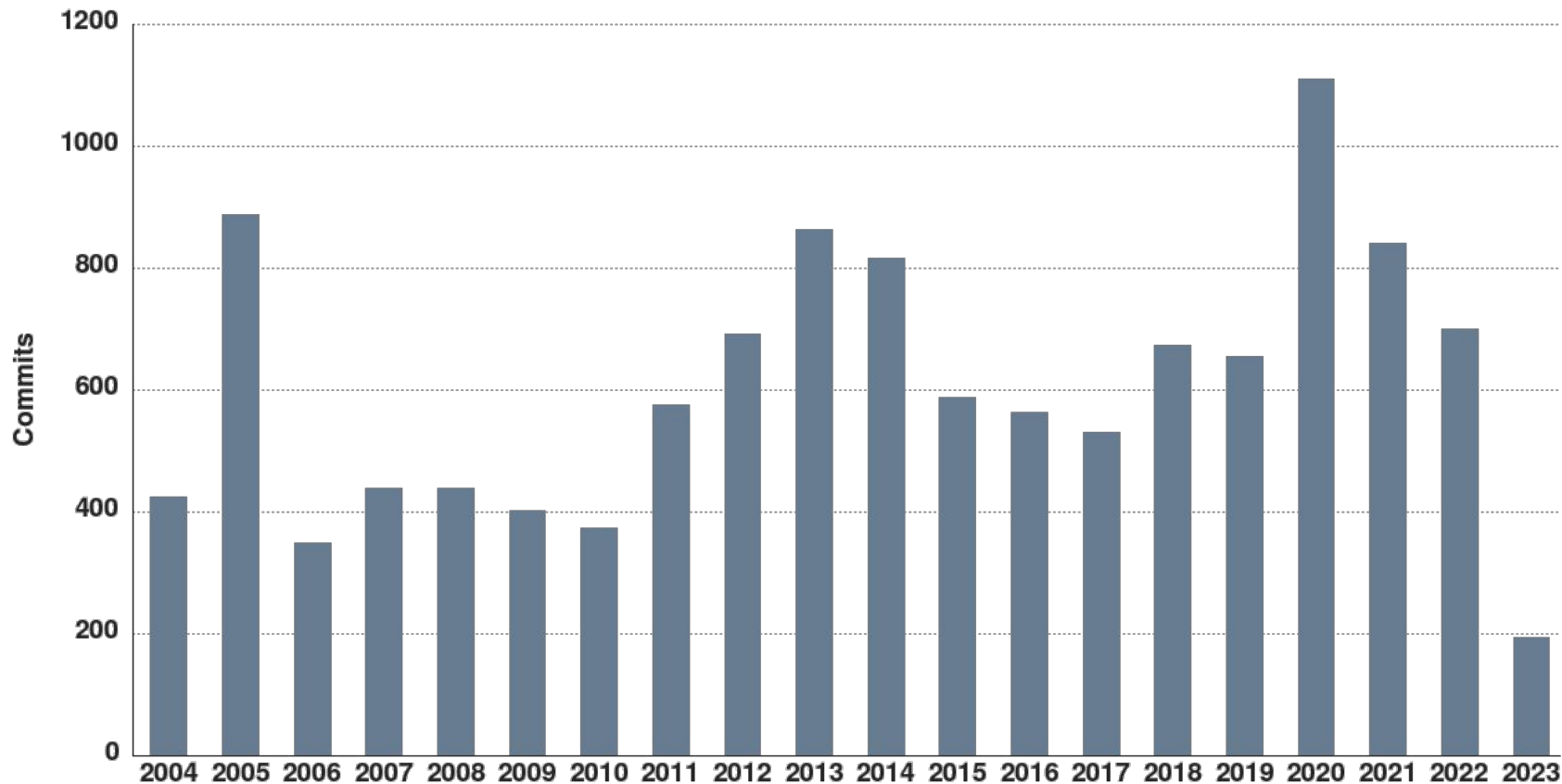
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 - David Smith
 - Andrew B. Hanushevsky
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 - Guilherme Amadio
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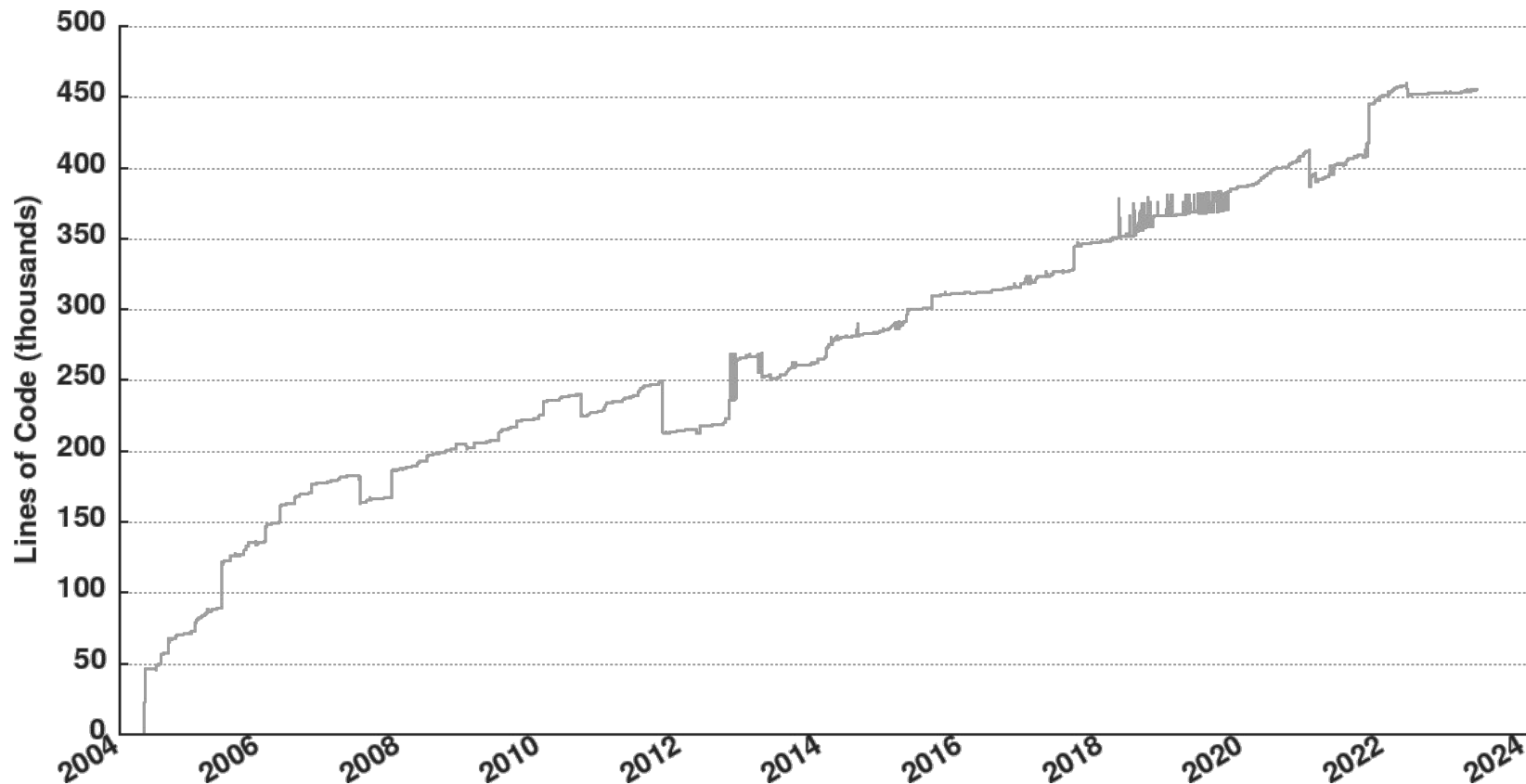
XRootD Git Stats (Commits per month)



XRootD Git Stats (Commits per year)



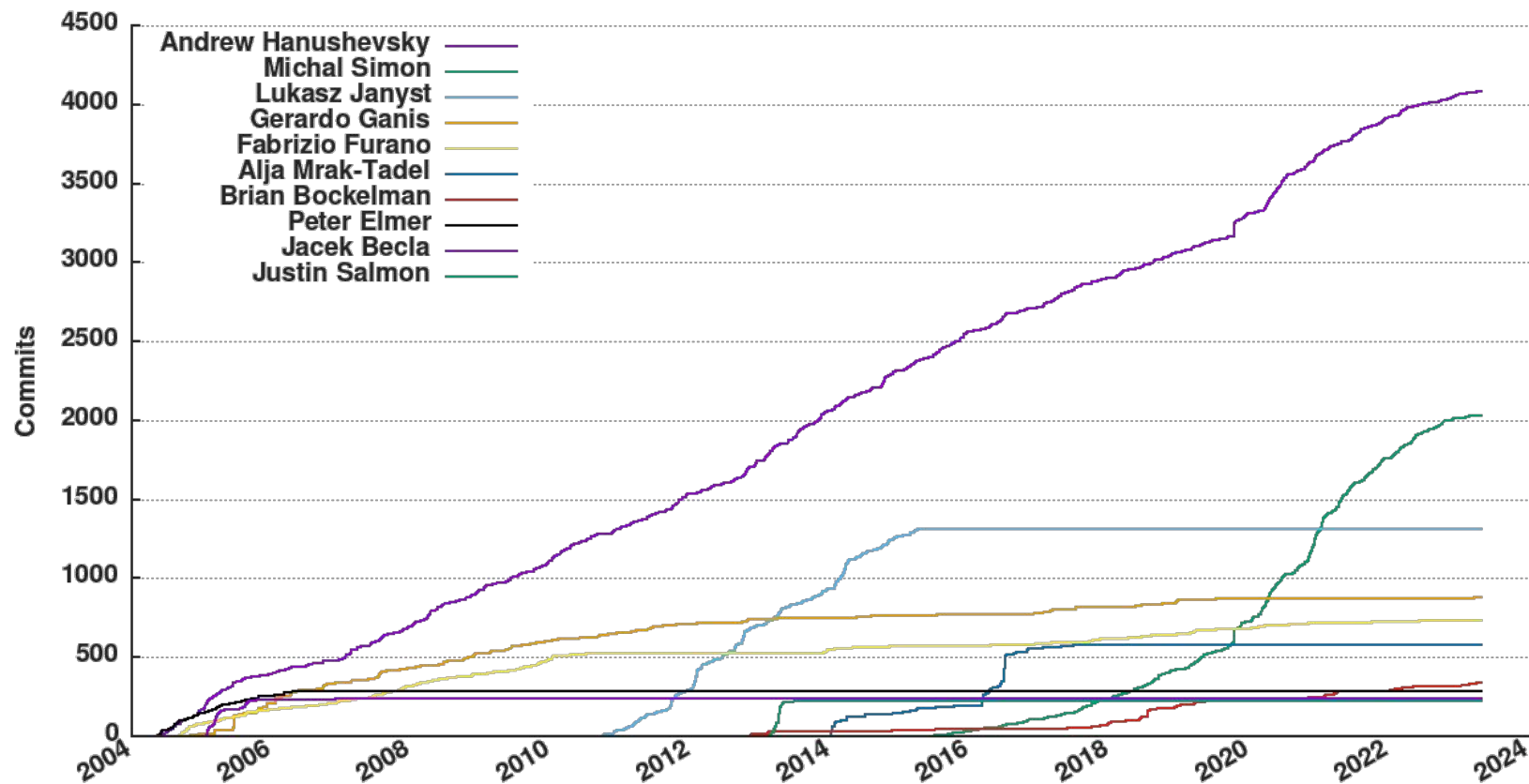
XRootD Git Stats (Lines of Code)



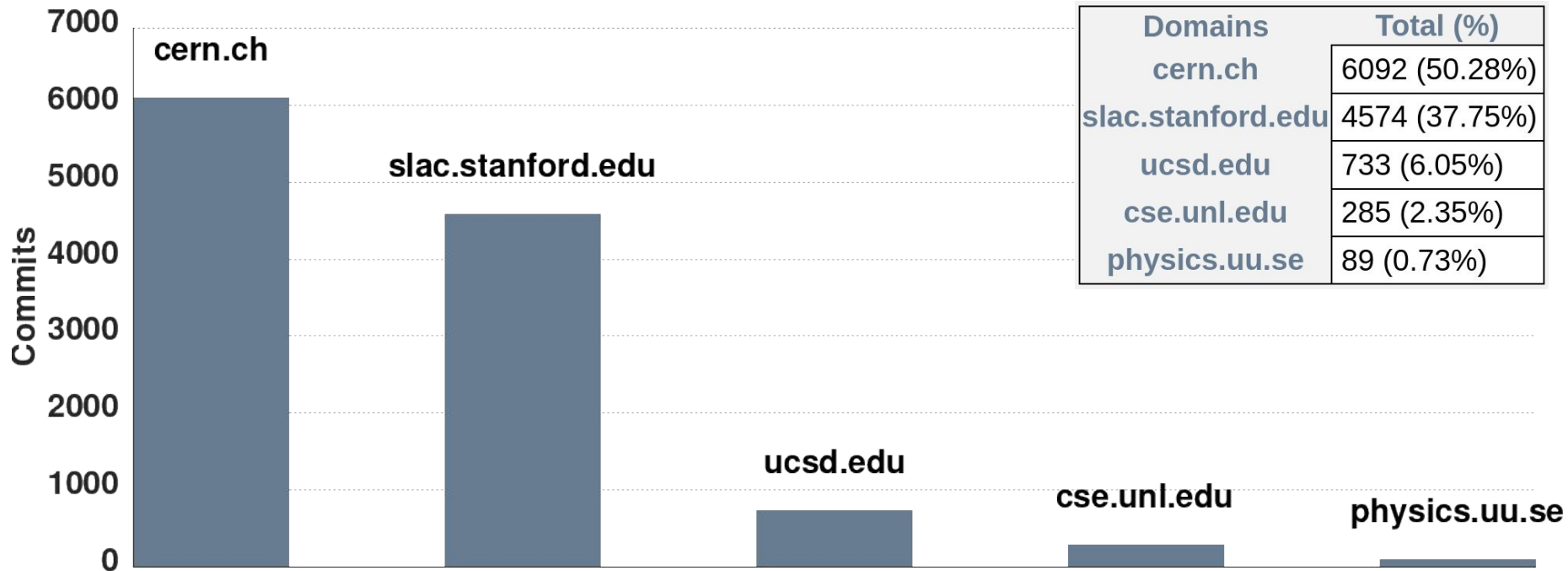
XRootD Git Stats (Top 20 Authors)

Author	Commits (%)	+ lines	- lines	First commit	Last commit	Age	Active days	# by commits
Andrew Hanushevsky	4084 (33.71%)	437315	127824	2004-05-11	2023-04-26	6923 days, 22:43:03	1583	1
Michal Simon	2030 (16.76%)	99204	92920	2015-05-29	2023-03-29	2861 days, 3:21:42	832	2
Lukasz Janyst	1314 (10.85%)	66878	84646	2010-09-20	2015-04-28	1680 days, 18:12:11	417	3
Gerardo Ganis	880 (7.26%)	78995	23725	2004-09-21	2023-04-17	6782 days, 3:56:33	387	4
Fabrizio Furano	736 (6.08%)	883950	842979	2004-09-08	2022-09-26	6592 days, 1:35:04	424	5
Alja Mrak-Tadel	578 (4.77%)	36812	23341	2014-01-02	2017-06-28	1272 days, 5:34:14	164	6
Brian Bockelman	337 (2.78%)	17746	5152	2011-03-14	2023-03-25	4393 days, 20:24:55	167	7
Peter Elmer	288 (2.38%)	5122	1533	2004-05-18	2006-05-24	735 days, 23:10:05	91	8
Jacek Becla	238 (1.96%)	19644	7946	2004-09-23	2008-05-13	1327 days, 20:53:27	87	9
Justin Salmon	223 (1.84%)	14750	8526	2012-11-02	2013-07-02	241 days, 23:05:56	40	10
Matevž Tadel	153 (1.26%)	10393	6514	2011-06-17	2023-02-20	4266 days, 8:25:55	106	11
Mattias Ellert	115 (0.95%)	11586	3997	2011-05-03	2023-01-17	4276 days, 19:59:59	75	12
Guilherme Amadio	108 (0.89%)	1876	1573	2022-10-20	2023-04-18	180 days, 3:24:37	39	13
Wei Yang	98 (0.81%)	4091	910	2007-02-20	2022-09-03	5673 days, 8:05:48	65	14
Derek Feichtinger	87 (0.72%)	25084	25128	2006-01-27	2010-08-06	1652 days, 16:55:25	66	15
Elvin Sindrilaru	81 (0.67%)	2233	696	2012-07-12	2023-03-27	3909 days, 21:50:26	54	16
Wilko Kroeger	77 (0.64%)	243	174	2005-12-08	2014-03-27	3030 days, 21:06:48	48	17
Cedric Caffy	65 (0.54%)	2383	1032	2021-10-12	2023-03-21	525 days, 3:12:05	26	18
Justin Lewis Salmon	64 (0.53%)	3083	1168	2013-02-23	2014-02-04	345 days, 13:07:49	22	19
Tofigh Azemoun	53 (0.44%)	7679	2423	2005-03-18	2006-12-07	628 days, 4:11:07	32	20

XRootD Git Stats (Commits of Top 10 Authors)



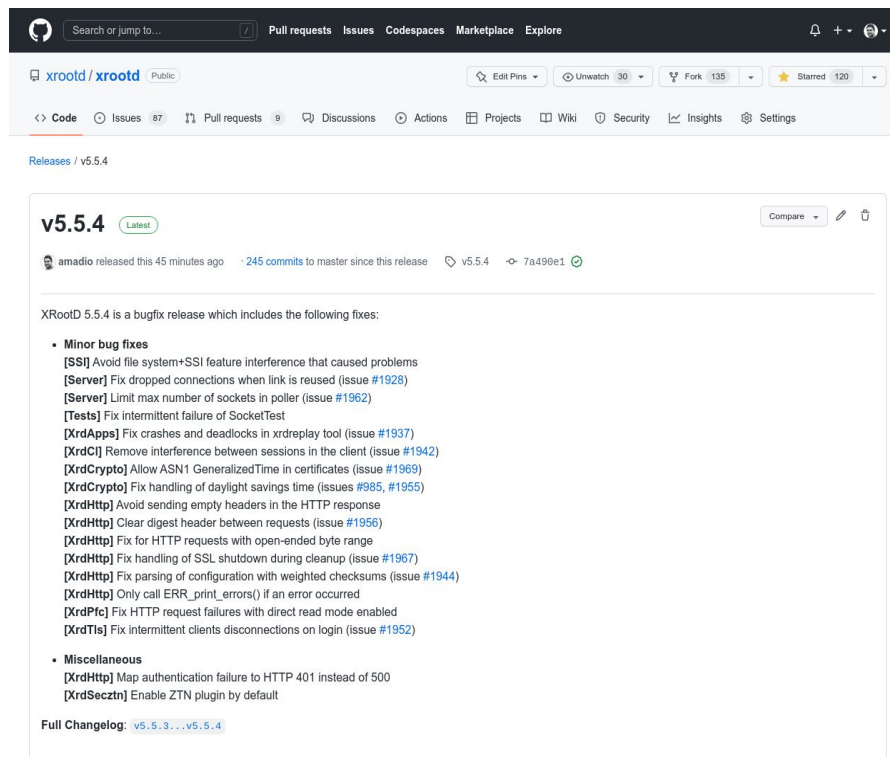
XRootD Git Stats (Top Affiliations)



Releases

Since last EOS workshop:

- ▶ One feature release: 5.5.0
 - Proxy and client support for XrdEc
 - SciTokens improvements
 - Support VOMS mapfile
 - Make https and xroots more compatible
 - g-Stream reporting for TPC connections
 - Record/Replay plugin
- ▶ Four patch releases: 5.5.1 – 5.5.4
 - XRootD 5.5.4 was released 24 Mar 2023
 - Many bug fixes, ZTN plugin by default



The screenshot shows the GitHub interface for the `xrootd/xrootd` repository. The 'Releases' tab is selected, showing the `v5.5.4` release as the 'Latest' version. The release was made by `amadio` 45 minutes ago, with 245 commits since the previous release. The release description states it is a bugfix release and lists the following fixes:

- Minor bug fixes**
 - [SSI] Avoid file system+SSI feature interference that caused problems
 - [Server] Fix dropped connections when link is reused (issue #1928)
 - [Server] Limit max number of sockets in poller (issue #1962)
 - [Tests] Fix intermittent failure of SocketTest
 - [XrdApps] Fix crashes and deadlocks in xrdreplay tool (issue #1937)
 - [XrdCl] Remove interference between sessions in the client (issue #1942)
 - [XrdCrypto] Allow ASN1 GeneralizedTime in certificates (issue #1969)
 - [XrdCrypto] Fix handling of daylight savings time (issues #985, #1955)
 - [XrdHttp] Avoid sending empty headers in the HTTP response
 - [XrdHttp] Clear digest header between requests (issue #1956)
 - [XrdHttp] Fix for HTTP requests with open-ended byte range
 - [XrdHttp] Fix handling of SSL shutdown during cleanup (issue #1967)
 - [XrdHttp] Fix parsing of configuration with weighted checksums (issue #1944)
 - [XrdHttp] Only call `ERR_print_errors()` if an error occurred
 - [XrdPfc] Fix HTTP request failures with direct read mode enabled
 - [XrdTls] Fix intermittent clients disconnections on login (issue #1952)
- Miscellaneous**
 - [XrdHttp] Map authentication failure to HTTP 401 instead of 500
 - [XrdSeczn] Enable ZTN plugin by default

Full Changelog: [v5.5.3...v5.5.4](#)

Next Feature Release: XRootD 5.6 (~2023/06)

- ▶ Migration to modern CMake (in progress, some of it already in master)
 - Update minimum required version to CMake 3.16 (many new features relative to 3.1)
 - Use upstream modules to reduce maintenance burden of build system
 - Use newer module [FindPython.cmake](#), with better support for virtual environments, etc
 - Replace usage of variables with targets and target properties
 - For more information, we recommend the excellent talk [Effective CMake](#), by [Daniel Pfeifer](#)
- ▶ Initial migration of tests from CppUnit to GoogleTest (in progress as well)
 - GoogleTest is actively developed and widely used by C++ developers, including EOS
- ▶ Multiple checksum algorithms support with HTTP protocol
- ▶ Support for distributions based on musl libc (Alpine Linux, Void Linux)
- ▶ Increase nodes per cms redirector: from 64 to 128
- ▶ Will address as many as possible outstanding enhancement requests

Next Major Release: XRootD 6.0 (2023)

- ▶ Move to C++17 standard as baseline, ensure compilation with C++20
- ▶ Drop support for Python2.x
- ▶ Support for tracking ownership based on uid/gid (tentative)
- ▶ Modernize packaging and implementation of Python bindings for Python 3.x
- ▶ Range cloning of files on supported operating systems (useful for EOS)
- ▶ Full migration of testing infrastructure to GoogleTest
 - CERN Summer Student project to improve test coverage for authentication, etc
- ▶ Refactoring and optimization of event loop on the client (xrscp)
- ▶ Continuously improve support for ZIP and potentially other archive formats
- ▶ Planned for release by the end of 2023

XRootD Dockerized Tests

- ▶ Existing tests in repository on GitLab
 - <https://gitlab.cern.ch/eos/xrootd-docker>
- ▶ Converted this setup into **xrd-docker** script
 - Subcommands
 - fetch - download data
 - package - create XRootD tarball
 - build - build docker images
 - setup - setup containers
 - run - run tests
 - clean - clean up running containers and drop testing network
- ▶ Operating Systems: CentOS 7, Alma 8, Alma 9
- ▶ Will be included in XRootD 5.6 release (already merged onto master)

Supported Platforms

- ▶ Platforms and compilers we support
 - Currently, we officially support CentOS 7, Alma 8, Alma 9, Ubuntu, and macOS
 - GitHub Actions now also cover Alpine Linux (due to recently added musl libc support)
- ▶ Plan to support more compilers (i.e. clang on Linux)
 - More opportunity to find bugs via compiler warnings
 - Be more resilient against compiler-specific features/bugs
 - More analysis tools to use in development (e.g. clang-tidy, clang-format)
- ▶ Hardware architectures
 - Currently no explicit support for anything other than x86_64 and arm64 (macOS)
 - Evaluate other architectures (e.g. PowerPC, ARM) and include in CI
 - Add other architectures via qemu to GitHub Actions

XRootD Packaging and Distribution

- ▶ RPM and DEB packaging scripts available in official GitHub repository
- ▶ XRootD is available via official channels in most distributions already
 - Alma, Arch, CentOS, Debian, Fedora, Gentoo, Manjaro, Raspbian, Rocky, Ubuntu, etc
- ▶ XRootD is also available on repositories that work across other OSs
 - Homebrew, macPorts, Nix, Spack, etc
 - Plan is to contribute new versions to Homebrew to cover macOS “semi-officially”
- ▶ Installation via official channels strongly encouraged



XRootD