Continuous Integration Tools for BOINC

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Goals of CI Tools

- Overview of code quality
- Automated testing as part of quality assurance
- Help developers and reviewers

- Increase code quality
- Avoid unintentional side effects of code changes

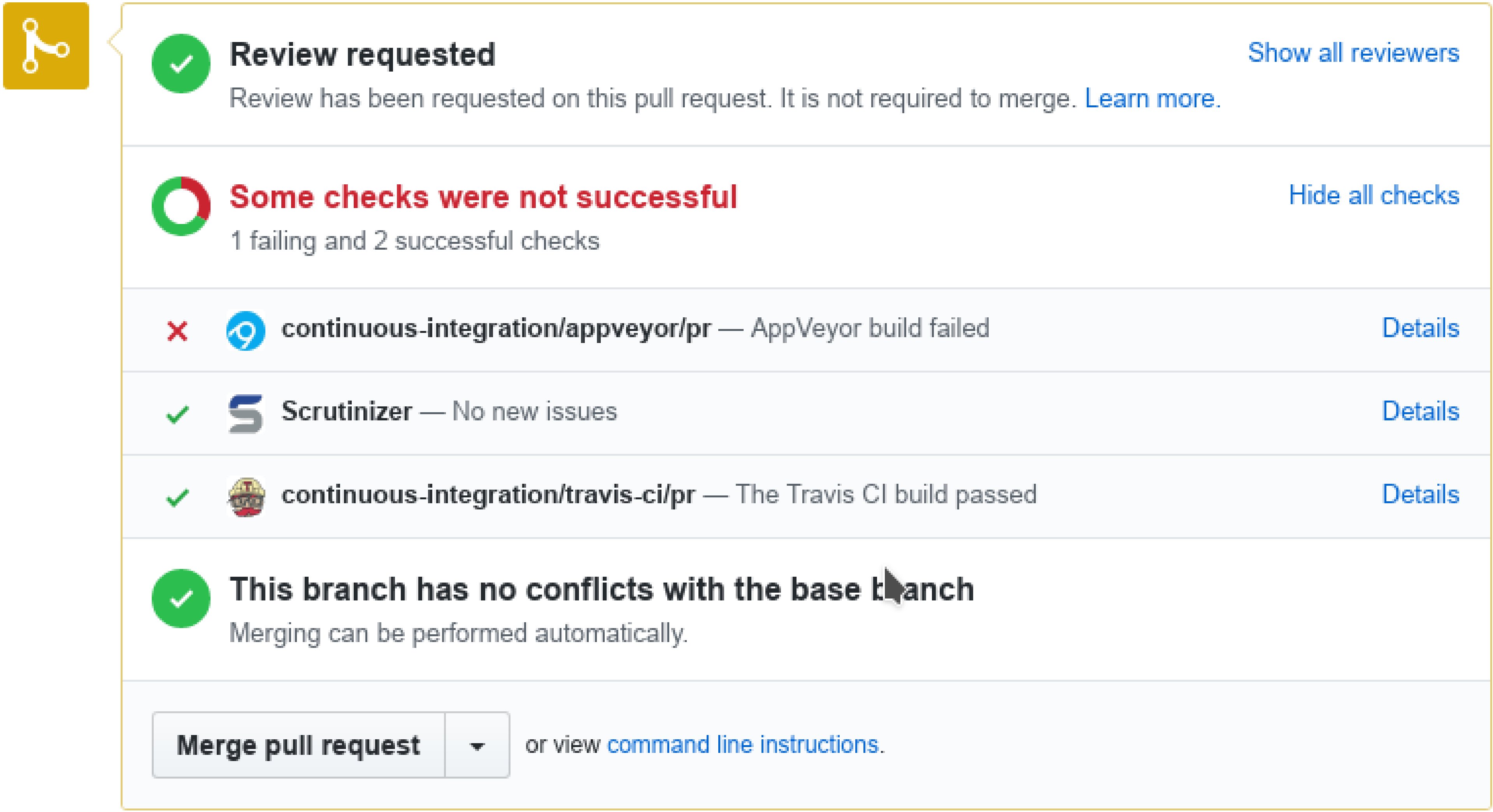
- Automated builds and tests are run for every pull request and merge into `master` branch

Current status

- **Travis CI**
- Linux/Mac based builds
- Extensive support for CI Tools (Testing, Coverage)

- **AppVeyor**
- Windows based builds
- Stores build artifacts

Examples - github



✓ **Review requested**

Review has been requested on this pull request. It is not required to merge. Learn more.

Show all reviewers

Some checks were not successful

1 failing and 2 successful checks

Hide all checks

✗ **continuous-integration/appveyor/pr** — AppVeyor build failed — Details

✓ **Scrutinizer** — No new issues — Details

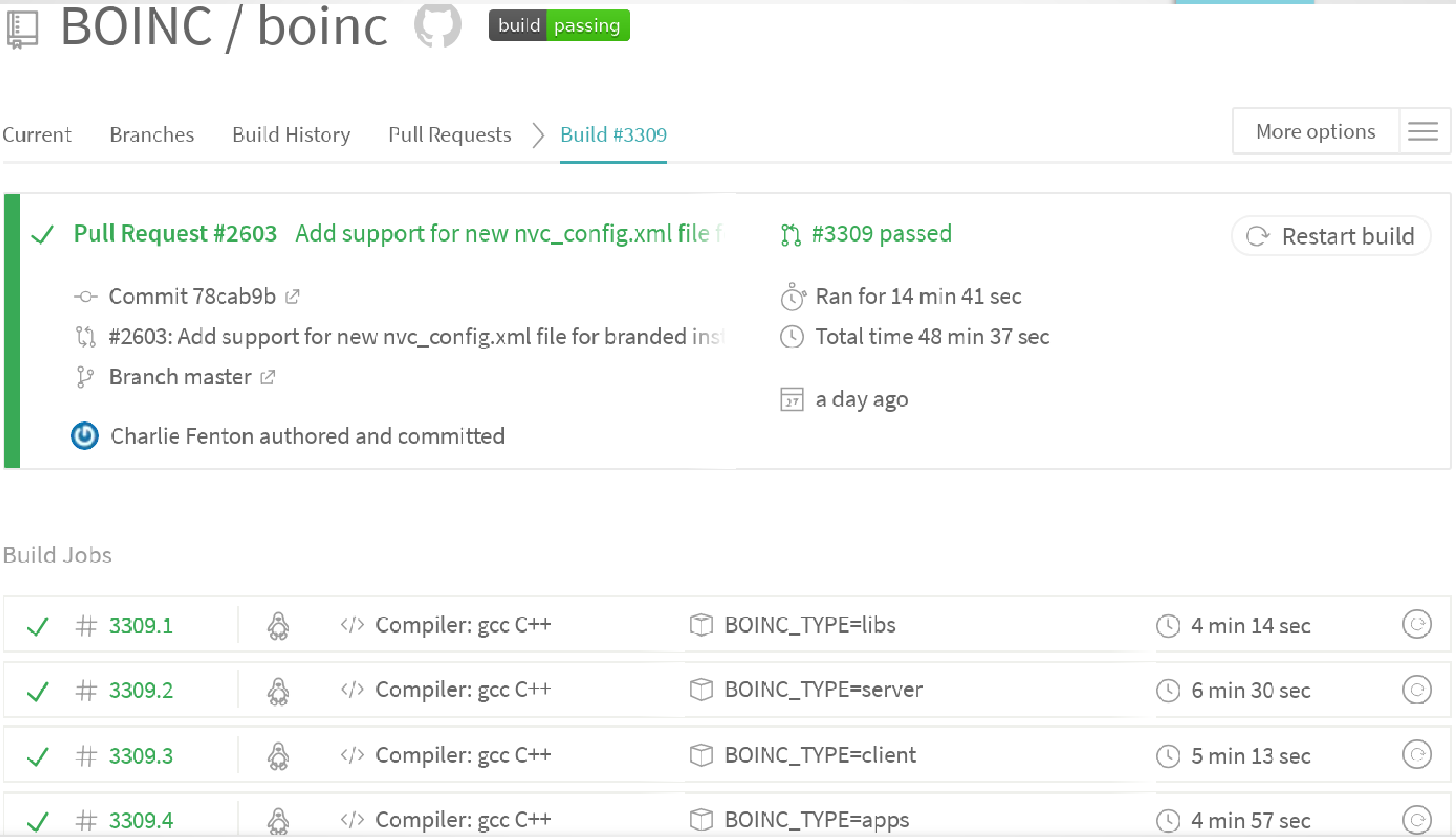
✓ **continuous-integration/travis-ci/pr** — The Travis CI build passed — Details

✓ **This branch has no conflicts with the base branch**

Merging can be performed automatically.

or view command line instructions.

Examples – Travis CI



BOINC / boinc build passing

Current | Branches | Build History | Pull Requests > Build #3309 | More options

✓ Pull Request #2603 Add support for new nvc_config.xml file f

Commit 78cab9b

#2603: Add support for new nvc_config.xml file for branded inst

Branch master

Charlie Fenton authored and committed

#3309 passed

Ran for 14 min 41 sec

Total time 48 min 37 sec

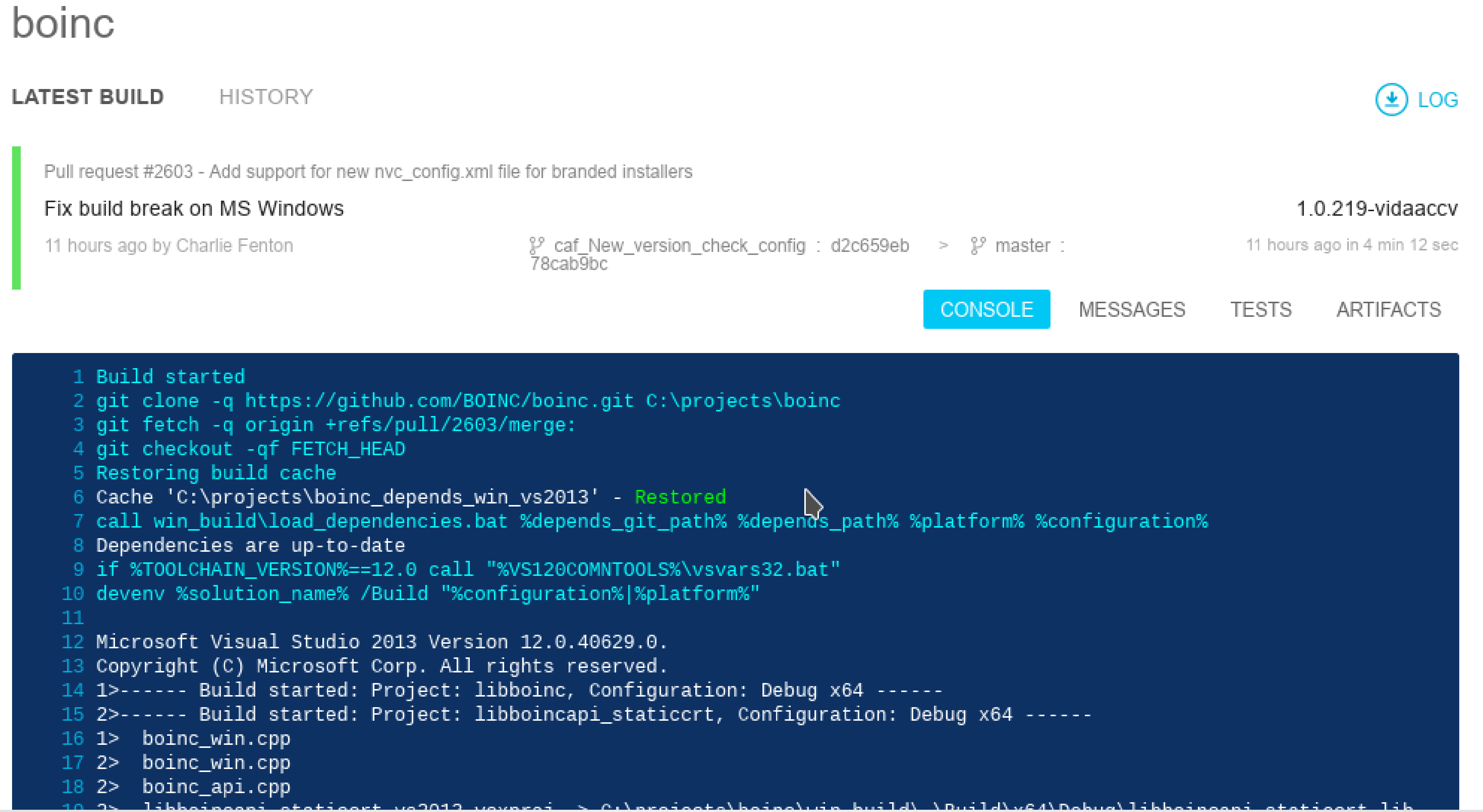
a day ago

Restart build

Build Jobs

✓	# 3309.1	Compiler: gcc C++	BOINC_TYPE=libs	4 min 14 sec	
✓	# 3309.2	Compiler: gcc C++	BOINC_TYPE=server	6 min 30 sec	
✓	# 3309.3	Compiler: gcc C++	BOINC_TYPE=client	5 min 13 sec	
✓	# 3309.4	Compiler: gcc C++	BOINC_TYPE=apps	4 min 57 sec	

Examples - AppVeyor



boinc

Pull request #2603 - Add support for new nvc_config.xml file for branded installers

Fix build break on MS Windows

1.0.219-vidaaccv

11 hours ago by Charlie Fenton

caf_New_version_check_config : d2c659eb > master : 78cab9bc

11 hours ago in 4 min 12 sec

```
Build started
git clone -q https://github.com/BOINC/boinc.git C:\projects\boinc
git fetch -q origin +refs/pull/2603/merge:
git checkout -qf FETCH_HEAD
Restoring build cache
Cache 'C:\projects\boinc_depends_win_vs2013' - Restored
call win_build\load_dependencies.bat %depends_git_path% %depends_path% %platform% %configuration%
Dependencies are up-to-date
if %TOOLCHAIN_VERSION%==12.0 call "%VS120COMNTOOLS%\vsvars32.bat"
devenv %solution_name% /Build "%configuration%|%platform%"

Microsoft Visual Studio 2013 Version 12.0.40629.0.
Copyright (C) Microsoft Corp. All rights reserved.
1>------ Build started: Project: libboinc, Configuration: Debug x64 ------
2>------ Build started: Project: libboincapi_staticcrt, Configuration: Debug x64 ------
1>  boinc_win.cpp
2>  boinc_win.cpp
2>  boinc_api.cpp
2>  libboincapi_staticcrt_vs2013.vcxproj -> C:\projects\boinc\win_build\..\Build\x64\Debug\libboincapi_staticcrt.lib
```

Current status

scrutinizer

SYNOPSYS®

- **Scrutinizer CI**
- PHP / python / JavaScript static code analysis
- Needs tweaking for better results

- **Coverity Scan**
- C / C++ static code analysis
- Integrated through Travis
- Triggered manually

Examples – Scrutinizer CI

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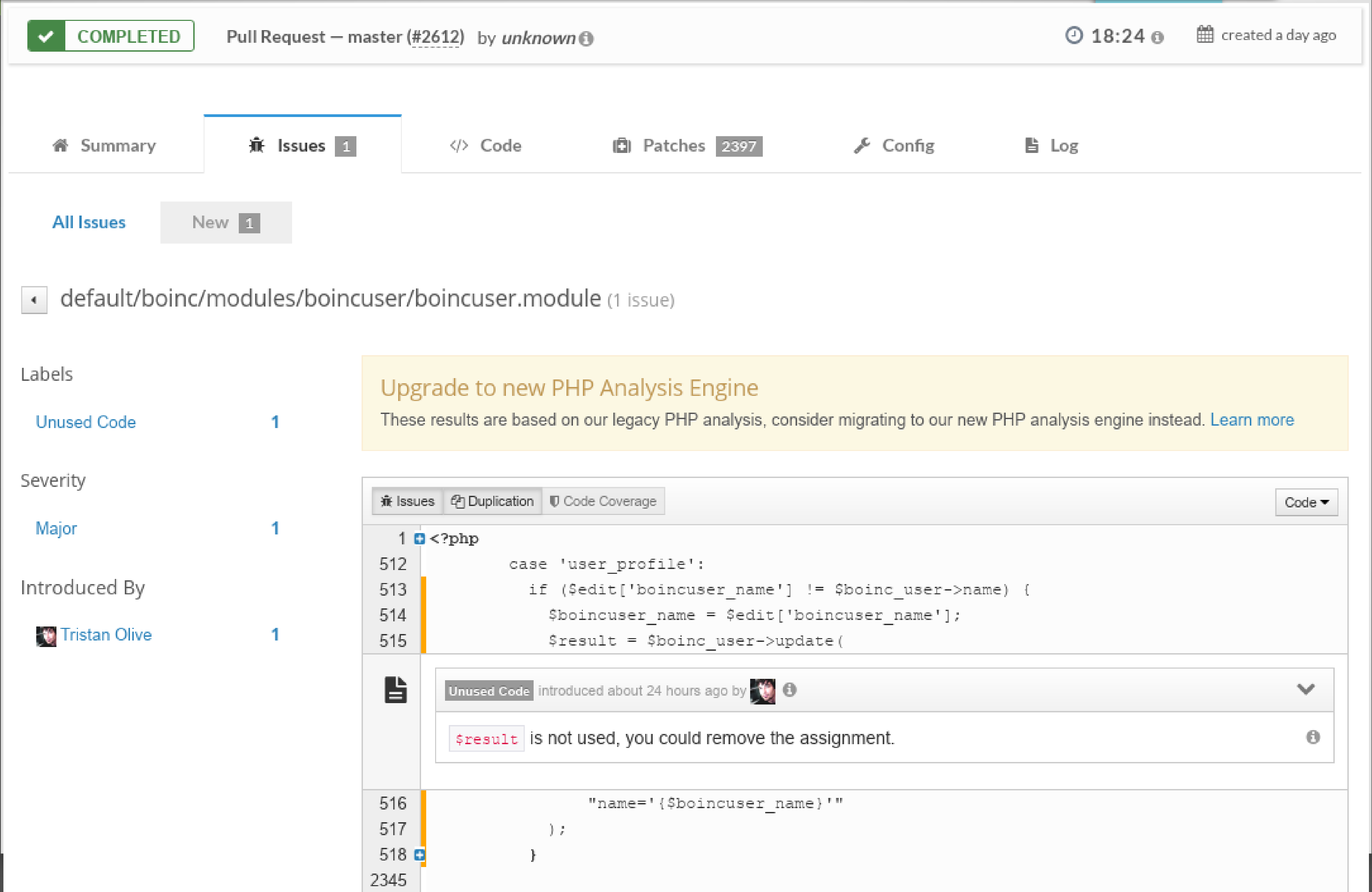


✓ COMPLETED Pull Request — master (#2612) by *unknown* 18:24 created a day ago

Summary | Issues 1 | Code | Patches 2397 | Config | Log

All Issues | New 1

default/boinc/modules/boincuser/boincuser.module (1 issue)

Labels	
Unused Code	1

Severity	
Major	1

Introduced By	
Tristan Olive	1

Upgrade to new PHP Analysis Engine

These results are based on our legacy PHP analysis, consider migrating to our new PHP analysis engine instead. Learn more

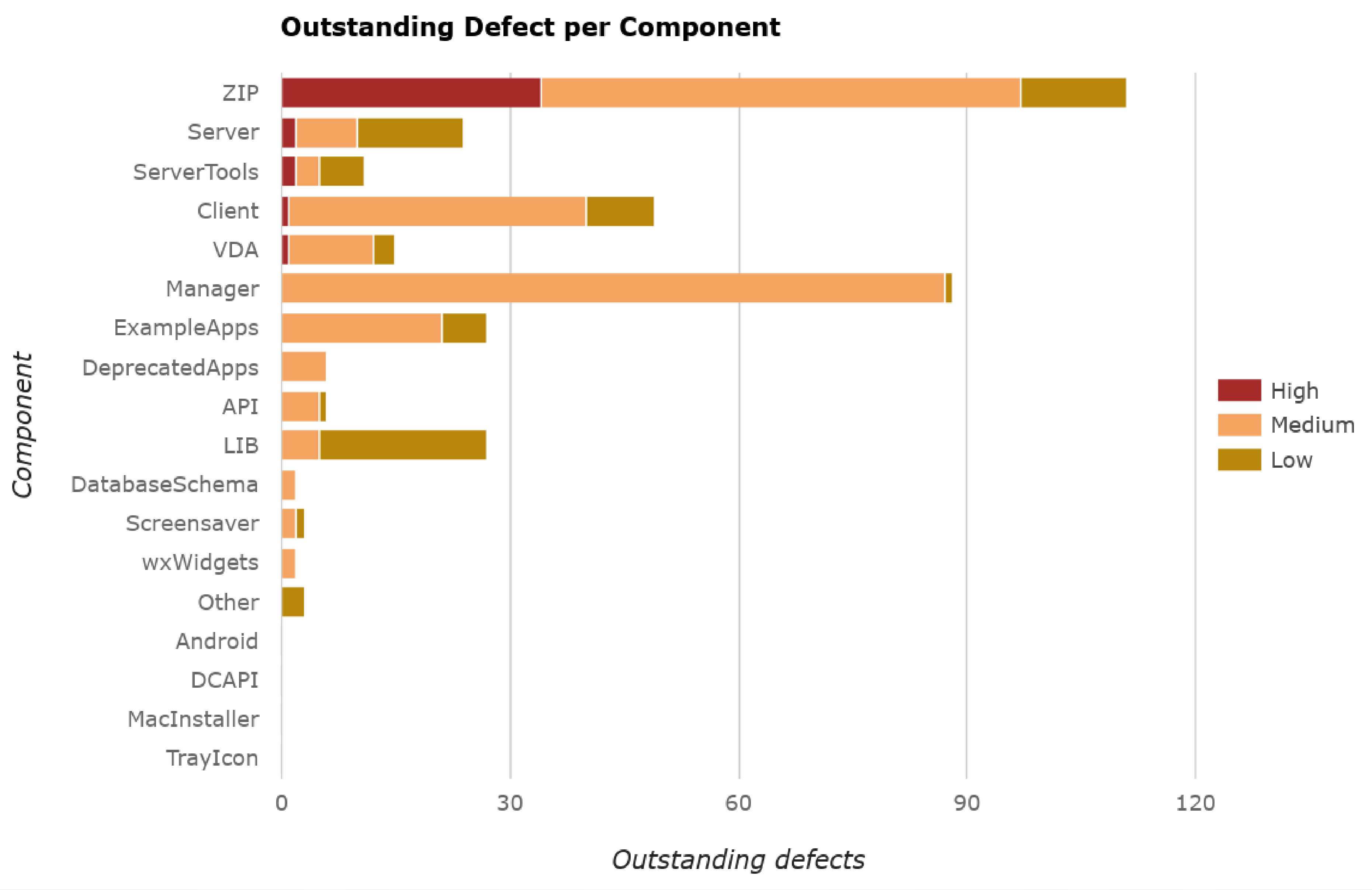
```
<?php
        case 'user_profile':
          if ($edit['boincuser_name'] != $boinc_user->name) {
            $boincuser_name = $edit['boincuser_name'];
            $result = $boinc_user->update(
```

Unused Code introduced about 24 hours ago by

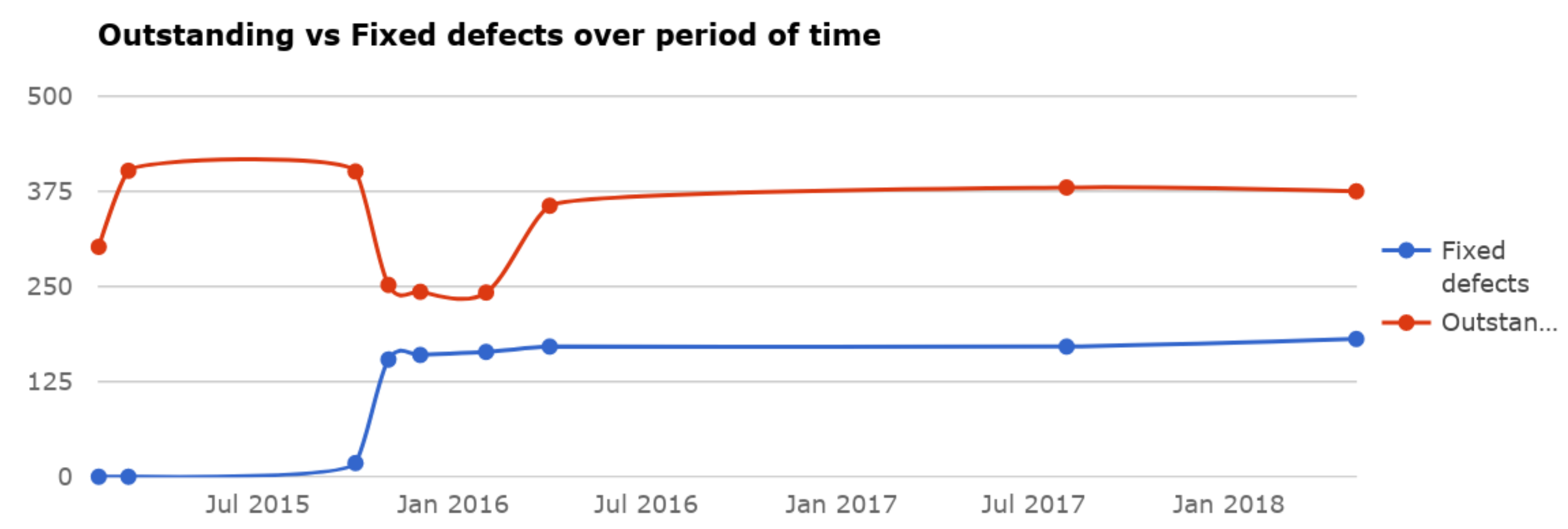
`$result` is not used, you could remove the assignment.

```
              "name='{$boincuser_name}'"
            );
          }
```

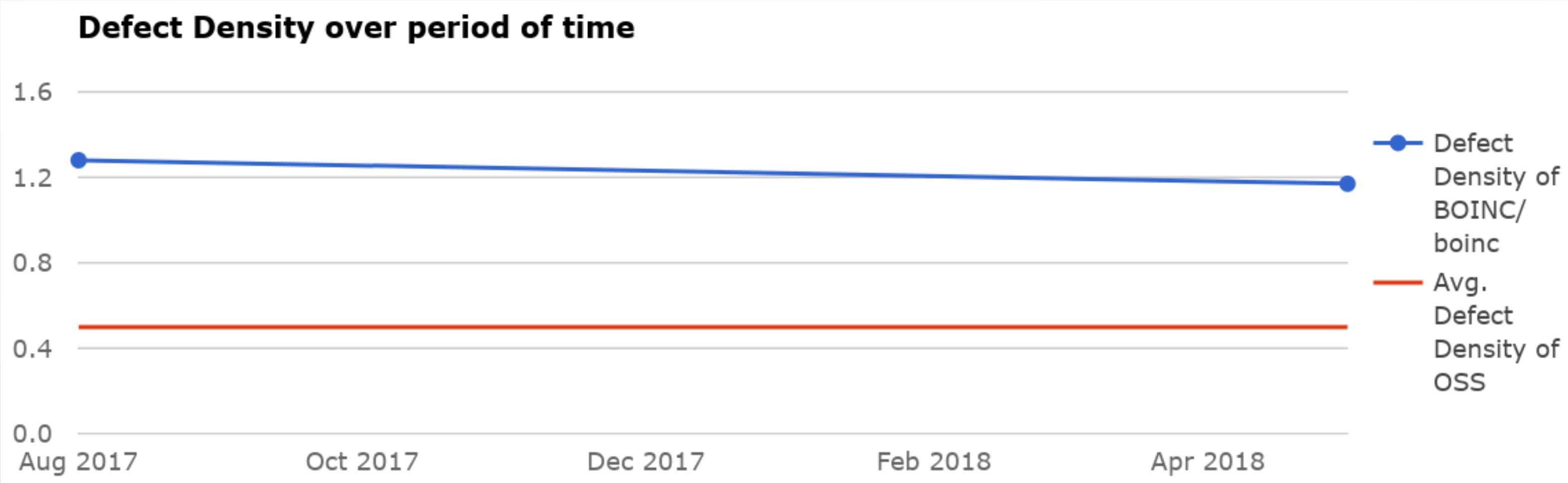
Examples – Coverity Scan



Examples – Coverity Scan



Outstanding vs Fixed defects over period of time



Defect Density over period of time

The graph compares the defect density of the project with the average defect density of open source projects that are similar in size (i.e. 100,000 to 499,999 lines of code)

Current status

- Only limited code quality metrics available
- Only fatal build breaks are detected
- Results of static code analyzers are ignored
- Passing tests is not mandatory
- No automated (Unit / Integration) testing is done

Additional tools

- Both can be integrated with Travis CI
- Immediate response on pull request quality
- Better quality control

- **boinc-server-test**
- Integration testing for server components
- Based on docker container provided by Marius
- Refined for testing by Kevin

- **googletest**
- Unit testing framework for C / C++
- PoC done by Keith
- uses/needs cmake

Challenges and Solutions

- No maintainer for the BOINC autotools scripts
- Scripts are barely working and contain lots of workarounds needed in the past
- New tools are using cmake instead of autotools

- Switch to cmake and leave old code behind
- More potential cmake maintainers available

Short cmake introduction

- Versatile cross-platform system to generate native build files
- Generates Makefile’s (replaces autoconf / automake)
- Auto-detecting dependencies
- Auto-detecting capabilities (generate config.h)
- Can generate Xcode projects
- Can generate Visual Studio project file
- Users: Netflix, KDE, cURL, MariaDB

Conclusion

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- BOINC already has lots of tools for better code quality
- We just need to use them more
- Having a good test infrastructure makes it easier to add big changes

- Autotools worked fine for the last 15 years, let’s switch to cmake to be save for the next 15
- Please help triage and fix defects found by static analyzers
- Do we need to promote CI tools better?