Testing Framework in JEDI

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In collaboration with the JEDI core team

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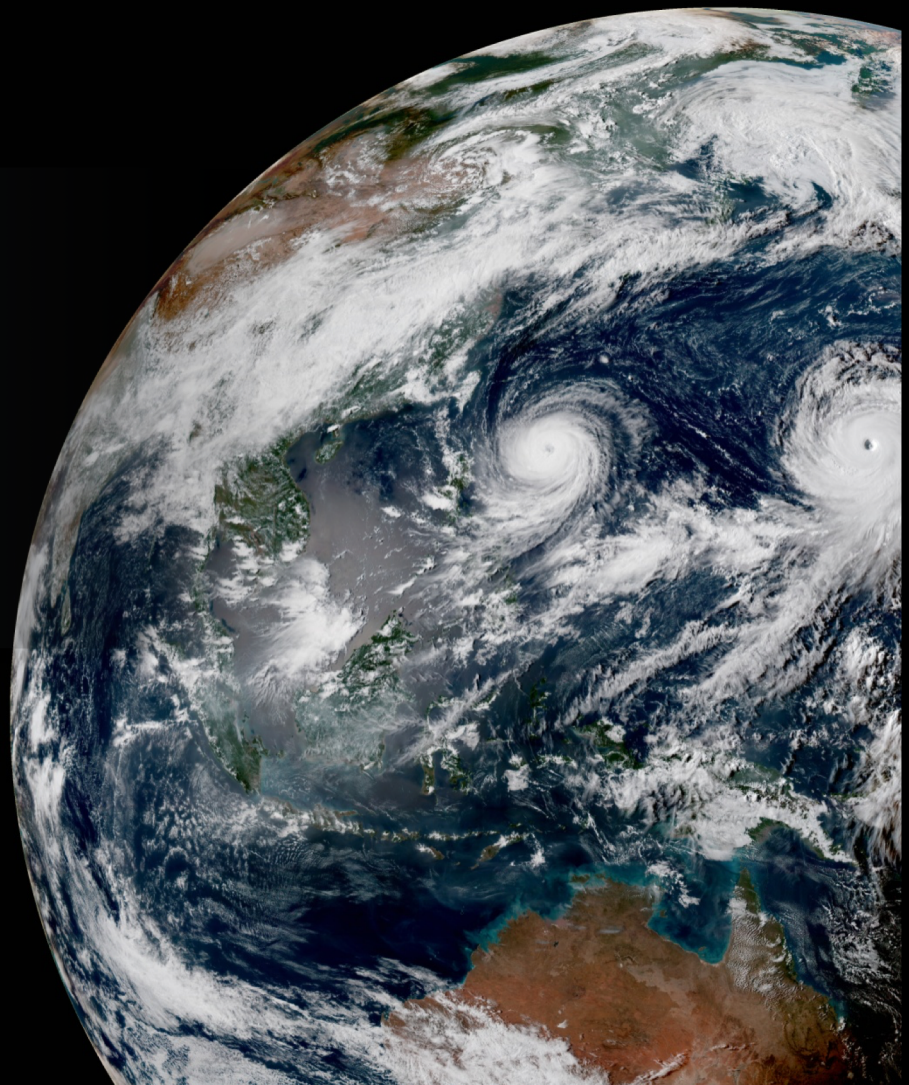
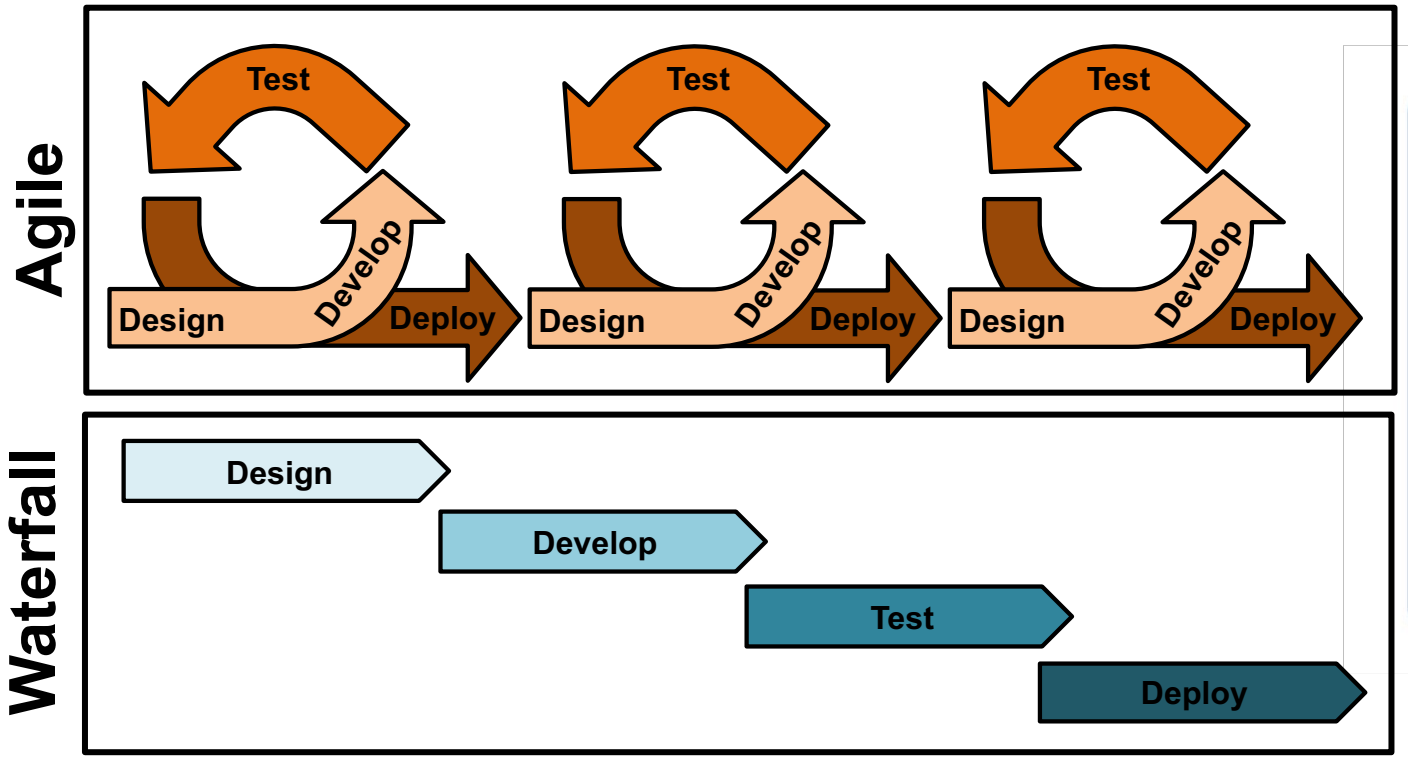
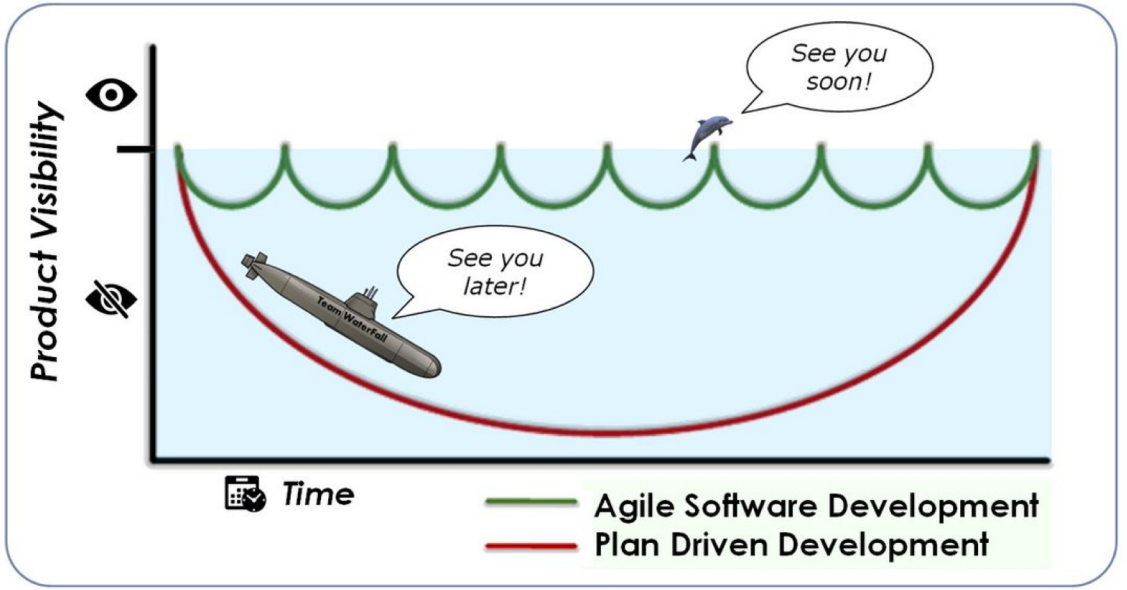
JCSDA Workshop, May 30th, 2019



Agile methodology enables the key stakeholders and developers to collaborate more closely to accelerate delivery

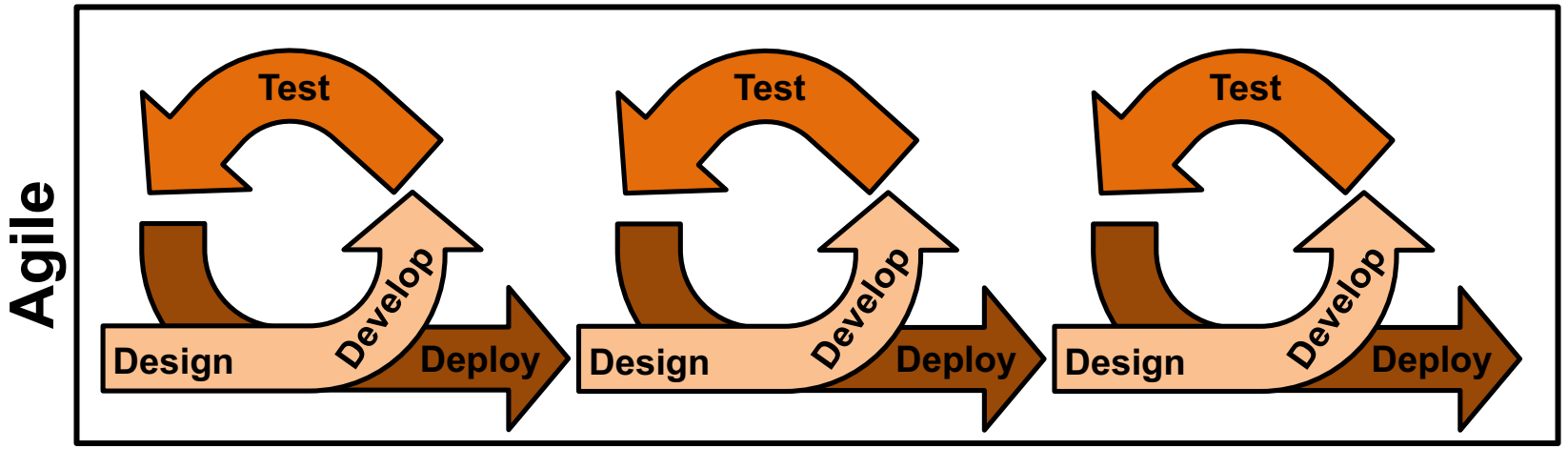
- Iterative development
- Requirements and solutions evolve through collaboration between self-organizing cross-functional teams

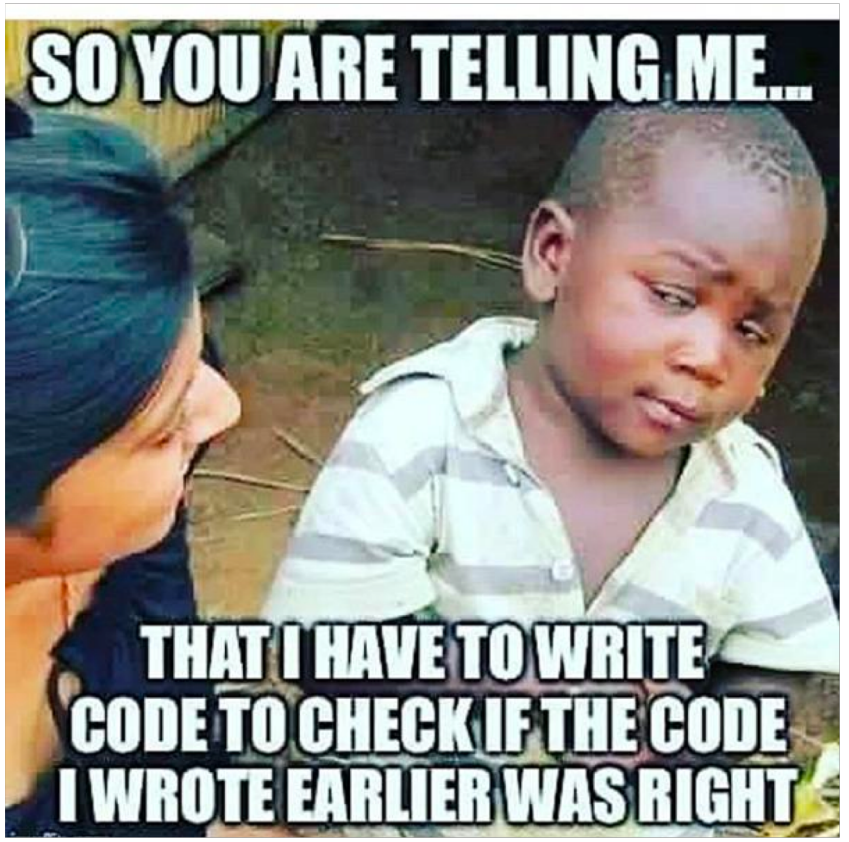




Testing is one of the key components of Agile methodology

Agile testing:
- Continuous process
- Continuous feedback
- Issues are fixed within the same iteration

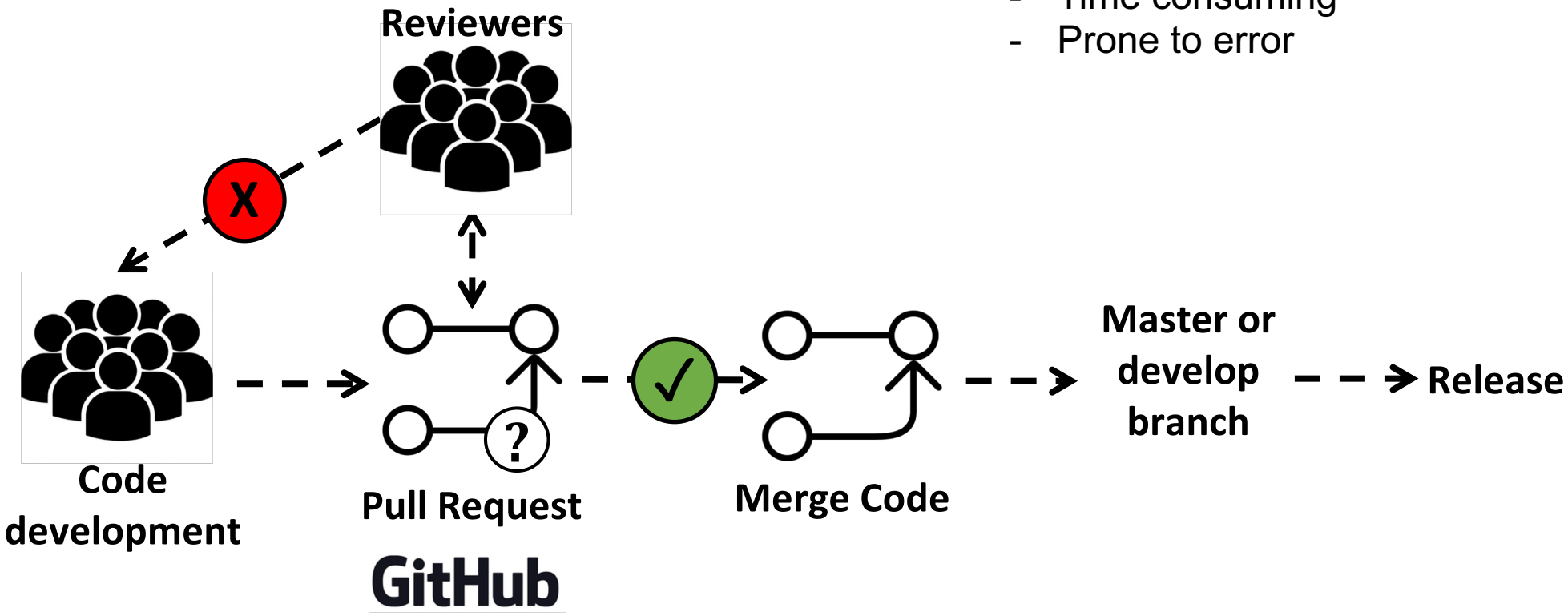




Test suites in JEDI

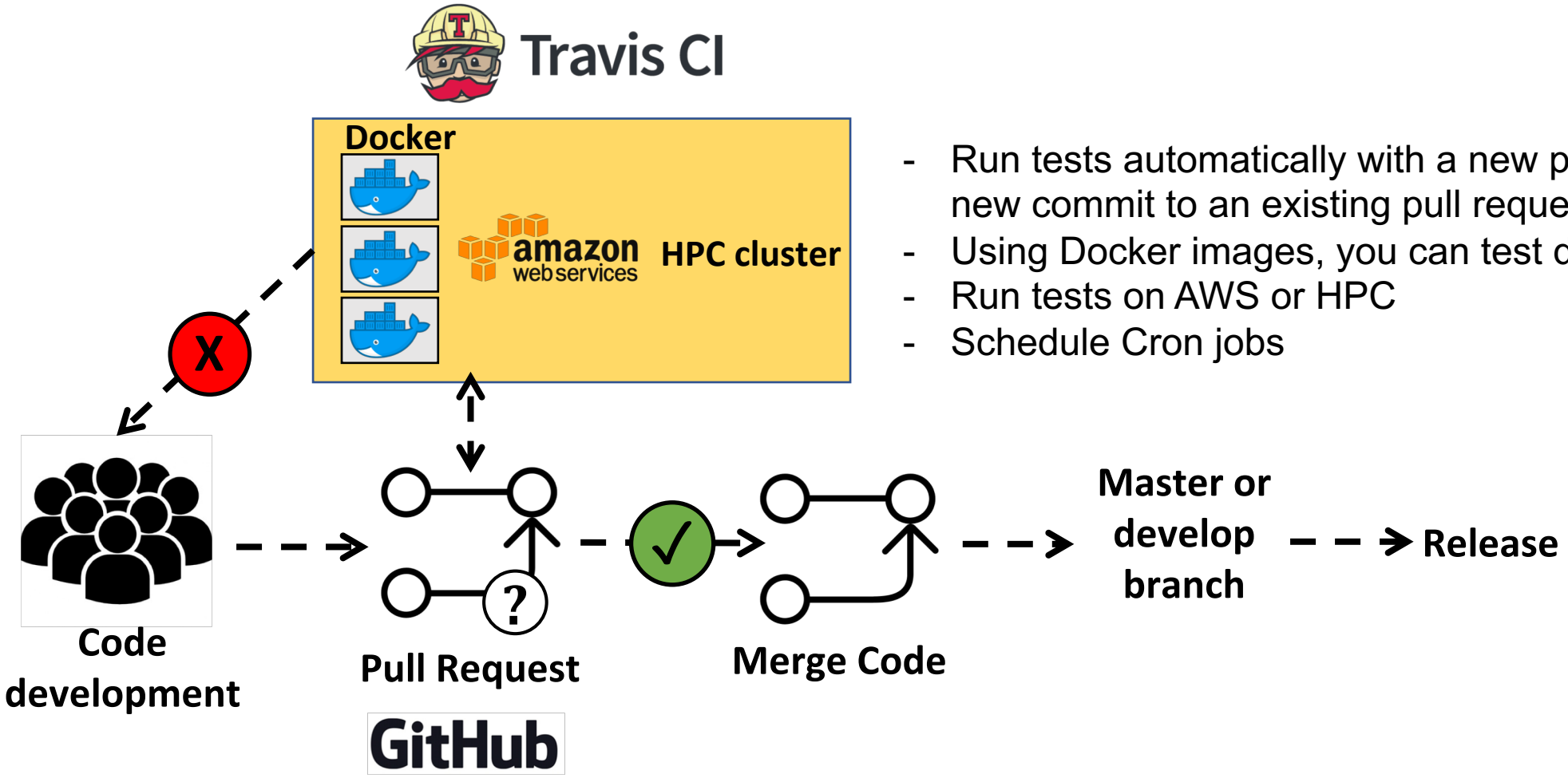
1. Unit tests (*Boost C++ libraries is removed and replaced with eckit; you don't need to compile BOOST!*)
   - Evaluate Boolean expressions during the execution of some particular component of the code
   - Is the input correct?
   - Does some measure of the State norm agrees with a known value within some specified tolerance?
   - Is this particular variable positive?
2. Integration and system tests (Application tests)

Testing Workflow in JEDI



- Time consuming
- Prone to error

Automated Testing Workflow in JEDI



- Run tests automatically with a new pull request or a new commit to an existing pull request
- Using Docker images, you can test different builds
- Run tests on AWS or HPC
- Schedule Cron jobs

Travis-CI pieces in JEDI GitHub repo

Travis-CI currently on OOPS and UFO repositories

Code added to repositories:

.travis.yml :

sets travis-ci environment
builds and runs Docker image using the latest Docker image on DockerHub
builds repo inside the container
runs ctests inside the container and generates reports needed for CodeCov
uploads reports to CodeCov

Dockerfile :

builds tools that are not already on jcsda/docker:latest
customizes the container

default-mca-params.conf:

helps solve the problem with running mpi on docker container and oversubscription setup

.codcov.yml

Example of Travis-CI interface in OOPS

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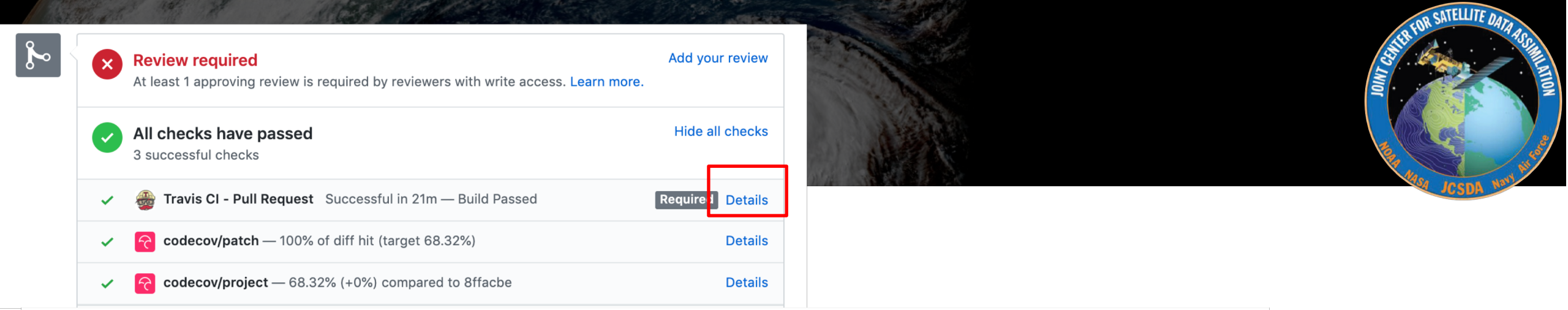
Unwatch 29 | Star 0 | Fork 2

Code | Issues 26 | Pull requests 7 | ZenHub | Security | Insights

Filters | is:pr is:open | Labels 8 | Milestones 2 | New pull request

7 Open | 190 Closed | Author | Labels | Milestones | Reviews | Assignee | Sort

- **New QG geometry** ✗ — 1
  #273 opened 2 days ago by benjaminmenetrier • Review required | Review/QA
- **More informative error messages for L95 model file I/O errors** ✓ — 1
  #272 opened 5 days ago by markjolah • Review required | Review/QA
- **Feature/remove ens linearize** ✓ — 6
  #270 opened 6 days ago by shlyaeva • Approved | Review/QA
- **Feature/remove obsop observed** ● — 3
  #269 opened 6 days ago by shlyaeva • Draft
- **Updated compare script and toy-model tests** ✓ — 7
  #264 opened 7 days ago by benjaminmenetrier • Approved | Review/QA



Review required — Add your review

At least 1 approving review is required by reviewers with write access. Learn more.

All checks have passed — Hide all checks

3 successful checks

- Travis CI - Pull Request — Successful in 21m — Build Passed — Required — Details
- codecov/patch — 100% of diff hit (target 68.32%) — Details
- codecov/project — 68.32% (+0%) compared to 8ffacbe — Details

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build passing

Current | Branches | Build History | Pull Requests

- PR #273 New QG geometry — benjaminmenetrier — #154 passe — 7ccc7b9
- PR #273 New QG geometry — benjaminmenetrier — #152 passe — 433168e
- PR #272 More informative error messages for L95 model fi — Mark J Olah — #149 passe — 23a2e5c

Current | Branches | Build History | Pull Requests > Build #154 | More options

Pull Request #273 New QG geometry

Commit 7ccc7b9
#273: New QG geometry
Branch develop
benjaminmenetrier

#154 passed
Ran for 20 min 31 sec
2 days ago

Restart build
Debug build

Compiler: gcc C++

Job log | View config

Remove log | Raw log

```
▶   1 Worker information                                  worker_info
▶   6 Build system information                            system_info
  413
▶ 414 docker stop/waiting                                 docker_mtu
▶ 416 resolvconf stop/waiting                             resolvconf
▶ 418 Adding APT Sources                                  apt
▶ 590 $ sudo service docker start                         services  0.02s
▶ 592 Installing SSH key from: default repository key     ssh_key
  594 Using /home/travis/.netrc to clone repository.
```

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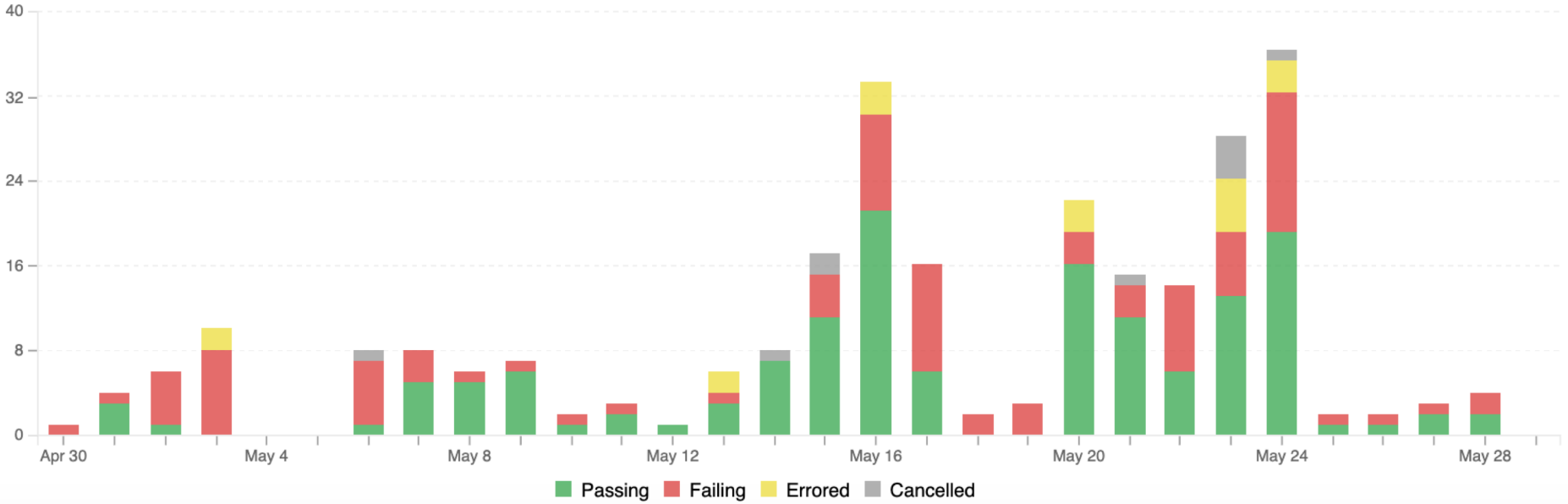
Repositories | Insights

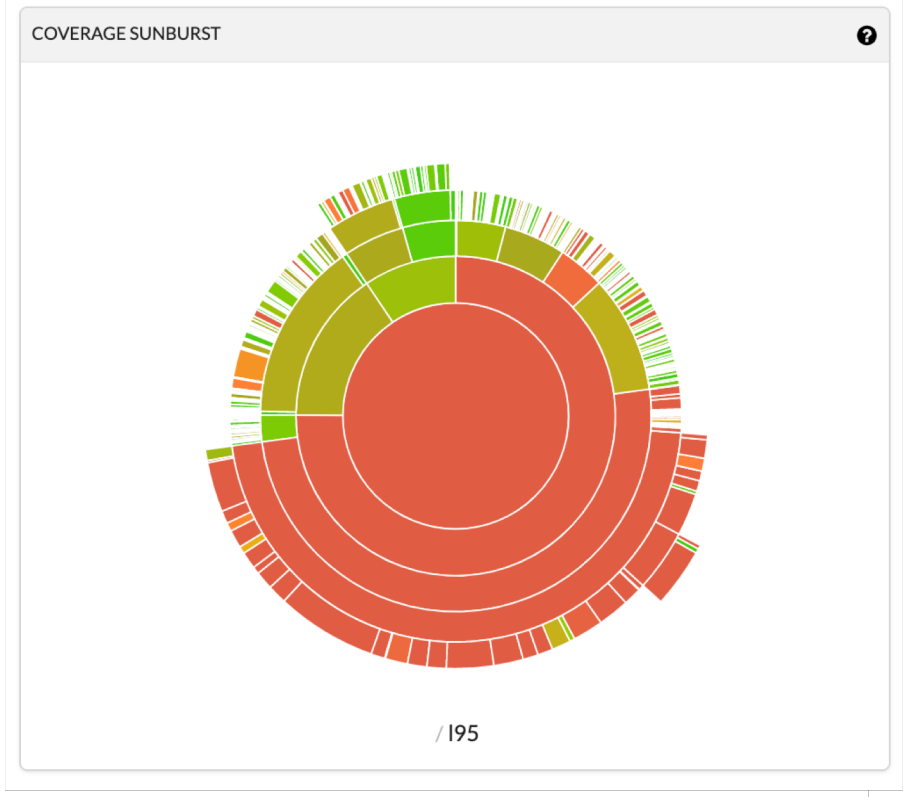
APRIL 30, 2019 - MAY 29, 2019 | View: public and private builds | Week | Month

TOTAL BUILDS	TOTAL JOB MINUTES	AVERAGE QUEUE TIME	ACTIVE REPOSITORIES
266	4,294 mins	1.14 mins	5

Build Statuses



CodeCov report:

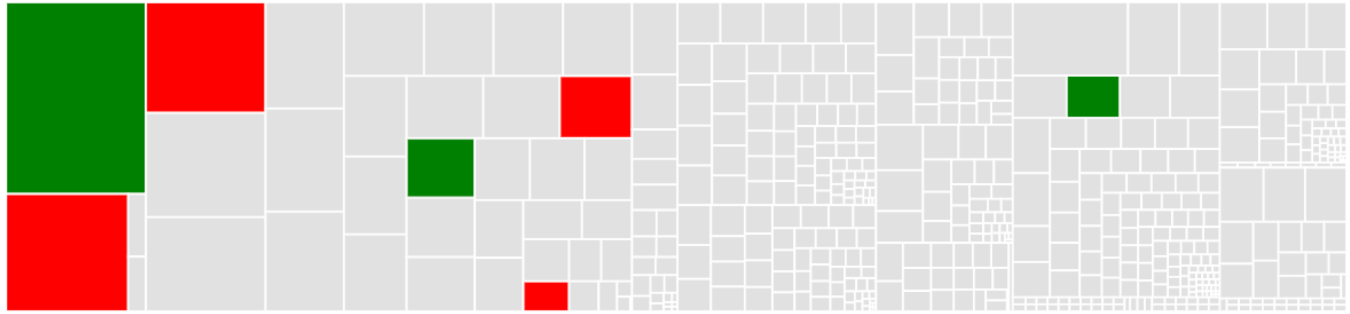


https://codecov.io/gh/JCSDA/oops

mer-a-o commented 2 days ago • edited

Codecov Report

> Merging #273 into develop will **decrease** coverage by `0.01%`.
> The diff coverage is `n/a`.



```
@@             Coverage Diff             @@
##           develop     #273      +/-   ##
==========================================
- Coverage    68.32%   68.31%   -0.02%
==========================================
  Files          513      513
  Lines        32218    32201      -17
==========================================
- Hits         22014    21999      -15
+ Misses       10204    10202       -2
```

Impacted Files	Coverage Δ	
qg/model/qg_obsdb_mod.F90	95.51% <ø> (-0.25%)	⬇
src/oops/generic/bump/tools_fit.F90	67.28% <0%> (-0.94%)	⬇
src/oops/generic/bump/external/tools_stripack.F90	45.73% <0%> (-0.9%)	⬇

In progress:

- Implement Travis-CI on all JEDI repositories
- Add test dependencies to the testing workflow
- Adding more application tests to increase test coverage
- Schedule Cron jobs on AWS to run computationally expensive jobs periodically