To test – continuously – or not to code

Intégration Continue :

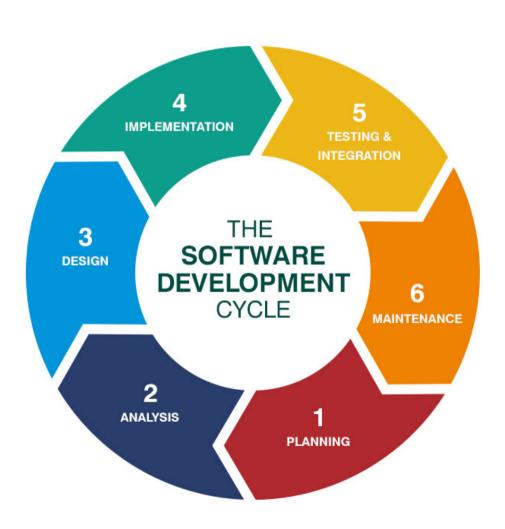
Retour d'expérience sur la mise en place d'un dashboard CDash et

ouverture sur d'autres outils

Claire Mouton - CREATIS, Lyon, France claire.mouton@creatis.insa-lyon.fr

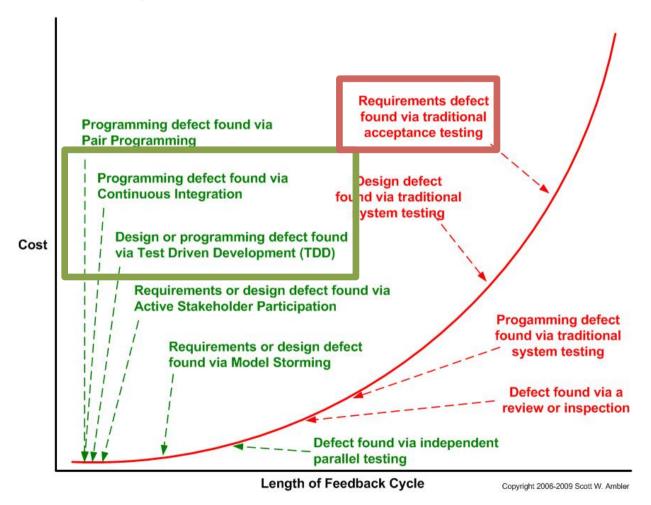
Pourquoi?

Pourquoi?



Pourquoi?

Time is money!



Quand?

Quand?

Intégration Continue

Tester en continu!



Intégration Continue : Principe

Vérifier à chaque modification de code source que le résultat des modifications ne produit pas de régression dans l'application développée

Intégration Continue : Prérequis

Partage du code source via un gestionnaire de version

• Intégration quotidienne des modifications par les développeurs

• Développement de tests d'intégration de l'application

Intégration Continue : Avantages

- Le test immédiat des unités modifiées
- La prévention rapide en cas de code incompatible ou manquant
- Les problèmes d'intégration sont détectés et réparés de façon continue, évitant les problèmes de dernière minute
- Une version fonctionnelle est toujours disponible pour un test, une démonstration ou une distribution

Intégration Continue : Méthodologie

Automatisation des tâches

(compilation, tests unitaires, fonctionnels et d'intégration, tests de performance, validation, documentation ...)

Méthodologie Agile

- des valeurs (communication, simplicité, ...)
- des pratiques (petites livraisons, tests, ...)

Au-delà de l'intégration continue

Couverture du code

Vérification syntaxique

Construction d'image de conteneurs et déploiement

Un outil d'intégration continue : CDash

Open source

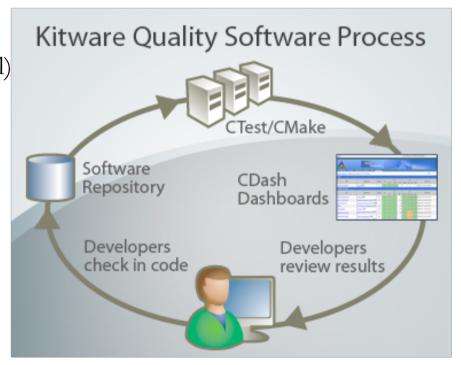
CDash déployé sur son propre serveur ou hébergé chez Kitware (my.cdash.org) Projet CMake (multiplateforme) / CTest

Événement - commit (Continuous)
- à la demande (Experimental)

- crontab (Nightly)

Compilation / Tests / Doc/ Couverture / Analyse Dynamique sur notre architecture (machine réelle, virtuelle, cluster, ...)

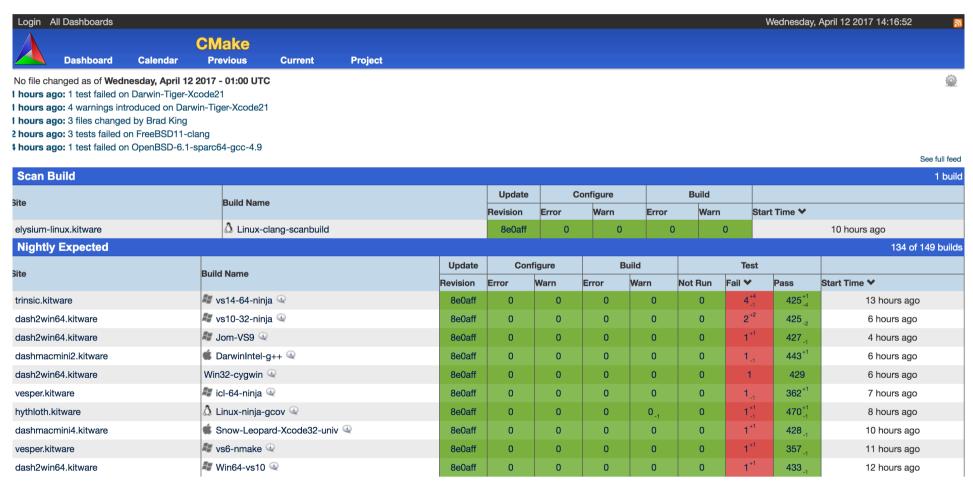
Envoi des résultats au dashboard en ligne



Comment? L'exemple de CDash pour CMake

L'exemple de CDash pour CMake

Compilation multiplateforme et Tests / Nightly



L'exemple de CDash pour CMake

Compilation multiplateforme et Tests / Continuous

Continuous 11 of 12 build										
Site	Build Name	Update	Update Configure		ı	Build		Test		
	Build Hairie	Revision	Error	Warn	Error	Warn	Not Run	Fail	Pass	Start Time ❤
purplekarrot.net	Δ clang-tidy	66be3a	0	0	0	0				12 minutes ago
purplekarrot.net	Δ include-what-you-use	66be3a	0	0	0	0				16 minutes ago
amber12.kitware	₩ Win64-nmake10-WINSDK-7.1	66be3a	0	0	0	0	0	0	427	30 minutes ago
faraway.kitware	∆ Linux	66be3a	0	0	0	0	0	0	485	36 minutes ago
faraway.kitware	∆ Linux	c8e214	0	0	0	0	0	0	485 ⁺⁶	57 minutes ago
amber12.kitware	₩ Win64-nmake10-WINSDK-7.1	c8e214	0	0	0	0	0	0	427	1 hour ago
faraway.kitware	△ Linux	ddcfe8	0	0	0	0	0	0	479 ₋₆	3 hours ago
purplekarrot.net	Δ clang-tidy	ddcfe8	0	0	0	0				7 hours ago
purplekarrot.net	Δ include-what-you-use	ddcfe8	0	0	0	0				7 hours ago
amber12.kitware	₩ Win64-nmake10-WINSDK-7.1	ddcfe8	0	0	0	0	0	0	427	10 hours ago

L'exemple de CDash pour CMake

Génération de la documentation

Continuous Help									
Site	Build Name	Update	Configure		Build				
Site		Revision	Error	Warn	Error	Warn	Start Time ❤		
hythloth.kitware	△ CMakeHelp	66be3a	0	0	0	0	36 minutes ago		
hythloth.kitware	△ CMakeHelp	c8e214	0	0	0	0	1 hour ago		
hythloth.kitware	∆ CMakeHelp	ddcfe8	0	0	0	0	2 hours ago		

L'exemple de CDash pour CMake

Couverture

Coverage								
Site	Build Name	Percentage	LOC Tested	LOC Untested	Date			
dash23.kitware	Linux-g++4.1	73.99% _{-0.07%}	43539 ₋₄₄	15305 +41	13 hours ago			
dash22.kitware	Win32-vs9-Release-Coverage	70.04%	455000	194600	13 hours ago			
CDash Server	Aggregate Coverage	82.27% +7.45%	54681 ₊₈₇₆₃	11785 ₋₃₆₇₁	13 hours ago			
hythloth.kitware	Linux-bullseye-cov	80.68%	436100	104400	12 hours ago			
dash5ubuntu.kitware	Linux-g++4.6.1	75.98%	43547	13765	12 hours ago			
hythloth.kitware	Linux-ninja-gcov	75.49% +0.02%	51508 ₋₆₃	16728 ₋₃₇	8 hours ago			

L'exemple de CDash pour CMake

Analyse dynamique avec

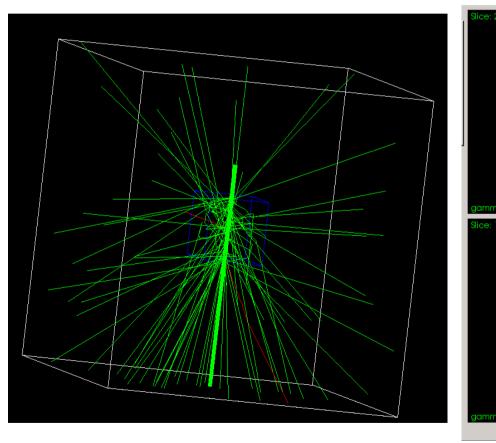
Valgrind

AddressSanitizer

Dynamic Analysis								
Site	Build Name	Checker	Defect Count	Date				
dash23.kitware	Linux-g++4.1	Valgrind	0	13 hours ago				
dashlin1.kitware	Linux-valgrind	Valgrind	132	12 hours ago				
elysium-linux.kitware	Linux-clang-sanitizer	AddressSanitizer	0	11 hours ago				
faraway.kitware	Linux-valgrind2	Valgrind	0	7 hours ago				

Retour d'expérience : CDash pour Gate

Retour d'expérience : CDash pour Gate

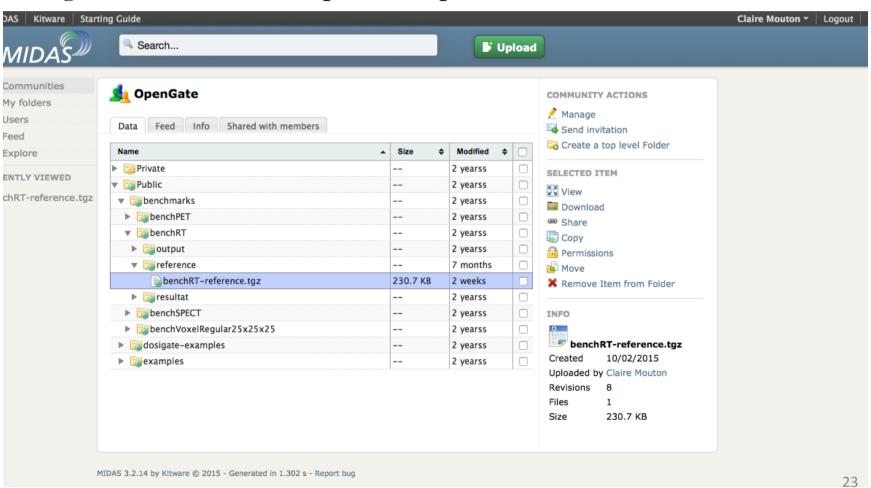


gamma beam in waterbox.

gamma-3d-Dose visualization with vv.

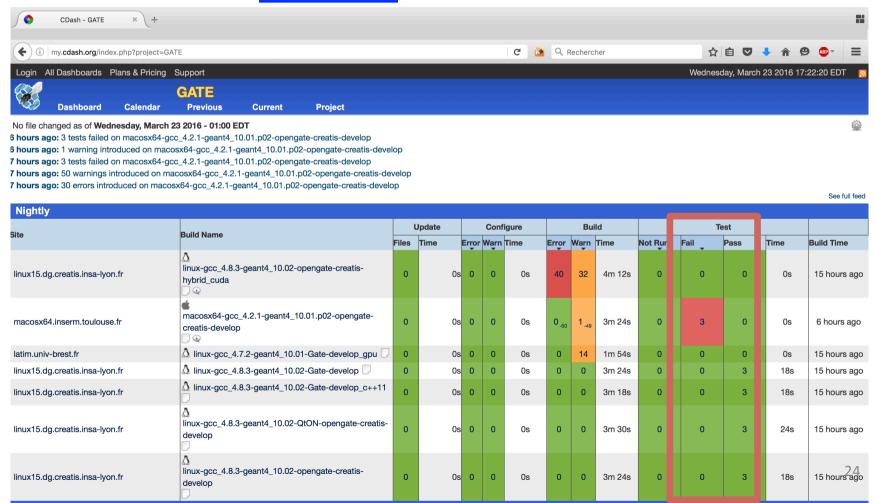
Retour d'expérience : CDash pour Gate

Images de référence récupérées depuis le serveur Midas



Retour d'expérience : CDash pour Gate

Vue d'ensemble du Dashboard



Retour d'expérience : CDash pour Gate

Les fichiers CMake

Configuration pour la compilation du projet et Ctest

```
2017-04-10 05:12:00 -- /home/ifc/opengate-github/opengate-creatis-dashboard/linux15 lin64/linux-gcc 4.8.5-geant4 10.02-opengate-public-develop gpu.cmake
```

Lancement via CTest

```
ctest_start(Nightly)
ctest_update()
ctest_configure()
ctest_build()
ctest_test()
ctest_submit()
```

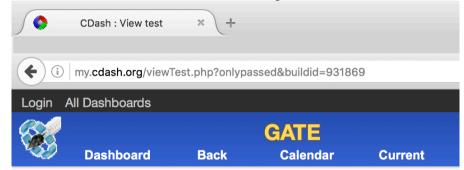
Retour d'expérience : CDash pour Gate

Build log avec détail des erreurs

```
Build Log Line 269
             [ 7%] Building CXX object itk-mhd/src/CMakeFiles/MetaIO.dir/metaVesselTube.o
             [ 7%] Building CXX object itk-mhd/src/CMakeFiles/MetaIO.dir/metaTransform.o
             [ 7%] Building CXX object itk-mhd/src/CMakeFiles/MetaIO.dir/metaTubeGraph.o
             [ 8%] Building CXX object itk-mhd/src/CMakeFiles/MetaIO.dir/metaForm.o
             [ 8%] Building CXX object itk-mhd/src/CMakeFiles/MetaIO.dir/metaArray.o
             [ 8%] Building CXX object itk-mhd/src/CMakeFiles/MetaIO.dir/metaFEMObject.o
             [ 8%] Linking CXX static library libMetaIO.a
             [ 8%] Built target MetaIO
             [ 8%] Building NVCC (Device) object CMakeFiles/Gate.dir/source/gpu/src/Gate generated GateGPUManager.cu.o
            nvcc fatal : Unsupported qpu architecture 'compute 21'
   Error
            CMake Error at Gate generated GateGPUManager.cu.o.cmake:207 (message):
              Error generating
              /.../Gate-develop-bin-10.02 gpu/CMakeFiles/Gate.dir/source/gpu/src/./Gate generated GateGPUManager.cu.o
             Scanning dependencies of target Gate
             [ 8%] Building CXX object CMakeFiles/Gate.dir/Gate.cc.o
             [ 8%] Building CXX object CMakeFiles/Gate.dir/source/arf/src/GateARFSD.cc.o
             [ 8%] Building CXX object CMakeFiles/Gate.dir/source/arf/src/GateARFTableMgrMessenger.cc.o
             [ 8%] Building CXX object CMakeFiles/Gate.dir/source/arf/src/GateARFSDMessenger.cc.o
             [ 8%] Building CXX object CMakeFiles/Gate.dir/source/arf/src/GateARFTable.cc.o
```

Retour d'expérience : CDash pour Gate

Résultat des tests



Testing started on 2016-03-23 06:05:48

Site Name:linux15.dg.creatis.insa-lyon.fr

Build Name:linux-gcc_4.8.3-geant4_10.02-Gate-develop

Total time:23s 60ms

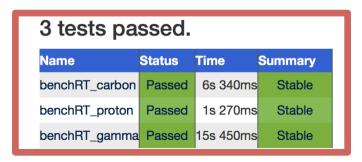
OS Name:Linux

OS Platform:x86_64

OS Release:4.4.5-200.fc22.x86_64

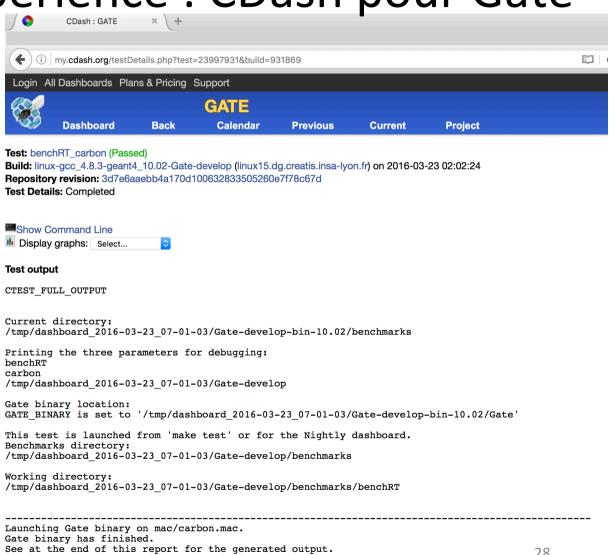
OS Version:#1 SMP Thu Mar 10 17:54:17 UTC 2016

Compiler Version:unknown



Retour d'expérience : CDash pour Gate

Exemple de log des tests (1/2)



Retour d'expérience : CDash pour Gate

Exemple de log des tests (2/2)

```
CDash: GATE
     i my.cdash.org/testDetails.php?test=23997931&build=931869
diff carbon-3d-Edep.raw
diff: Performing diff -s
Files reference/carbon-3d-Edep.raw and output/carbon-3d-Edep.raw are identical
exit status partial is:
diff carbon-3d-Edep-Squared.mhd
diff: Performing diff -s
Files reference/carbon-3d-Edep-Squared.mhd and output/carbon-3d-Edep-Squared.mhd are identical
exit status partial is:
diff carbon-3d-Edep-Squared.raw
diff: Performing diff -s
Files reference/carbon-3d-Edep-Squared.raw and output/carbon-3d-Edep-Squared.raw are identical
exit status partial is:
diff carbon-3d-NbOfHits.mhd
diff: Performing diff -s
Files reference/carbon-3d-NbOfHits.mhd and output/carbon-3d-NbOfHits.mhd are identical
exit status partial is:
diff carbon-3d-NbOfHits.raw
diff: Performing diff -s
Files reference/carbon-3d-NbOfHits.raw and output/carbon-3d-NbOfHits.raw are identical
exit status partial is:
diff stat stat-carbon.txt
diff stat: Performing detailed diff on the 6th first lines of stat-carbon.txt:
Files /dev/fd/63 and /dev/fd/62 are identical
exit status partial is:
0
Meaning of the exit status partial:
'0': no difference i.e. SUCCESSFUL TEST
'1': difference in a text file i.e. FAILING TEST
'2': difference on a binary file or missing file i.e. FAILING TEST
                                                                                     29
```

.____

D'autres outils

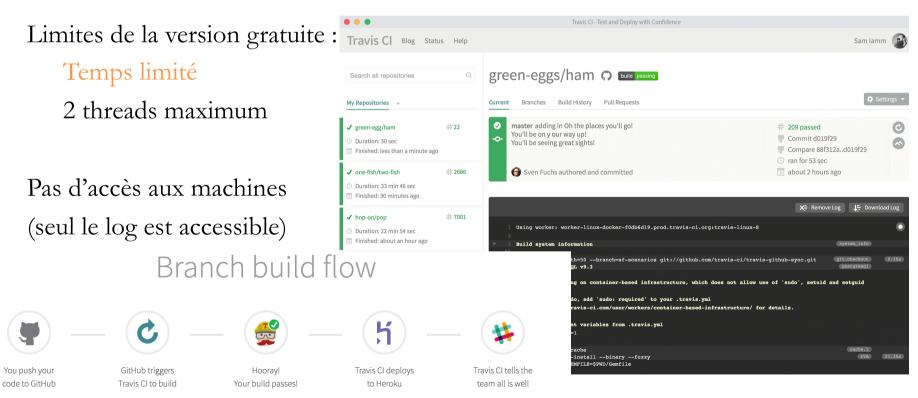
Travis CI

Gratuit pour projets open-source – Licence MIT (open source)

Hébergé: compilation, exécution en ligne

Interfacé à Github

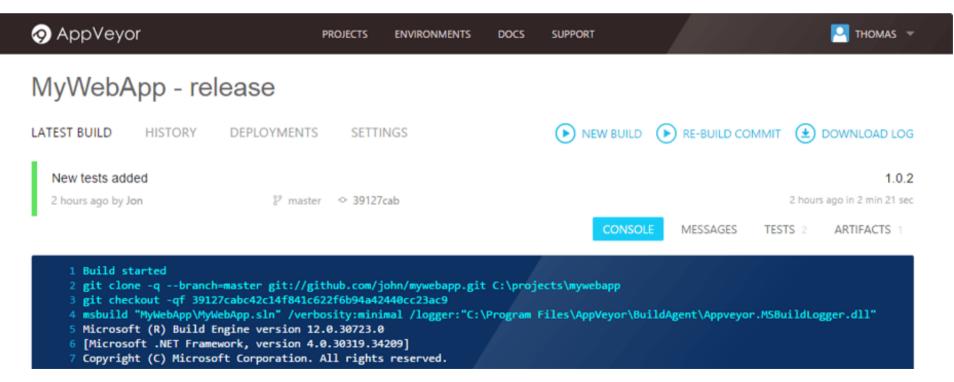
Unix / Pas d'environnement Windows



Appveyor

Equivalent à Travis CI pour Windows

Propriétaire



Gitlab-CI

Intégré à GitLab - fichier ".gitlab-ci.yml" à la racine de votre dépôt

Open source Multi-plateforme

Multi-langage Compilation en parallèle

Possibilité d'utiliser des images Docker personnalisées



GitLab C	Add Project L	Jsers Background Jobs		a dm	itriy.zaporozhets@gmail.com ເ→ Logout
Project:	GitLab db:my	'SQI (Public) View on GitLab			Details Stats
All builds	master 4-2-stable	gitlabdotcom-5-0 5-0-stable			
Status	Commit	Message	Branch	Duration	Finished at
running	c1a9e9228	Fix badge image url to ci.gitlab.org	master	about 1 hour	
success	97de212e8	Merge pull request #3522 from dplarson/correct	master	about 1 hour	about 12 hours ago
success	97de212e8	Merge pull request #3522 from dplarson/correct	master	about 1 hour	1 day ago
success	8bd99779f	Merge pull request #3538 from AeroNotix/patch-1	master	about 1 hour	1 day ago
success	5577ee826	remove outdated routing specs	master	about 1 hour	1 day ago
failed	e0df75de3	refactor Issues.js. Remove unused actions. Resp	master	about 1 hour	2 days ago
success	7f3687537	Fixed mr filter tests	master	about 1 hour	2 days ago
success	9fddd5b44	Refactoring & restyle pagination: - remove admi	master	about 1 hour	2 days ago
success	52ad34fd5	New entries in CHANGELOG	master	about 1 hour	3 days ago
success	f4ae433d9	Increase event title font size on dashboard act	master	about 1 hour	3 days ago
success	5b06c9a73	apply redesigned MR list to dashboard, group etc	master	about 1 hour	3 days ago
success	b6e71360b	fix resicpes to point 5-0-stable branch	5-0-stable	39 minutes	3 days ago

Jenkins (fork de Hudson)

Open source

A installer sur sa propre infrastructure

Interfacé à gestionnaires de versions tels que CVS, Subversion, Git

Exécute des projets basés sur Apache Ant et Apache Maven aussi bien que des scripts en shell Unix ou batch Windows

Solution de remplacement populaire à l'outil de référence CruiseControl



Strider-CD

Open source

Intégration continue et serveur de déploiement

A installer sur sa propre infrastructure

Interfaçable à Github, Gitlab, Bitbucket, Node.js, Docker

Strider	Dashboard	Projects	Account Admin				A Comment
Latest	Builds:						
	Job		Project	Commit		Duratio	n
	‡ 51f458a7	d	jaredly/codetalker		0	135s	
	① 51f45893	C /	notablemind/note		0	5s	2 minutes ago
۵	5 1f45498	2 /	Strider-CD/strider	jshint fixes	0	481s	11 minutes ago
	✓ 51f2db75	C /	Strider-CD/strider-simple-worker	Merge pull request #15 from Strider-CD/c	0	35s	a day ago
	① 51f2b384	2 /	Strider-CD/strider-travis		0	6s	a day ago
	5 1eec859	C /	jaredly/org-lite		0	1s	4 days ago
	1 51eec4e5	C /	jaredly/search		0	607s	4 days ago
	51eb90b1	C /	notablemind/socketio-monitor		0	1s	7 days ago

Comparaisons avec d'autres outils

Name	Platform •	License ♦	Builders: Windows 💠	Builders: Java	Builders: other \$	Notification \$	Integration, IDEs \$	Integration, other \$
AnthillPro	Cross-platform	Proprietary	MSBuild, NAnt, Visual Studio	Ant, Maven 1-2-3	Shell script, batch script, cross-platform command-line, Groovy, Make, RTC Jazz, TFS Build, Custom Script Interpreter	Email, XMPP, RSS, Systray	Eclipse, Visual Studio	Many
Apache Continuum	JDK, web container	Apache 2.0	Unknown	Maven 1-2-3	Shell script ^[2]	Mail, XMPP and Google Talk, MSN, IRC, report deployment with wagon	Unknown	Unknown
Apache Gump	Python	Apache 2.0	Unknown	Ant, Maven 1	Unknown	Email	Unknown	Unknown
AppVeyor	Hosted	Proprietary	Visual Studio, MSBuild, Psake	No	Custom Script, PowerShell	Email, HipChat, Slack, Catlight &	No	GitHub, Bitbucket, Kiln, Windows Azure
Bamboo	Web container	Proprietary	MSBuild, ^[3] NAnt, ^[4] Visual Studio ^[5]	Ant, ^[6] Maven 1-2-3 ^[7]	Custom script, command-line tool, Bash, Xcode, [8] Phing, [9] Grunt	XMPP, Google Talk, Email, RSS, Remote API, HipChat	IntelliJ IDEA, Eclipse, Visual Studio	FishEye, Jira, Clover, Bitbucket, GitHub
Buddy	Cross-platform	Proprietary	No	Ant, Maven, Gradle	Elixir, Go, Haskell, Node.js, PHP, Python, Ruby, .NET Core	Desktop, Email, Slack, SMS	No	Amazon Web Services, Bitbucket, GitHub, GitLab, Google Cloud Services, Heroku, Modulus
BuildBot	Python	GPL	Command-line	Command-line	Command-line	Email, Web, GUI, IRC	Unknown	Unknown
BuildMaster	Cross-platform	Proprietary	Yes	Yes	Cross-platform command-line	Email, custom	No	Many
CABIE	LAMP	GPL2	Unknown	Unknown	Unknown	Web	Unknown	Unknown
CruiseControl	Cross-platform	BSD-style	NAnt, Rake, Xcode	Phing, Apache Ant, Maven	catch-all 'exec'	Email, CCTray	Eclipse	Unknown
CruiseControl.NET	Cross-platform	BSD-style	MSBuild, NAnt, Visual Studio	Unknown	Command-line	Email, CCTray, RSS	Unknown	Unknown
GoCD	Cross-platform	Apache 2.0	Command-line	Command-line	Command-line	Email, hipchat, Slack, Gerrit, Gitter, Riemann etc &	No	GitHub
Jenkins-Hudson	Web container	Creative Commons and MIT	MSBuild, NAnt	Ant, Maven 2, Kundo	Cmake, Gant, Gradle, Grails, Phing, Rake, Ruby, SCons, Python, shell script, command-line	Android, Email, Google Calendar, IRC, XMPP, RSS, Twitter, Slack, Catlight, CCMenu, CCTray	Eclipse, IntelliJ IDEA, NetBeans	Bugzilla, Google Code, Jira, Bitbucket, Redmine, FindBugs, Checkstyle, PMD and Mantis, Trac, HP ALM
OpenMake Software Meister	Cross-platform	Proprietary	MSBuild, NAnt, Visual Studio	Ant, Maven 1-2-3	Shell script, batch script, cross-platform command-line, Groovy, Make, RTC Jazz, TFS Build, Custom Script Interpreter	Email, XMPP, RSS, Systray	Eclipse, Visual Studio	Bugzilla, Google Code, Jira, Bitbucket, Redmine, FindBugs, Checkstyle, PMD and Mantis, Trac
Travis CI	Hosted	MIT	No	Ant, Maven, Gradle ^[10]	C, C++, Clojure, Elixir, Erlang, Go, Groovy, Haskell, Java, Node.js, Perl, PHP, Python, Ruby, Rust, Scala, Smalltalk	Email, Campfire, HipChat, IRC, Slack, Catlight, CCMenu, CCTray	No	GitHub, Heroku
TeamCity	Web container	Proprietary	MSBuild, NAnt, Visual Studio, ReSharper-based .NET code analysis	Ant, Maven 2-3, Gradle, IntelliJ IDEA-based build and code analysis	command-line, PowerShell ^[11] , Xcode ^[12] , Rake, FxCop	Email, XMPP, RSS, IDE, SysTray, Catlight	Eclipse, Visual Studio, IntelliJ IDEA, RubyMine, PyCharm, PhpStorm, WebStorm	JetBrains YouTrack, Jira, Bugzilla, FishEye, FindBugs, PMD, dotCover, NCover
Team Foundation Server, Visual Studio Team Services (VSTS)	Cross-platform	Proprietary, MIT	MSBuild, Visual Studio	Ant, Maven, Gradle, Android	C, C++, Go, Groovy, Java, Node.js, Perl, PHP, Python, Ruby	Email, SOAP, Catlight	Visual Studio, Eclipse, IntelliJ IDEA, Android Studio, Visual Studio Code	GitHub, Jenkins, Slack, Hipchat, FindBugs, Checkstyle, PMD
Vexor	Hosted	Proprietary	No	Unknown	Ruby, Clojure, Scala, Python, Node.js, Go, Rust, Haskell	Email, HipChat, Slack	Unknown	GitHub, Bitbucket, Gitlab

https://en.wikipedia.org/wiki/Comparison_of_continuous_integration_software

https://www.slant.co/topics/799/~best-continuous-integration-tools https://www.slant.co/topics/186/~best-hosted-continuous-integration-services

Atelier Intégration Continue Groupe Calcul

Prêts à franchir le cap de l'automatisation de vos compilations et tests?

Atelier du 29 au 31 mai 2017, supports en ligne: http://calcul.math.cnrs.fr/spip.php?article282

Au programme: Git, Docker,

Jenkins, Gitlab CI, Travis CI