

Continuous integration with ci.inria.fr

Practical seminar, 11 17 2015

Soraya Arias Maurice Brémond Gaëtan Harter David Parsons

Summary

1. Continuous integration ?

- Principles

- Purposes

- Issues with build automation

2. ci.inria.fr

- ci.inria.fr

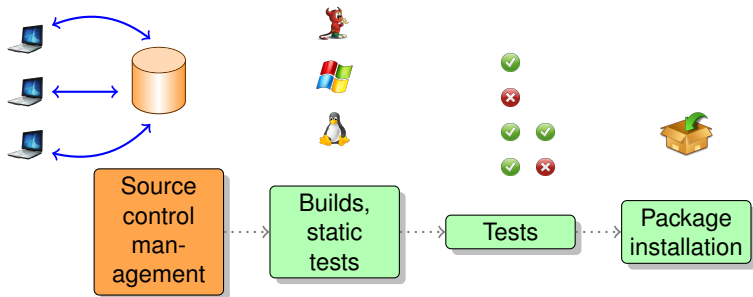
- The user root page

- The project page

1

Continuous integration ?

Software integration process = build workflow



An automated process :

- Continuous : the process is started with new “commits”.
- On a regular basis, for example nightly or weekly.

Continuous integration

Why ?

A short development cycle to find problems early in:

- code merging,
- the software tests,
- the portability,
- ...

Continuous integration is related to software development practices

Implications

- Each step of the integration workflow needs to be **automated** : configuration, build, tests, packaging.
- This automation needs a continuous integration software.
- Feedback must be organised : mails, dashboards, ...

Build automation

Intrinsic issues

- Dependency between source files and compiled targets
- Compilation rules
- “debug” target, optimised target
- What kind of library : static or shared ?
- ...

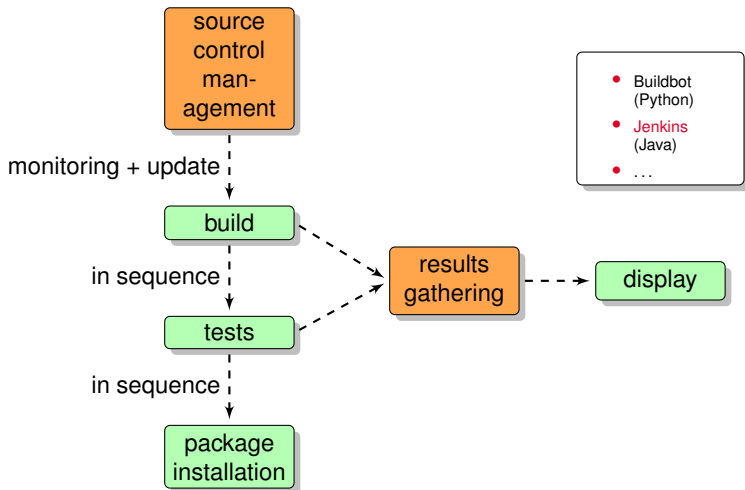
make

- autotools
- cmake
- scons
- qmake
- ...

System environment issues

- Which compiler, which “runtime” ?
- Which arguments ?
- Where are the external libraries ?
- How to link with external libraries ?
- ...

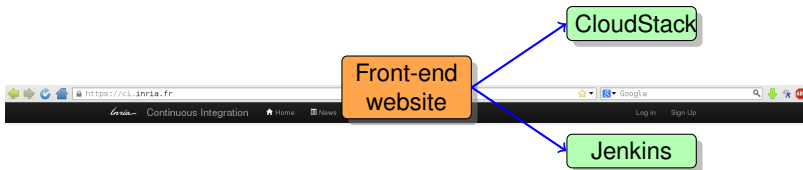
Typical workflow



2

ci.inria.fr

https://ci.inria.fr/



Continuous Integration, Inria

Simple and flexible platform to improve your Quality of Software and reduce wasted time.



Users 208 Projects 112

Designed for Inria and its Pa

Why do I need your service? Read below

Reduce risks

Replace "big and long" integration phases (especially at the end of the project) with "small and frequent" ones. The idea is to work with small increments as explained [here](#). This way, you will have more time to focus on added value tasks.

SaaS platform : Your project ready to use in a few minutes

The platform is designed to provide on-demand Continuous Integration projects (powered by Jenkins) with a strong integration with a dedicated cloud to easily and

Rapid feedback

Get a rapid feedback on your checkout will depend of the c

Master your v

An integrated cloud powered (creates, updates, deletes) will provided by administrators to the community.



Wiki ciportal

page | discussion

Main Page

Contents (hide)

- 1 Brief introduction
- 2 User responsibility
- 3 How to get started?
- 4 Service offer
 - 4.1 Software platform
 - 4.2 Hardware platform
 - 4.3 Availability

The user root page

The screenshot shows the user root page for Soraya Arias on the Inria CI dashboard. The browser address bar shows 'ci.inria.fr/dashboard'. The navigation bar includes 'Continuous Integration', 'Dashboard', 'News', 'Projects', and 'Active Users', with a user profile dropdown for 'soraya.arias@inria.fr'. A dropdown menu for 'Projects' is open, showing 'List projects' and 'Create a new project'. The main content area has two cards: 'Host my project' (green button) and 'Join an existing project' (blue button). Below are three project cards: 'cadp for Windows' (Active, Private), 'KohaUbuntuTest' (Active, Private), and 'TPCISedRa' (Active, Public). Each card has 'Jenkins' and 'Manage project' buttons.

ci.inria.fr/dashboard

Continuous Integration Dashboard News Projects Active Users soraya.arias@inria.fr

Dashboard Soraya Arias

- List projects
- Create a new project

Host your project on the Continuous Integration platform. It will provide a fully configured Jenkins server (with backup) and nodes to build your jobs. You will also be able to use your existing nodes.

Join an existing project. Browse the project list and click the 'join' button.

Host my project

Join an existing project

cadp for Windows	Active Private	Jenkins	Manage project
KohaUbuntuTest	Active Private	Jenkins	Manage project
TPCISedRa	Active Public	Jenkins	Manage project

The user root page

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ci.inria.fr/dashboard

Continuous Integration Dashboard News Projects Active Users soraya.arias@inria.fr

Dashboard Soraya Arias

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TPCISedRa	Active Public	Jenkins	Manage project

Documentation Contact us Back to top

The project page

siconos--

Public Active

Project Id: 56

Fullname: Siconos Software

[Edit](#) [Delete](#)

Description:

SICONOS is an open source scientific software primarily targeted at modeling and simulating nonsmooth dynamical systems

Slaves

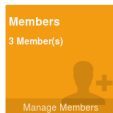


9

Manage Slaves

Members


3 Member(s)



Manage Members

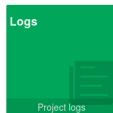
Manage Jenkins

Production version: 1.617
Qualification version: 1.617
Previous version: 1.466.2



Manage Jenkins

Logs



Project logs

Jenkins dashboard



Jenkins dashboard



[Documentation](#) [Contact us](#)

[Back to top](#)

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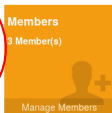


9

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3 Member(s)



Manage Members

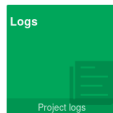
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Manage Jenkins

Logs



Project logs

Jenkins dashboard



Jenkins dashboard

Management of virtual machines

siconos--

[Public](#) [Active](#)[Slaves](#)[Members](#)[Manage Jenkins](#)[Logs](#)[Jenkins dashboard](#)

If you want to get more actions / information on slaves (add a disk, create a template, etc.), you can access CloudStack using the same credentials as the CI portal. The Domain must be `ci/siconos--`. [CloudStack](#)

If you want to add an external slave (not created on CloudStack) you may need to add the public SSH key of your Jenkins on it : [Download](#)

[Add slave](#)

Status	Display name	Hostname	IP	OS	CPU (Mhz)	Memory (MB)	Created	Shh	Actions
Running	siconos---vm0	siconos---vm0	172.21.10.174	Ubuntu 12.04 amd64	2000	4096	28/10/2015 15:57	Connect	Stop Delete
Running	windows	siconos---windows	172.21.8.106	BETA - Windows 7 64b-Visual-V25	1024	1024	21/07/2013 15:07	Connect	Stop Delete
Running	siconos---gcc-latest	siconos---gcc-latest	172.21.9.181	ubuntu-14.04.1-server-amd64	2000	4096	25/10/2014 17:34	Connect	Stop Delete
Running	siconos---clang-advanced	siconos---clang-advanced	172.21.9.172	ubuntu-14.04.1-server-amd64	2000	4096	23/10/2014 22:45	Connect	Stop Delete
Running	siconos---fedora18	siconos---fedora18	172.21.9.215	Fedora 18 64 bits	2000	2048	03/06/2014 16:03	Connect	Stop Delete

Management of virtual machines

siconos--

Public Active

Slaves

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Running	siconos---fedora18	siconos---fedora18	172.21.9.215	Fedora 18 64 bits	2000	2048	03/06/2014 16:03	Connect	Stop Delete

The creation of a virtual machine

New slave siconos--

Name *

Give it a name !

Optional description in Jenkins (optional)

Template *

Featured

Community

My Templates

- centos-6.3-amd64
- centos-6.3-i386
- OS X 10.9 - Mavericks
- ubuntu-12.04-amd64
- ubuntu-12.04-i386

Information : Slave's name can contain letters, digits and hyphen (-).
It must start with a letter and cannot end with an hyphen.

Computer offering

Minimal configurations:
Windows: 2x1.5 GHz + 2 GB RAM.
OS X: 1x1 GHz + 2 GB RAM.

Additional Disk (optional)

Information : Featured templates have 20GB (For GNU/Linux) and 40GB (Windows and OS X).

Reset

Create slave

← Back

Access to the virtual machine server : cloudstack

siconos--

Public Active

Slaves

Members

Manage Jenkins

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Jenkins dashboard

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[CloudStack](#)

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Access to the virtual machine server : cloudstack

The screenshot shows the CloudStack web interface. The browser address bar displays <https://ci-cloud.inria.fr/client/>. The interface includes a navigation sidebar on the left with menu items: Dashboard, Instances, Storage, Network, Templates, Events, and Accounts. The main content area is titled "Virtual machines" and features three summary cards: "Running VMs" with a green background and the number 2, "Stopped VMs" with a red background and the number 0, and "Total VMs" with a blue background and the number 2. Below these cards is a "Latest events" section with a "View all" button, showing two events: "USER.LOGIN" (user has logged in) and "VM.CREATE". To the right, a "Network" section shows "Isolated networks: 0". The top right of the interface shows "Notifications", "Default View", "Project View", and the user name "Maurice Brémond".

Access to the virtual machine server : cloudstack/machine

The screenshot displays the CloudStack web interface. The top navigation bar includes 'CloudStack', 'Notifications', 'Default View', 'Project View', and the user name 'Maurice Brémond'. The left sidebar shows 'Dashboard', 'Instances', and 'Storage'. The main content area is titled 'Instances' and 'windows7'. A table lists instance details:

Property	Value
Display name	windows7
State	Running
Zone name	zone-ci
Template	Windows 7 64b SP1-with JRE-v21b
OS Type	Windows 7 (64-bit)
Compute offering	xLarge Instance

A red circle highlights the 'Connect to Projector' button in the instance details. A red arrow points from this button to a remote desktop window showing the Windows 7 desktop environment. The desktop window title is 'Remote Desktop Connection' and it displays the 'Getting Started' window with various application icons and a taskbar.

Jenkins : management

siconos--

Public Active

Slaves Members Manage Jenkins Logs **Jenkins dashboard**

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CloudStack

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Add slave

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Jenkins : management

Jenkins

Build Queue (2)

- continuous-release
- continuous-release-cxx11

Build Executor Status

- clang
1 idle
- clang-advanced
1 idle
- gcc-latest
1 idle
- ppc64 (offline)
- siconos-fedora18
1 idle
- siconos-fedora20

S	W	Name ↓	Last Success	Last Failure
		MSVC-2013-amd64-Release	1 yr 3 mo - #21	1 hr 57 min - #471
		docker-clean	1 hr 18 min - #67	6 days 2 hr - #6
		crosscompilation	4 days 0 hr - #2278	1 day 1 hr - #2279
		continuous-release-cxx11	1 mo 9 days - #349	20 days - #440
		continuous-release	20 days - #419	26 days - #392
		continuous-clang-msan	1 mo 9 days - #232	1 hr 57 min - #384
		continuous-clang-full	5 mo 3 days - #179	1 hr 57 min - #430
		continuous-clang-asan	2 mo 29 days - #152	1 hr 57 min - #387
		continuous-clang	2 yr 1 mo - #23	1 hr 57 min - #667
		continuous	2 mo 28 days - #2381	1 hr 38 min - #2713
		continuous-gcc-asan	1 mo 9 days - #261	1 hr 57 min - #413

Icon: [S](#) [M](#) [L](#)

Legend [BSS for all](#) [BSS for failure](#)

Jenkins : management

The screenshot shows the Jenkins web interface. On the left, a navigation menu includes 'New Item', 'People', 'Build History' (circled in red), 'Manage Jenkins', 'Credentials', and 'My Views'. Below the menu are sections for 'Build Queue (2)' and 'Build Executor Status'.

The 'Build Queue (2)' section lists two items:

- continuous-release
- continuous-release-cxx11

The 'Build Executor Status' section lists several executors:

- clang (1 idle)
- clang-advanced (1 idle)
- gcc-latest (1 idle)
- ppc64 (offline)
- siconos-fedora18 (1 idle)
- siconos-fedora20

The main content area displays a table of build history. The table has columns for 'S' (Success/Failure status), 'W' (Weather icon), 'Name', 'Last Success', and 'Last Failure'. The table is filtered by 'Tous'.

S	W	Name ↓	Last Success	Last Failure
🔴	☁️	MSVC-2013-amd64-Release	1 yr 3 mo - #21	1 hr 57 min - #471
🔵	☀️	docker-clean	1 hr 18 min - #67	6 days 2 hr - #6
🔴	☁️	crosscompilation	4 days 0 hr - #2278	1 day 1 hr - #2279
🔴	☁️	continuous-release-cxx11	1 mo 9 days - #349	20 days - #440
🔵	☀️	continuous-release	20 days - #419	26 days - #392
🔴	☁️	continuous-clang-msan	1 mo 9 days - #232	1 hr 57 min - #384
🔴	☁️	continuous-clang-full	5 mo 3 days - #179	1 hr 57 min - #430
🔴	☁️	continuous-clang-asan	2 mo 29 days - #152	1 hr 57 min - #387
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🔴	☁️	continuous	2 mo 28 days - #2381	1 hr 38 min - #2713
🔴	☁️	continuous-gcc-asan	1 mo 9 days - #261	1 hr 57 min - #413

Below the table, there is an 'Icon: S M L' label and a 'Legend' section with icons for 'BSS_for_all' and 'BSS_for_fallu'.

Jenkins : management



Jenkins >

- New Item
- People
- Build History
- Manage Jenkins
- Credentials
- My Views

Build Queue (2)

- [continuous-release](#)
- [continuous-release-cxx11](#)

Build Executor Status

- clang**
1 Idle
- clang-advanced**
1 Idle
- gcc-latest**
1 Idle
- ppc64** (offline)

Manage Jenkins

- New version of Jenkins (1.638) is available for [download \(changelog\)](#).** Or Upgrade Automatically
- Slave to master security subsystem is currently off. [Please read the documentation](#) and consider turning it on.**



[Configure System](#)

Configure global settings and paths.



[Configure Global Security](#)

Secure Jenkins; define who is allowed to access/use the system.



[Reload Configuration from Disk](#)

Discard all the loaded data in memory and reload everything from file system. Useful when you modified config files.



[Manage Plugins](#)

Add, remove, disable or enable plugins that can extend the functionality of Jenkins. **(updates available)**



[System Information](#)

Displays various environmental information to assist trouble-shooting.



[System Log](#)

System log captures output from java.util.logging output related to Jenkins.



[Load Statistics](#)

Check your resource utilization and see if you need more computers for your builds.



[Jenkins CLI](#)

Access/manage Jenkins from your shell, or from your script.



[Script Console](#)

Jenkins : management

Jenkins

- New Item
- People
- Build History
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- My Views

Build Queue (2)

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Configure global settings and paths.
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Check your resource utilization and see if you need more computers for your builds.
- [Jenkins CLI](#)
Access/manage Jenkins from your shell, or from your script.
- [Script Console](#)

Jenkins : installed plugins



Jenkins

search

Jenkins > Plugin Manager

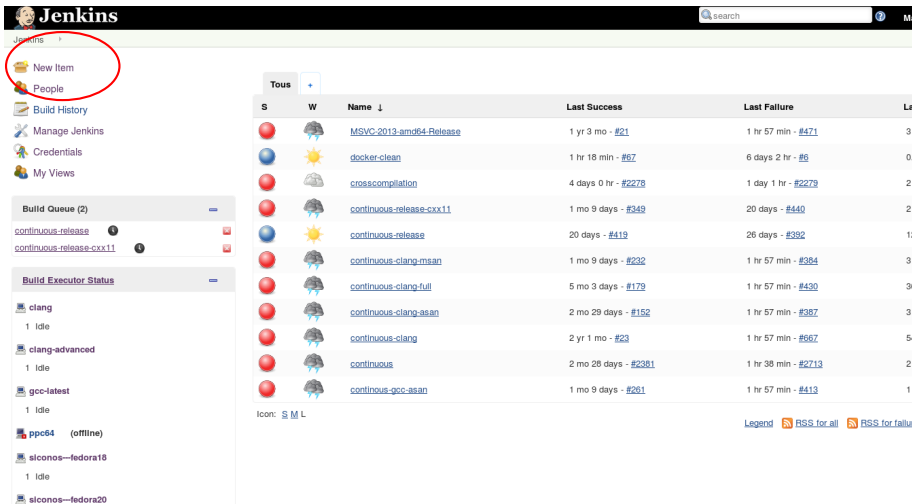
Back to Dashboard

Manage Jenkins

Updates Available **Installed** Advanced

Enabled	Name ↓
<input checked="" type="checkbox"/>	Windows Slaves Plugin Allows you to connect to Windows machines and start slave agents on them.
<input checked="" type="checkbox"/>	Warnings Plug-In This plug-in collects the compiler warnings of the project modules and visualizes the results. If you like this open source plug-in please consider supporting my work by buying my Android game Inca Trails .
<input checked="" type="checkbox"/>	Travis YML Plugin This plugin runs your jobs using .travis.yml file in your project.
<input checked="" type="checkbox"/>	Translation Assistance plugin This plugin adds an additional dialog box in every page, which enables people to contribute localizations for the messages they are seeing in the current page.
<input checked="" type="checkbox"/>	Token Macro Plugin This plug-in adds reusable macro expansion capability for other plug-ins to use.
<input checked="" type="checkbox"/>	Subversion Plug-in This plugin adds the Subversion support (via SVNKit) to Jenkins.
<input checked="" type="checkbox"/>	Static Analysis Utilities This plug-in provides utilities for the static code analysis plug-ins. If you like this open source plug-in please consider supporting my work by buying my Android game Inca

Jenkins : new build project



The screenshot shows the Jenkins dashboard. In the left sidebar, the 'New Item' button is highlighted with a red circle. Below it are other navigation options like 'People', 'Build History', 'Manage Jenkins', 'Credentials', and 'My Views'. The 'Build Queue (2)' section shows two items: 'continuous-release' and 'continuous-release-cxx11'. The 'Build Executor Status' section shows several executors: 'clang', 'clang-advanced', 'gcc-latest', 'ppc64 (offline)', 'siconos-fedora18', and 'siconos-fedora20'. The main table lists various build jobs with their status, weather icons, names, last success, and last failure.

S	W	Name ↓	Last Success	Last Failure	L
		MSVC-2013-amd64-Release	1 yr 3 mo - #21	1 hr 57 min - #471	3
		docker-clean	1 hr 18 min - #67	6 days 2 hr - #6	0
		crosscompilation	4 days 0 hr - #2278	1 day 1 hr - #2279	2
		continuous-release-cxx11	1 mo 9 days - #349	20 days - #440	2
		continuous-release	20 days - #419	26 days - #392	1
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		continuous	2 mo 28 days - #2381	1 hr 38 min - #2713	2
		continuous-gcc-asan	1 mo 9 days - #261	1 hr 57 min - #413	1

Icon: [S](#) [M](#) [L](#)

Legend [BSS for all](#) [BSS for fallu](#)

Jenkins : new build project

The screenshot shows the Jenkins configuration page for a new build project named 'mybuild'. The page is divided into several sections:

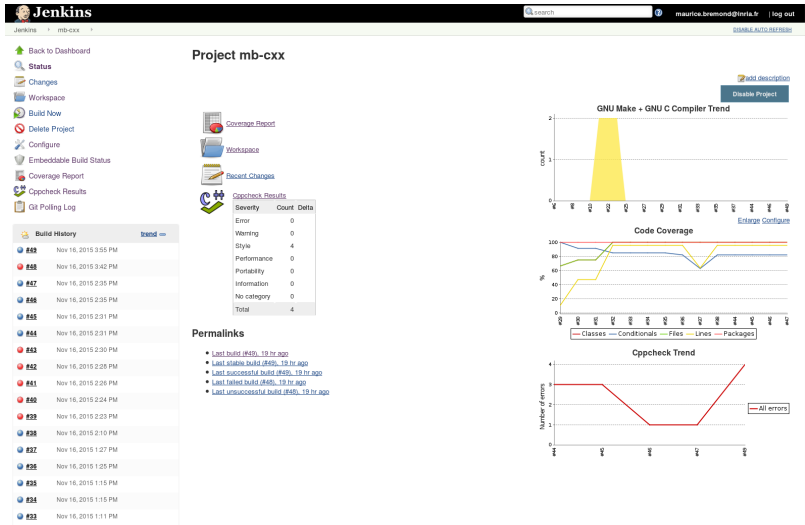
- Navigation:** A top navigation bar with the Jenkins logo, a search box, and a breadcrumb trail: 'Jenkins > mybuild > configuration'.
- Left Sidebar:** A vertical menu with links: 'Back to Dashboard', 'Status', 'Changes', 'Workspace', 'Build Now', 'Delete Project', and 'Configure'. Below this is a 'Build History' section with a 'trend' link and two RSS feeds: 'RSS for all' and 'RSS for failures'.
- Main Configuration Area:**
 - Project name:** A text field containing 'mybuild'.
 - Description:** A large empty text area.
 - [Raw HTML] Preview:** A link to preview the description in raw HTML.
 - Discard Old Builds:** An unchecked checkbox.
 - GitHub project:** A text field.
 - Advanced Project Options:** A section with four unchecked checkboxes: 'This build is parameterized', 'Disable Build (No new builds will be executed until the project is re-enabled.)', 'Execute concurrent builds if necessary', and 'Restrict where this project can be run'.
 - Source Code Management:** A section with three radio buttons: 'None' (selected), 'Git', and 'Subversion'.
 - Build Triggers:** A section with four unchecked checkboxes: 'Trigger builds remotely (e.g., from scripts)', 'Build after other projects are built', 'Build periodically', and 'Build when a change is pushed to GitHub'.

Jenkins : results

The screenshot shows the Jenkins dashboard with a sidebar on the left and a main table of build results on the right. The sidebar includes navigation links like 'New Item', 'People', 'Build History', 'Manage Jenkins', 'Credentials', and 'My Views'. Below these are sections for 'Build Queue (2)' and 'Build Executor Status' with a list of executors such as 'clang', 'clang-advanced', 'gcc-latest', 'ppc64 (offline)', 'siconos-fedora18', and 'siconos-fedora20'. The main table lists builds with columns for status (S), weather icon (W), name, last success, and last failure. The 'crosscompilation' build is circled in red.

S	W	Name ↓	Last Success	Last Failure
		MSVC-2013-amd64-Release	1 yr 3 mo - #21	1 hr 57 min - #471
		docker-clean	1 hr 18 min - #67	6 days 2 hr - #6
		crosscompilation	4 days 0 hr - #2278	1 day 1 hr - #2279
		continuous-release-cxx11	1 mo 9 days - #349	20 days - #440
		continuous-release	20 days - #419	26 days - #392
		continuous-clang-msan	1 mo 9 days - #232	1 hr 57 min - #384
		continuous-clang-full	5 mo 3 days - #179	1 hr 57 min - #430
		continuous-clang-asan	2 mo 29 days - #152	1 hr 57 min - #387
		continuous-clang	2 yr 1 mo - #23	1 hr 57 min - #667
		continuous	2 mo 28 days - #2381	1 hr 38 min - #2713
		continuous-gcc-asan	1 mo 9 days - #261	1 hr 57 min - #413

Jenkins : results



Read the documentation

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Reduce risks

Replace "big and long" integration phases (especially at the end of the project) with "small and frequent" ones. The idea is to work with small increments as explained [here](#). This way, you will have more time to focus on added value tasks.



SaaS platform : Your project ready to use in a few minutes

The platform is designed to provide on-demand Continuous Integration projects (powered by Jenkins) with a strong integration with a dedicated cloud to easily and quickly run jobs on various architectures / OS.



Rapid feedback

Get a rapid feedback on your project (just like a health check up!) The quality of the checkup will depend of the quality of your [tests](#), so pay attention to them!



Master your workers

An integrated cloud powered by [CloudStack](#) is available. It allows you to manage (create, update, delete) workers needed to execute jobs. Fully-integrated templates are provided by administrators but you can also create and share your own templates with the community.

Read the documentation!

The screenshot shows the Inria Wiki portal. At the top right, there are links for "Log in" and "Inria Connection". The Inria logo, with "informatics" and "mathematics" above it, is on the left. The page title is "Wiki ciportal". Below the title are tabs for "page", "discussion", "read", "view source", and "view history", along with a search box. A left sidebar contains two sections: "Main page" with links to "Main page" and "Current events", and "User Portal" with links to "Web portal", "CloudStack", "Slave access", "Jenkins", "FAQ", "Community", and "Charter". The main content area features a "Main Page" heading and a "Contents [hide]" box with a table of contents:

1	Brief introduction
2	User responsibility
3	How to get started?
4	Service offer
4.1	Software platform
4.2	Hardware platform
4.3	Availability

Below the table of contents is the "Brief introduction" section. It contains the following text:

Continuous integration is a software development strategy that aims at improving the integration work by applying frequent quality controls. The goal is to improve the global quality of software.

This strategy leverages software testing and good development practices. Before going further, ensure you have the following conditions:

- the source code is hosted by a source code manager (Git, Mercurial, SVN, ...);
- your project can be built automatically (Makefile, Automake, CMake, Ant, Maven, ...);
- possibly, you have an automated test suite (JUnit, CppUnit, ...)

If you think that continuous integration can improve your software but you do not know how to fulfill the previous conditions, contact your local experimentation and development service (SED).

If you want to know more about continuous integration, you are seriously encouraged to read [this article](#).

The bottom of the screenshot shows the beginning of the "User responsibility" section.