

Continuous Delivery

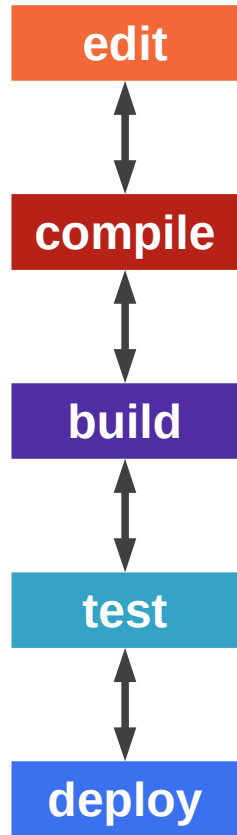
Prof. Dr. Dirk Riehle

Friedrich-Alexander University Erlangen-Nürnberg

AMOS F02

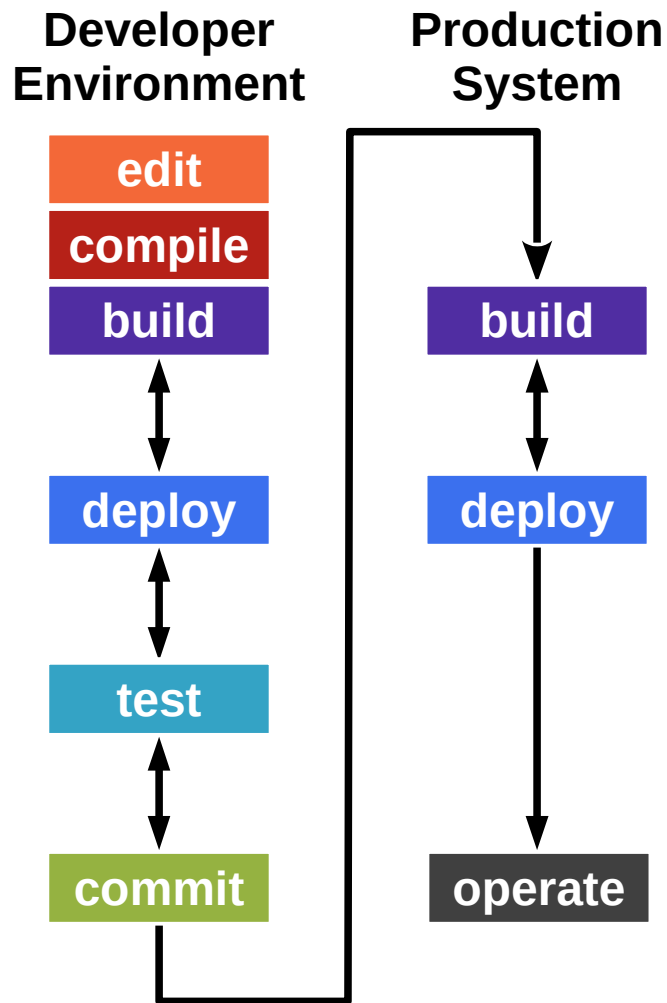
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Beginner's Development Cycle



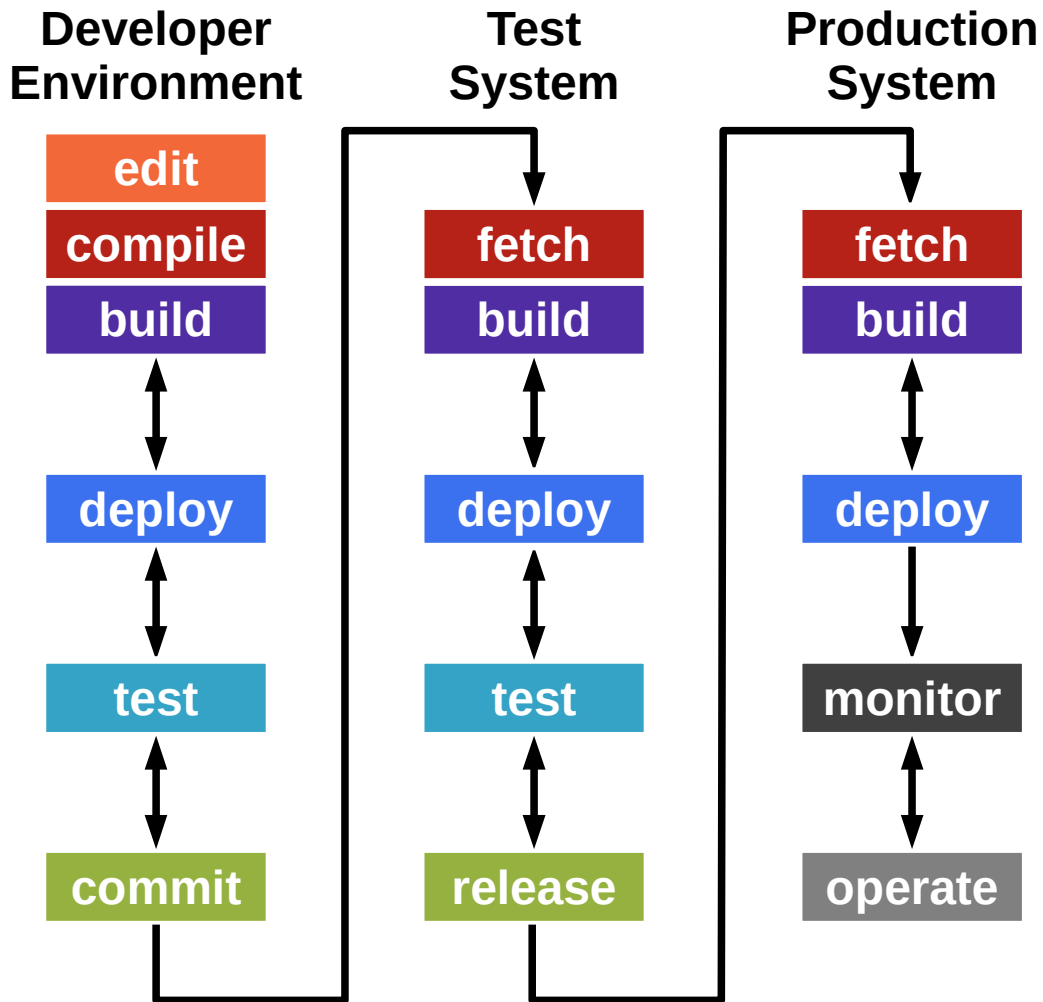
- **Developer**
 - **Edit:** Implements new feature
 - Iterates over the code until it looks right
 - **Compile:** Compiles the code
 - Iterates over the code until it compiles (no syntax error)
 - **Build:** Puts classes, build path together
 - Packages jar, if any, by hand
 - **Test:** Tests the program
 - Keeps going until “behavior looks right” i.e. no bugs
 - **Deploy:** Puts code into production
 - If a student, submits homework

Practitioner's Development Cycle



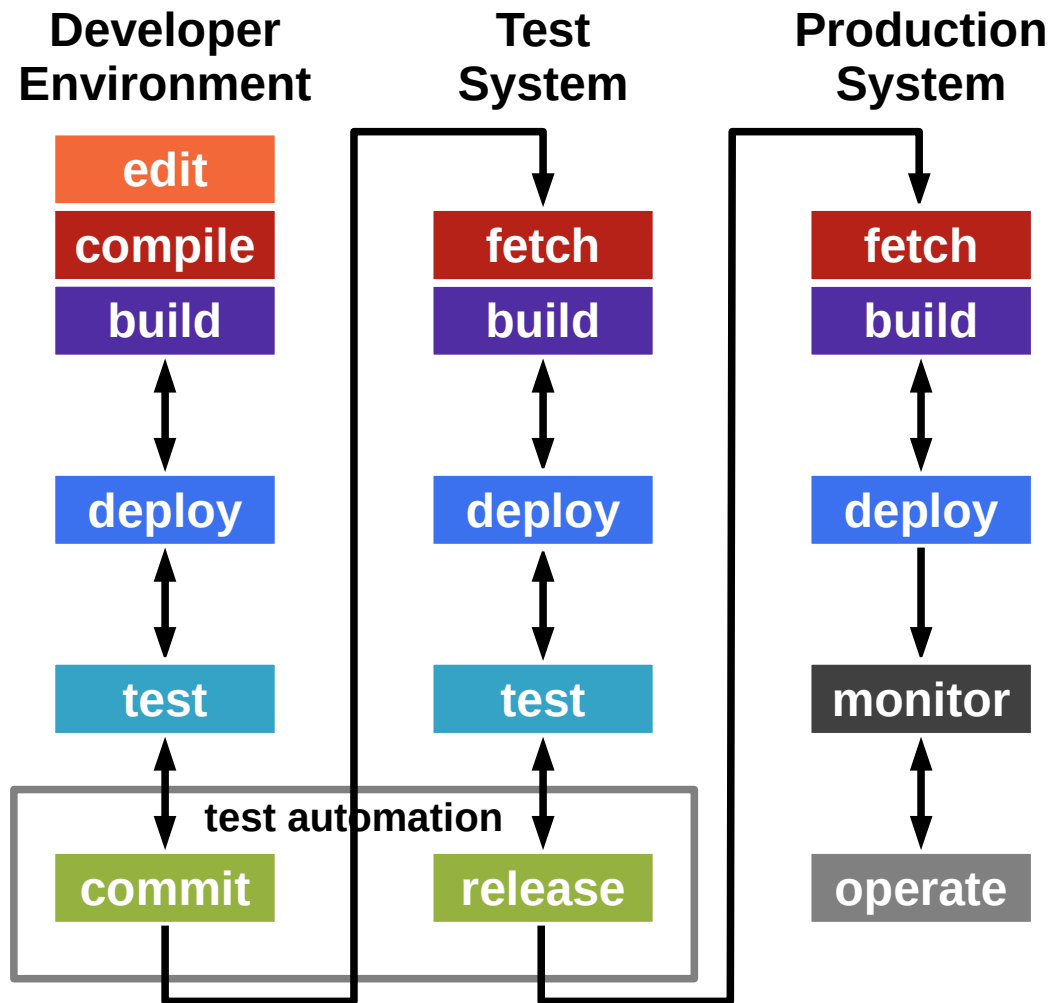
- Developer
 - Finishes development work
 - Uses local edit-compile-test cycle
 - Commits to indicate finishing
 - Builds for production environment
 - Could possibly use local build
 - Deploys to production system

Professional Development Cycle



- QA engineer
 - Fetches code
 - Builds full system
 - Deploys in test system
 - Tests full system
 - Automated and by-hand
 - Component tests
 - Acceptance
 - Integration tests
 - Deploys full system
 - Operates system

Continuous Integration Development Cycle



- Release (QA) engineer
 - Fetches code
 - Builds full system
 - Deploys in test system
 - Tests full system
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 - Acceptance
 - Integration tests
 - Deploys full system
 - Operates system

Test Automation

- Test automation ...
 - automatically carries out all available tests
 - Component tests (unit tests)
 - Acceptance tests (functional tests)
 - Integration tests and system tests
 - provides feedback to development and QA

Continuous Integration

- Continuous integration (CI) is a code integration process
 - Upon trigger (commit to official repository)
 - the system under construction is fetched, built, deployed, and tested
 - in a fully automated way (no human intervention)
 - Feedback upon system status is provided to both
 - developers and
 - managers
- The purpose of continuous integration is to
 - always know where you are standing with respect to the project
 - ideally improve quality such that you can deploy at any time
- Continuous integration requires test-driven development

Continuous Integration and Lava Lamps

In the early days, lava lamps were used to signal whether the project could be deployed to production or not.



Continuous Integration Dashboards




Continuous integration quickly evolved to build and test status dashboards hung on office walls for everyone to see.


Example Dashboard Build #437


[Jenkins](#) » [fsahoy](#) » [#437](#)

ENABLE AUTO REFRESH


[Back to Project](#)


 [Status](#)


 [Changes](#)


 [Console Output \[raw\]](#)

 [View Build Information](#)


 [Polling Log](#)

 [Test Result](#)


 [See Fingerprints](#)

 [Previous Build](#)


 [Next Build](#)


 **Build #437 (Jul 27, 2011 12:40:18 PM)**

Started 6 mo 28 days ago
Took [1 min 7 sec](#)









 Changes

1. version bump to 1.1-SNAPSHOT, added ignored UpdateLogbook selenium test ([detail](#) / [hgwweb](#))

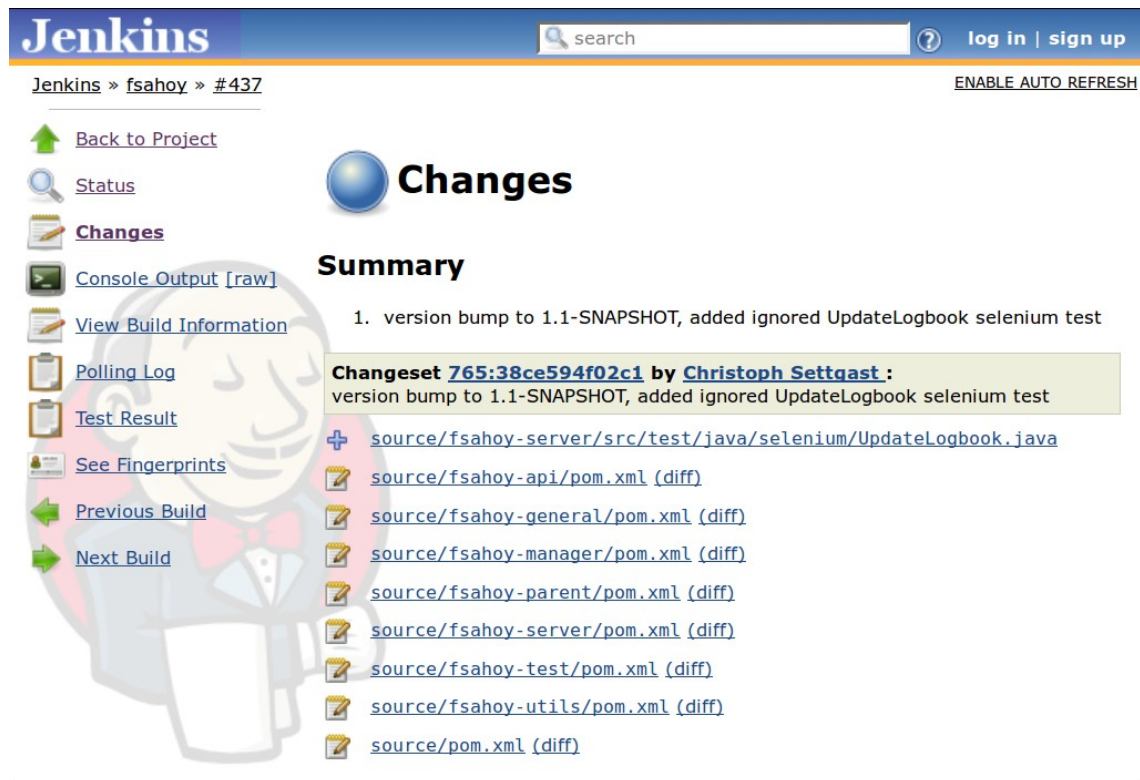
 [Started by an SCM change](#)

 [Test Result](#) (no failures)

Module Builds

 FreeSeasAhoy Project	0.94 sec
 FreeSeasAhoy Api	5.4 sec
 FreeSeasAhoy General	3.8 sec
 fsahoy-main (didn't run)	
 FreeSeasAhoy Manager	1.3 sec
 FreeSeasAhoy MetaProject	0.11 sec
 FreeSeasAhoy Test Fixtures	1.2 sec
 FreeSeasAhoy Utilities	3.3 sec

Example Dashboard Changes #437



Jenkins search log in | sign up

Jenkins » fsahoy » #437 ENABLE AUTO REFRESH

[Back to Project](#)
[Status](#)
Changes
[Console Output \[raw\]](#)
[View Build Information](#)
[Polling Log](#)
[Test Result](#)
[See Fingerprints](#)
[Previous Build](#)
[Next Build](#)

Changes

Summary

1. version bump to 1.1-SNAPSHOT, added ignored UpdateLogbook selenium test

Changeset 765:38ce594f02c1 by Christoph Settgaest :
version bump to 1.1-SNAPSHOT, added ignored UpdateLogbook selenium test

- [source/fsahoy-server/src/test/java/selenium/UpdateLogbook.java](#)
- [source/fsahoy-api/pom.xml \(diff\)](#)
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- [source/fsahoy-parent/pom.xml \(diff\)](#)
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- [source/pom.xml \(diff\)](#)

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Example Dashboard Test Results #437

Jenkins [?](#) [log in](#) | [sign up](#)

Jenkins » fsahoy » #437 » Test Result [ENABLE AUTO REFRESH](#)

[Back to Project](#)
[Status](#)
[Changes](#)
[Console Output \[raw\]](#)
[View Build Information](#)
[Polling Log](#)
[Test Result](#)
[See Fingerprints](#)
[Previous Build](#)
[Next Build](#)

Test Result

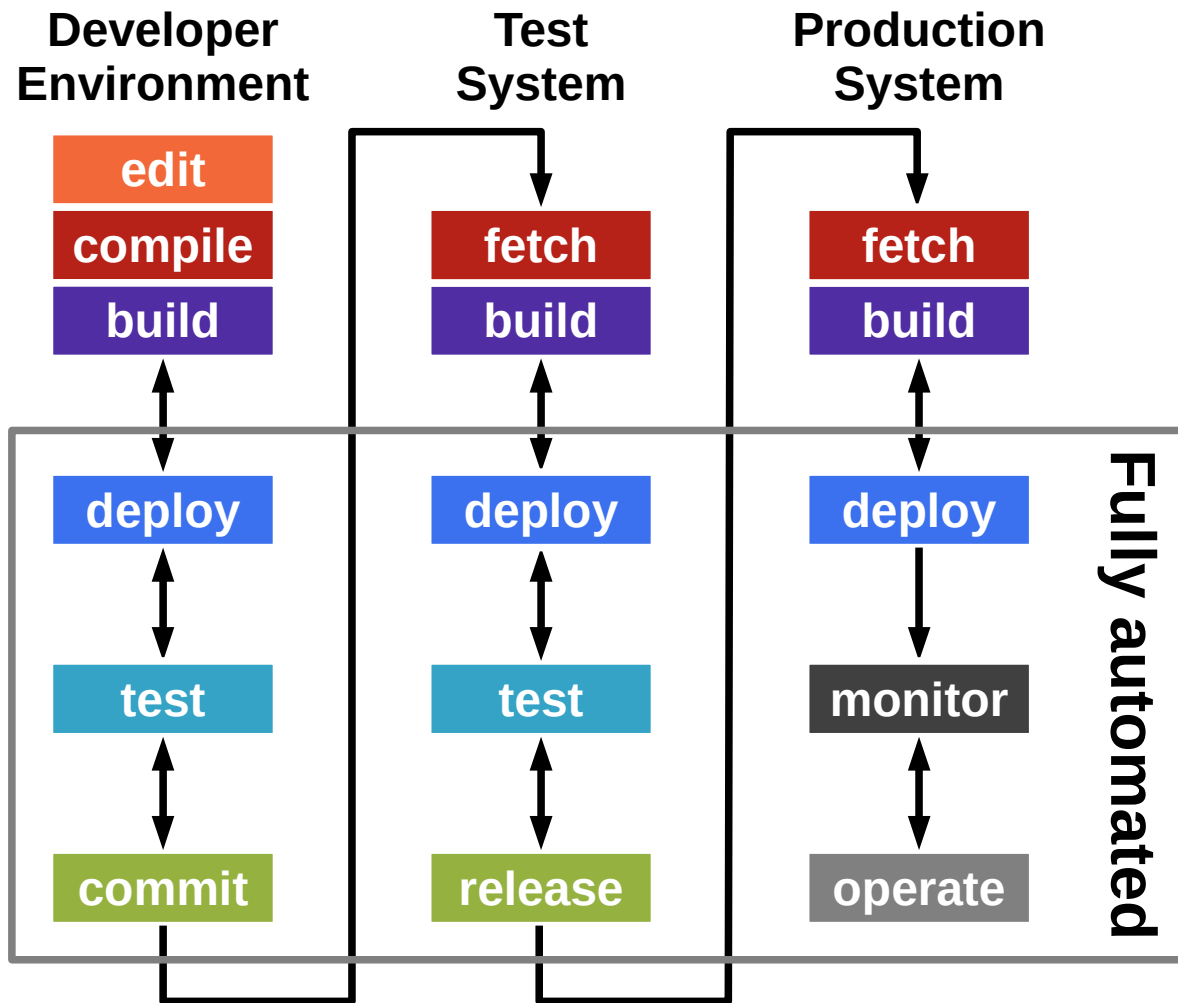
0 failures (±0) , 3 skipped (±0)

107 tests (±0)

Module	Fail	(diff)	Total	(diff)
de.fau.cs.fsahoy:fsahoy-api	0		2	
de.fau.cs.fsahoy:fsahoy-general	0		71	
de.fau.cs.fsahoy:fsahoy-server	0		20	
de.fau.cs.fsahoy:fsahoy-utils	0		14	

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Continuous Deployment Development Cycle



- Fully automated
 - Compile and build
 - Deployment
 - To test environment
 - To production
 - Test execution
- Partially automated
 - System monitoring
 - Automated rollback
- Human decisions
 - Commit decision
- No release decision

Continuous Delivery

- Continuous delivery is a delivery process
 - Upon trigger (commit to official repository)
 - the system is integrated, tested, and **deployed to production**
 - in a fully automated way (no human intervention)
 - A poorly functioning system may be rolled back
 - Requires monitoring and rollback facility of deployed system
 - System status is assessed using key figures
- The purpose of continuous delivery is to
 - put development results into production as fast as possible
 - improve quality by holding the team to high operational standards

- 1. Test automation**
- 2. Continuous integration**
- 3. Continuous deployment [1]**

[1] Short for “development operations”

Continuous Delivery 2 / 2

- Test automation =
 - Tests and testing
- Continuous integration =
 - Test-driven development +
 - Automated building +
 - Test automation
- Continuous deployment =
 - Continuous integration +
 - Deploy to production +
 - Monitoring and rollback
- DevOps
 - Continuous deployment +
 - Operations and culture

Review / Summary of Session

- Continuous delivery
 - Test automation
 - Continuous integration
 - Continuous deployment
 - Development operations

Thank you! Questions?

dirk.riehle@fau.de – <http://osr.cs.fau.de>

dirk@riehle.org – <http://dirkriehle.com> – [@dirkriehle](#)

Credits and License

- Original version
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 - Licensed under [Creative Commons Attribution 4.0 International License](#)
- Contributions
 - ...

Continuous Delivery

Prof. Dr. Dirk Riehle

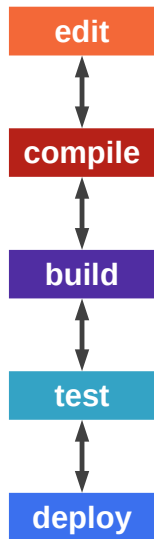
Friedrich-Alexander University Erlangen-Nürnberg

AMOS F02

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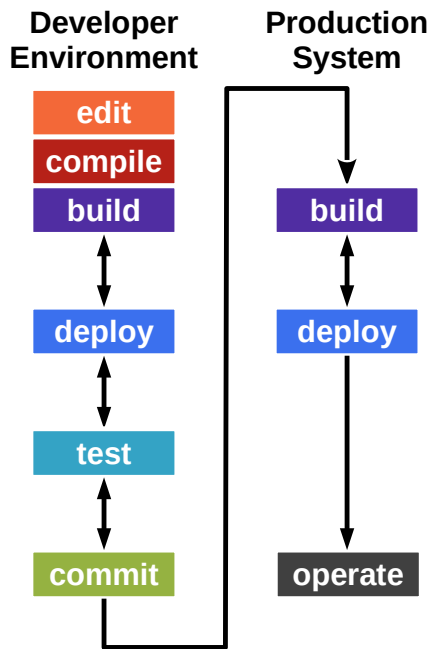
It is Friedrich-Alexander University Erlangen-Nürnberg – FAU, in short.
Corporate identity wants us to say “Friedrich-Alexander University”.

Beginner's Development Cycle



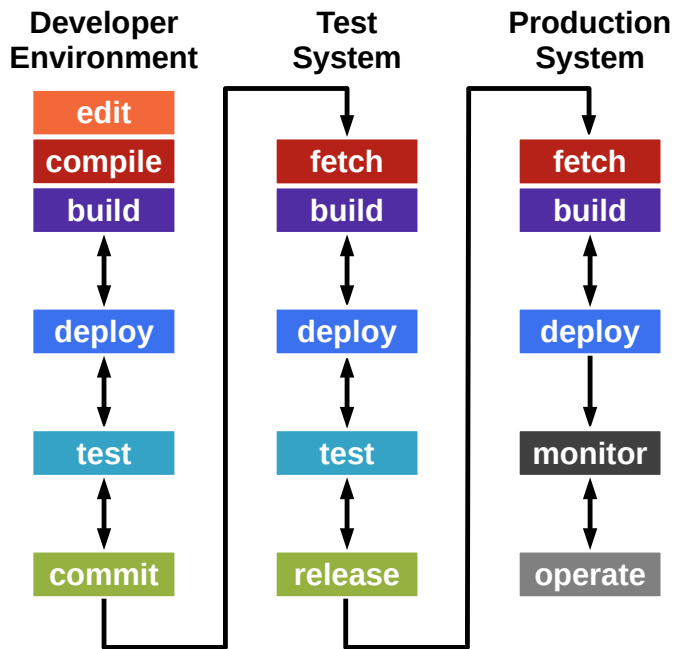
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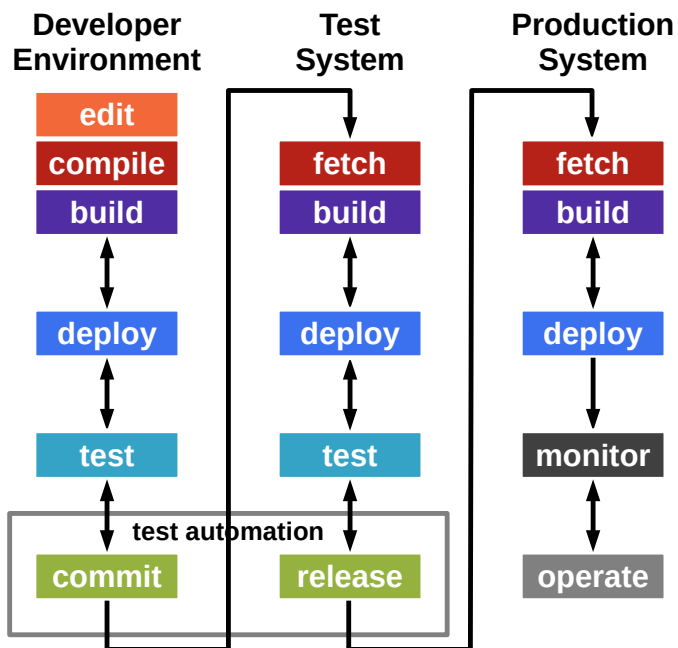
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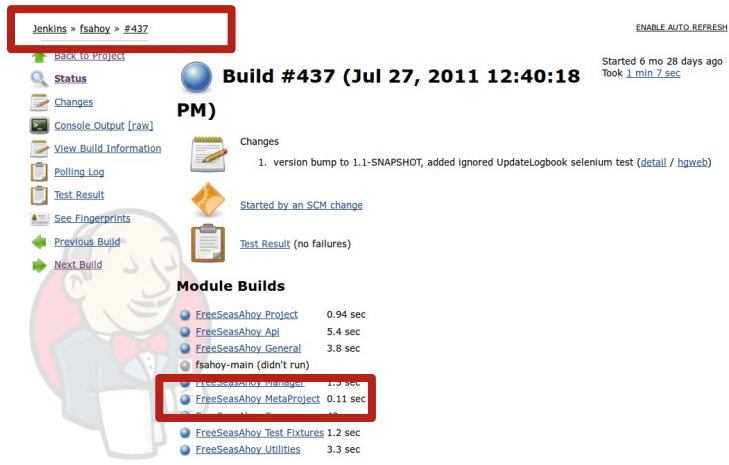
The AMOS Project
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Continuous Integration Dashboards



Continuous integration quickly evolved to build and test status dashboards hung on office walls for everyone to see.

Example Dashboard Build #437



The screenshot shows the Jenkins dashboard for Build #437. The breadcrumb navigation at the top left is 'Jenkins > fsahoy > #437', which is highlighted with a red box. The main header displays 'Build #437 (Jul 27, 2011 12:40:18)' and 'Started 6 mo 28 days ago' with a link to 'Took 1 min 7 sec'. A sidebar on the left contains links for 'Back to Project', 'Status', 'Changes', 'Console Output [raw]', 'View Build Information', 'Polling Log', 'Test Result', 'See Fingerprints', 'Previous Build', and 'Next Build'. The main content area shows a 'PM)' status, a list of changes (including a version bump to 1.1-SNAPSHOT), and a 'Test Result' section indicating 'no failures'. Below this is a 'Module Builds' section with a table of build times for various modules. The 'FreeSeasAhoy MetaProject' row is highlighted with a red box.

Module	Build Time
FreeSeasAhoy Project	0.94 sec
FreeSeasAhoy Api	5.4 sec
FreeSeasAhoy General	3.8 sec
fsahoy-main (didn't run)	
FreeSeasAhoy Manager	1.5 sec
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FreeSeasAhoy Utilities	3.3 sec

Example Dashboard Changes #437

Jenkins [log in](#) | [sign up](#)

Jenkins » fsahoy » #437 [ENABLE AUTO REFRESH](#)

[Back to Project](#)
[Status](#)
Changes
[Console Output \[raw\]](#)
[View Build Information](#)
[Polling Log](#)
[Test Result](#)
[See Fingerprints](#)
[Previous Build](#)
[Next Build](#)

Changes

Summary

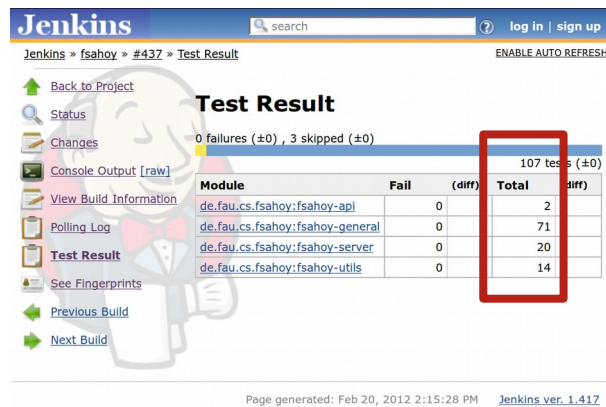
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Example Dashboard Test Results #437



Jenkins [log in](#) [sign up](#)

Jenkins » fsahoy » #437 » Test Result ENABLE AUTO REFRESH

[Back to Project](#)
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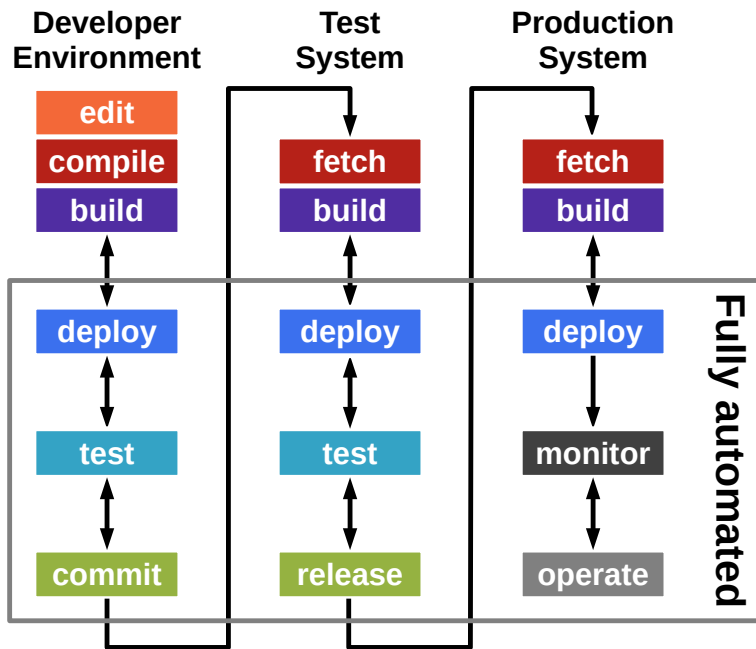
Test Result

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de.fau.cs.fsahoy:fsahoy-api	0		2	
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de.fau.cs.fsahoy:fsahoy-utils	0		14	

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DR

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- Contributions
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