

Continuous Integration of The FreeBSD Project

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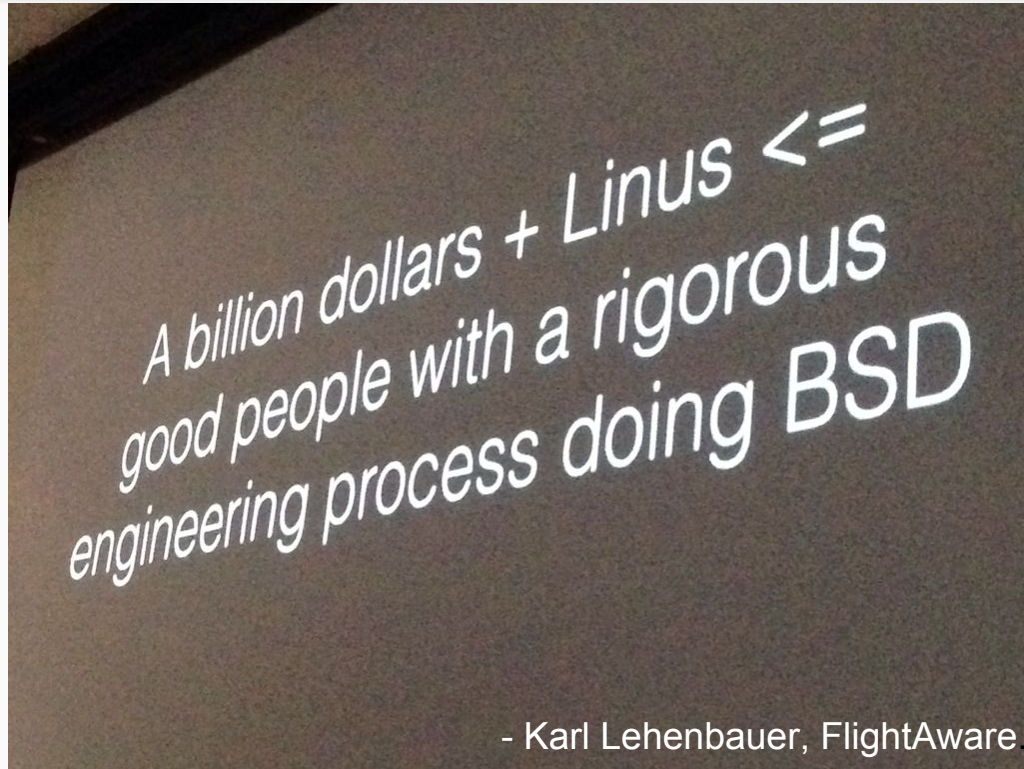


Something about Me

- 許立文
- From Taiwan, a.k.a. Formosa
- Programmer
- System Administrator
- Traveler
- Diver
- Cyclist
- Snowborder



BSDCan 2014 Keynote



We Need a (more) Higher Quality FreeBSD

- A higher quality Releasee
- Buildable -CURRENT branch
- Reliable -STABLE branch
- Faster development

Test Early, Test Often

Integration Test is Important

We need to do it continuously.



Continuous Integration (CI)

Grady Booch, 1991

A software engineering practice of merging all developer working copies to a shared mainline several times a day

- To know conflicts earlier
- To know bugs earlier

CI Best Practices

- Maintain a code repository
- Automate the build
- Make the build self-testing
- Everyone commits to the baseline every day
- Every commit (to baseline) should be built
- Keep the build fast
- Test in a clone of the production environment
- Make it easy to get the latest deliverables
- Everyone can see the results of the latest build
- Automate deployment

We Do This from Beginning

- Maintain a code repository ✓ (svn.FreeBSD.org)
- Automate the build
- Make the build self-testing
- Everyone commits to the baseline every day
- Every commit (to baseline) should be built
- Keep the build fast
- Test in a clone of the production environment
- Make it easy to get the latest deliverables
- Everyone can see the results of the latest build
- Automate deployment

We are an Open Source OS Project

- Maintain a code repository ✓ (svn.FreeBSD.org)
- Automate the build
- Make the build self-testing
- ~~Everyone commits to the baseline every day~~
- Every commit (to baseline) should be built
- Keep the build fast
- ~~Test in a clone of the production environment~~
- Make it easy to get the latest deliverables
- Everyone can see the results of the latest build
- ~~Automate deployment~~

What We Need

- Automate the build
- Make the build self-testing
- Every commit (to baseline) should be built
- Keep the build fast
- Make it easy to get the latest deliverables
- Everyone can see the results of the latest build

How We Do Them

A good CI system provides:

- Automate the build
- Make the build self-testing
- Make it easy to get the latest deliverables
- Everyone can see the results of the latest build

Needs help from everyone:

- Every commit (to baseline) should be built
- Keep the build fast

Automatic Build & Some History

2002~2014, Tinderbox

- By Dag-Erling Smørgrav <des@FreeBSD.org>
- <http://tinderbox.freebsd.org>
 - Probably started in March 2002
 - Probably stopped in September or October 2014
- Open Sourced
 - <svn://svn.freebsd.org/base/user/des/tinderbox>
- Well Documented
 - <https://www.freebsd.org/doc/en/books/developers-handbook/testing-tinderbox.html>
 - <https://wiki.freebsd.org/Tinderbox>

tinderbox.FreeBSD.org

FreeBSD tinderbox logs

https://web.archive.org/web/20141224193546/http://tinderbox.freebsd.org/

	amd64	arm	armv6 arm	i386	i386 pc98	ia64	mips	mips64 mips	powerpc	powerpc64 powerpc	sparc64
head	2014-09-17 12:53 UTC summary full log	2014-09-17 10:19 UTC summary full log	2014-09-17 13:46 UTC summary full log	2014-09-17 13:24 UTC summary full log	2014-09-17 09:13 UTC summary full log	n/a	2014-09-17 08:54 UTC summary full log	2014-09-17 07:04 UTC summary full log	2014-09-17 10:27 UTC summary full log	2014-09-17 10:23 UTC summary full log	2014-09-17 07:20 UTC summary full log
stable/10	2014-09-17 13:10 UTC summary full log	2014-09-17 11:04 UTC summary full log	2014-09-17 12:22 UTC summary full log	2014-09-17 13:33 UTC summary full log	2014-09-17 10:15 UTC summary full log	2014-09-17 09:43 UTC summary full log	2014-09-17 10:22 UTC summary full log	2014-09-17 08:39 UTC summary full log	2014-09-17 11:03 UTC summary full log	2014-09-17 10:58 UTC summary full log	2014-09-17 08:56 UTC summary full log
stable/9	2014-09-17 13:57 UTC summary full log	2014-09-17 07:47 UTC summary full log	n/a	2014-09-17 04:59 UTC summary full log	2014-09-17 08:27 UTC summary full log	2014-09-17 08:08 UTC summary full log	2014-09-17 06:14 UTC summary full log	n/a	2014-09-17 09:15 UTC summary full log	2014-09-17 09:25 UTC summary full log	2014-09-17 07:22 UTC summary full log
stable/8	2014-09-17 14:01 UTC summary full log	2014-09-17 14:01 UTC summary full log	n/a	2014-09-17 14:01 UTC summary full log	2014-09-17 14:01 UTC summary full log	2014-09-17 14:01 UTC summary full log	2014-09-17 14:01 UTC summary full log	n/a	2014-09-17 14:01 UTC summary full log	n/a	2014-09-17 14:01 UTC summary full log
stable/7	2014-09-17 14:00 UTC summary full log	n/a	n/a	2014-09-17 14:00 UTC summary full log	2014-09-17 14:00 UTC summary full log	2014-09-17 14:00 UTC summary full log	n/a	n/a	2014-09-17 14:00 UTC summary full log	n/a	2014-09-17 14:00 UTC summary full log

2014-12-24 19:35:45 UTC

tinderbox.freebsd.org

2013, jenkins-admin@FreeBSD.org

- Founded by Craig Rodrigues in late 2013
 - Current Members:
 - Ahmed Kamal, Baptiste Daroussin (bapt@), Craig Rodrigues (rodrigc@), Li-Wen Hsu (lwhsu@), Steve Wills (swills@)
 - <https://www.freebsd.org/administration.html#t-jenkins-admin>
 - Alumni:
 - Julio Merino (jmmv@), Steven Kreuzer (skreuzer@), R. Tyler Croy
- First working group was in BSDCan 2014
- Discussions continued in BSDCan 2015, AsiaBSDCon 2016, BSDCan 2016
- Second working group was in EuroBSDCon 2016
- More information: <https://wiki.freebsd.org/Jenkins>

Jenkins

- An open source automation server written in Java
- Created by Kohsuke Kawaguchi
- <http://jenkins.io>
- Helps automating the non-human part of the whole software development process
 - Continuous Integration
 - Continuous delivery
- Extended by various of plugins




Jenkins

2013, <https://Jenkins.FreeBSD.org>

- Created and operated by jenkins-admin@ since the group formed
- Independent successor of tinderbox.FreeBSD.org
- Periodically builds and tests FreeBSD src and doc trees
 - Branches: head, stable-11, stable-10, stable-9
 - Architectures: amd64, i386, sparc64
 - Others: build with GCC
 - Leverage the cross toolchain
 - amd64 cross build amd64 itself :)
- Repository: <https://github.com/freebsd/freebsd-ci>

https://Jenkins.FreeBSD.org

Jenkins [log in](#) [ENABLE AUTO REFRESH](#)

People


Build History

Build Queue

No builds in the queue.

Build Executor Status

- master
1 Idle
- chaos.ysv.freebsd.org (offline)
- havoc.ysv.freebsd.org (offline)
- jenkins-10.freebsd.org
1 part of [FreeBSD_HEAD](#) #699
- jenkins10a.freebsd.org
1 [FreeBSD_HEAD_amd64_gcc](#) #1610
- jenkins9b.freebsd.org
1 Idle
2 Idle
- kyua1.nyi.freebsd.org ▾
1 [FreeBSD_HEAD_arm64](#) #4003



This is build and test server for [The FreeBSD Project](#).

See the [Jenkins wiki page](#) for more information.

[All](#) [FreeBSD_doc](#) [FreeBSD_ports_ci](#) [FreeBSD_ports_ci_head](#) [FreeBSD_src_head](#) [FreeBSD_src_stable](#) [Tests](#)

S	W	Name ↓	Last Success	Last Failure	Last Duration	Number of builds
🔴	☁️	AlwaysPass	11 mo - #10	11 mo - #19	0.5 sec	🟢 1 🟡 0 🔴 9
🟢	☁️	FreeBSD_DOC	19 hr - #842	1 day 8 hr - #838	29 sec	🟢 804 🟡 0 🔴 17
🟢	☀️	FreeBSD_Doc-igor	19 hr - #2226	1 mo 24 days - #2146	39 sec	🟢 191 🟡 0 🔴 9
🔴	☁️	FreeBSD_DOC-phabric	N/A	20 days - #200	9.4 sec	🟢 0 🟡 0 🔴 200
🟢	☀️	FreeBSD_HEAD	4 hr 13 min - #698	1 day 13 hr - #688	2 hr 45 min	🟢 445 🟡 117 🔴 118
🔴	☁️	FreeBSD_HEAD-modules	2 yr 2 mo - #682	2 yr 2 mo - #686	2 hr 15 min	🟢 161 🟡 0 🔴 4
🔴	☀️	FreeBSD_HEAD-scan-build	9 mo 27 days - #162	12 mo - #151	3 min 56 sec	🟢 65 🟡 13 🔴 53
🟢	☀️	FreeBSD_HEAD_amd64_gcc	2 hr 25 min - #1609	1 day 1 hr - #1602	1 hr 25 min	🟢 192 🟡 0 🔴 8
🟢	☀️	FreeBSD_HEAD_arm64	1 hr 48 min - #4002	14 hr - #3997	1 hr 11 min	🟢 183 🟡 0 🔴 17
🟢	☀️	FreeBSD_HEAD_i386	2 hr 49 min - #3992	14 hr - #3987	1 hr 9 min	🟢 187 🟡 0 🔴 13

FreeBSD_HEAD pipeline

Stage View

Average stage times:

#659

Sep 15

3

23:29

commits

#658

Sep 15

2

17:28

commits

#657

Sep 15

3

11:28

commits

Checkout scripts	Checkout src	Build	Build UFS image	Test
3s	1min 11s	1h 39min	6min 35s	54min 21s
3s	59s	1h 33min	5min 31s	
almost complete				
4s	1min 40s	1h 42min	7min 36s	1h 2min
1s	59s	1h 39min	6min 31s	56min 16s

2016, <https://CI.FreeBSD.org>

- Started in summer 2016
- Also based on Jenkins
- Experiment for some new ideas and features
- Artifact server Introduced
 - Open to the public for downloading and doing more tests
- Job template
 - Make it easier to add new CI jobs without knowing jenkins configuration
- Codes are currently in my fork repository, will merge back in the future
 - <https://github.com/lwhsu/freebsd-ci>
 - <https://github.com/lwhsu/jjb-freebsd-ci>

Automatic Build on <https://CI.FreeBSD.org>

- *-build jobs
 - `scripts/build/build-world-kernel.sh`
 - Generalized for different versions and architectures
 - Thanks for the good build infrastructure
 - `make buildworld & buildkernel`
 - Build distribution fileless
- *-LINT jobs
 - `scripts/build/build-kernel-LINT.sh`
 - Build LINT kernel

Self Tests

Kyua

- Testing framework for infrastructure software
- By Julio Merino <jmmv@{NetBSD,FreeBSD}.org>
- Repository
 - <https://github.com/jmmv/kyua>
- Documentation
 - <https://github.com/jmmv/kyua/wiki/Quickstart>
 - Julio's talk & tutorial at AsiaBSDCon 2014
 - <https://drive.google.com/drive/folders/0B08g-X1kPkSYNmIEdTb5RjIFbkk>

bhyve - The BSD Hypervisor

- <http://bhyve.org/>
- Built in FreeBSD since 10.0
- On ci.FreeBSD.org
 - *-images jobs build virtual machine images installed by distribution files
 - *-testvm jobs build virtual machine with kyua installed
 - Basically the same with above job, but virtual disk size is smaller
- *-test jobs take testvm image from artifact server and run it
 - For other architectures we may use QEMU in the future

Putting Them Together

- Create virtual machine image
 - Pre-install kyua and test files
 - Customized script
 - Run tests
 - Generate reports
 - Shutdown virtual machine
 - `scripts/build/build-test_image.sh`
- Run tests in virtual machine
 - Fetch the vm image, boot it
 - Wait for it completes running tests, or kill it when timeout
 - Extract test reports from the vm image
 - `scripts/test/run-tests.sh`

Access to Results

JUnit Format Output

```
<testcase classname="bin.cat.cat_test" name="align" time="0.018">
<system-out>Executing command [ /bin/sh -c cat -be /usr/tests/bin/cat/d_align.in ]
</system-out>
<system-err>Test case metadata
-----

allowed_architectures is empty
allowed_platforms is empty
description = Test that cat(1) aligns the output right with options &apos;-be&apos; (PR bin/4841)
has_cleanup = false
is_exclusive = false
required_configs is empty
required_disk_space = 0
required_files is empty
required_memory = 0
required_programs is empty
required_user is empty
timeout = 300

Timing information
-----

Start time: 2016-09-23T01:22:37.490230Z
End time:   2016-09-23T01:22:37.508471Z
Duration:  0.018s

Original stderr
-----

<&lt;EMPTY&&gt;
</system-err>
</testcase>
```

Parsed and Displayed by Jenkins

<https://<job url>/<build number>/testReport>

Test Result

0 failures (±0) , 54 skipped (±0)

5,858 tests (±0)

[Took 56 min.](#)

All Tests

Package	Duration	Fail	(diff) Skip	(diff) Pass	(diff) Total	(diff)
bin.cat	78 ms	0	0	3	3	
bin.date	1.1 sec	0	0	39	39	
bin.dd	0.2 sec	0	0	3	3	
bin.expr	0.35 sec	0	0	14	14	
bin.ls	8.3 sec	0	0	35	35	
bin.mv	0.46 sec	0	0	1	1	
bin.pax	0.11 sec	0	0	1	1	
bin.pkill	34 sec	0	0	28	28	
bin.sh.builtins	5.9 sec	0	0	163	163	

Failed Case Display

Regression

sys.geom.class.gate.2_test.main (from (test-report.xml))

Failing for the past 1 build (Since 🟡 #21)

[Took 1 sec.](#)

Error Message

1 of 2 tests failed

Standard Output

```
1..2
ok 1 - md5 checksum
not ok 2 - md5 checksums didn't match (d41d8cd98f00b204e9800998ecf8427e != c937ef1b24d6fd190263c74b5401be36)
```

Standard Error

Test case metadata

Test Result Trend

Project FreeBSD-head-amd64-test



[Recent Changes](#)



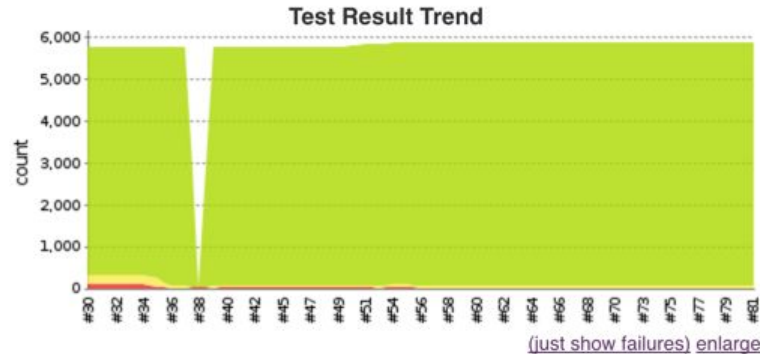
[Latest Test Result](#) (no failures)

Upstream Projects

[FreeBSD-head-amd64-testvm](#)

Permalinks

- [Last build \(#81\), 2 days 5 hr ago](#)
- [Last stable build \(#81\), 2 days 5 hr ago](#)
- [Last successful build \(#81\), 2 days 5 hr ago](#)
- [Last failed build \(#71\), 6 days 13 hr ago](#)
- [Last unstable build \(#55\), 17 days ago](#)
- [Last unsuccessful build \(#71\), 6 days 13 hr ago](#)
- [Last completed build \(#81\), 2 days 5 hr ago](#)



Artifacts

- *.txz
 - From *-build jobs
 - Distribution files just like what on <https://download.FreeBSD.org>
- disk.img.xz
 - From *-images jobs
 - Virtual machine disk image file, installed from above *.txz files
- disk-test.img.xz
 - From *-testvm jobs
 - Virtual machine disk image file, with test script and test case

artifact.ci.FreeBSD.org

- <ftps://artifact.ci.FreeBSD.org>
 - Serves files upload from jobs
 - Publish Over FTP Plugin
 - FTP over TLS
- <http://artifact.ci.FreeBSD.org>
 - Serves files download for downstream jobs in pipeline or external users
 - snapshots/
 - branch/svn_revision/target/target_arch
 - head/r303226/amd64/amd64

Open Configurations

Jenkins 2.0: "Pipeline as Code"

- <https://jenkins.io/2.0/>
- jenkins.FreeBSD.org uses it to build -head and stable-10
 - <https://github.com/freebsd/freebsd-ci/blob/master/scripts/build/build-test.groovy>

Jenkins Job Builder

- By OpenStack project
 - <http://docs.openstack.org/infra/jenkins-job-builder/>
- Jenkins job can only be edited on web interface
- Jenkins Job Builder provides YAML -> Jenkins configurations
- Create / update job with Jenkins' web service
- Make jenkins configurations trackable and reproducible
- <https://github.com/lwhsu/jjb-freebsd-ci>

Make Creating New Job Easier

- Not everyone knows (and has to know) how to configure Jenkins
- Most of the build jobs are just having different build script
- Create a "job template"
 - Environment setup
 - Check out latest source code
 - Setup needed version of FreeBSD
 - Install required packages
 - Execute specified build script for that job
 - Environment cleanup

Job Definition

```
- job:  
  name: FreeBSD-head-scan_build  
  scm:  
    - FreeBSD-src-head  
  builders:  
    - checkout-scripts  
    - setup-jail  
    - execute-in-jail  
  publishers:  
    - clean-jail  
  wrappers:  
    - timestamps
```

Build-in-jail Script Sets

- <https://github.com/lwhsu/freebsd-ci/tree/jjb/scripts/jail>
- Simplify environment setup and job execution
 - Three phase: setup.sh, execute.sh, clean.sh
 - sudo installed by default
- A typical job configuration
 - build.sh
 - Main build script, which is executed by execue.sh in the jail
 - jail.conf
 - Jail environment configuration: version, arch, etc.
 - pkg-list
 - Package needs to be installed (from pkg.FreeBSD.org)

Adding a New Job

- Submitters bring their own build scripts:
 - jail.conf, pkg-list, build.sh
 - Other configurations (ex: src.conf, make.conf)
- Jenkins-admin merges scripts to freebsd-ci/jobs/<job name>/
- Jenkins-admin creates a new entry jenkins job builder, push it
- Done! Our Jenkins will execute it around the clock

Example: FreeBSD-head-arm64-build

- jail.conf

```
TARGET=amd64  
TARGET_ARCH=amd64  
WITH_32BIT=0  
OSRELEASE=10.3-RELEASE
```

- pkg-list

```
aarch64-binutils
```

- build.sh

```
#!/bin/sh  
env \  
    JFLAG=${BUILDER_JFLAG} \  
    TARGET=arm64 \  
    TARGET_ARCH=aarch64 \  
    sh -x freebsd-ci/scripts/build/build-world-kernel.sh
```

Quarantine Mode

- Used to build source with patch coming from external users
 - `QUARANTINE=1` in `jail.conf`
 - Using jail to create an isolated environment
 - Remove internet connection after required packages installed
 - Limitation job resource from jenkins job setup
 - Limit execution time
- ```
wrappers:
- timeout:
 timeout: 90
 fail: true
 type: absolute
```

# Other Integrations

# Notifications

- When to notify
  - Build failed
  - Build unstable (compile successfully, but some test cases failed)
  - Build back to stable
- How to notify
  - Email
  - IRC
- What to notify
  - Changes since last build (who & what)
  - Tail of the console output
  - What are the test cases failed

# Email Notification

- Double-edged sword
- If nobody reads, it's totally no use
- Email-ext plugin

## freebsd-current mailing list, July 2016

- [Jenkins build is still unstable: FreeBSD HEAD #500](#) *jenkins-admin at FreeBSD.org*
- [Jenkins build is still unstable: FreeBSD HEAD #501](#) *jenkins-admin at FreeBSD.org*
- [bhyve with lagg failover doesn't work on wifi](#) *Randy Westlund*
- [Jenkins build is still unstable: FreeBSD HEAD #502](#) *jenkins-admin at FreeBSD.org*
- [FreeBSD HEAD i386 - Build #3721 - Failure](#) *jenkins-admin at FreeBSD.org*
- [Build failed in Jenkins: FreeBSD HEAD #503](#) *jenkins-admin at FreeBSD.org*
- [AR8327 Etherswitch led control patch](#) *Dan Nelson*
- [FreeBSD HEAD i386 - Build #3722 - Still Failing](#) *jenkins-admin at FreeBSD.org*
- [EARLY AP STARTUP hangs during boot](#) *Gary Jennejohn*
- [FreeBSD HEAD i386 - Build #3723 - Fixed](#) *jenkins-admin at FreeBSD.org*
- [Jenkins build is unstable: FreeBSD HEAD #504](#) *jenkins-admin at FreeBSD.org*
- [Jenkins build is still unstable: FreeBSD HEAD #505](#) *jenkins-admin at FreeBSD.org*
- [Jenkins build is still unstable: FreeBSD HEAD #506](#) *jenkins-admin at FreeBSD.org*
- [AR8327 Etherswitch led control patch](#) *Dan Nelson*
- [EARLY AP STARTUP hangs during boot](#) *John Baldwin*
- [Jenkins build is still unstable: FreeBSD HEAD #507](#) *jenkins-admin at FreeBSD.org*
- [FreeBSD 11.0-BETA3 Now Available](#) *Glen Barber*
- [resolvconf needs @RESTARTCMD@ to be replaced after r303062](#) *Guy Yur*
- [Jenkins build is still unstable: FreeBSD HEAD #508](#) *jenkins-admin at FreeBSD.org*
- [resolvconf needs @RESTARTCMD@ to be replaced after r303062](#) *Pedro Giffuni*
- [resolvconf needs @RESTARTCMD@ to be replaced after r303062](#) *Glen Barber*
- [resolvconf needs @RESTARTCMD@ to be replaced after r303062](#) *Pedro Giffuni*
- [Jenkins build is still unstable: FreeBSD HEAD #509](#) *jenkins-admin at FreeBSD.org*
- [ACPI errors when booting laptop](#) *Ben Woods*
- [Jenkins build is still unstable: FreeBSD HEAD #510](#) *jenkins-admin at FreeBSD.org*
- [EFI boot: can we make loader.efi work as BOOT{x64, aa64, arm, ia32}.efi?](#) *Xin Li*
- [EFI boot: can we make loader.efi work as BOOT{x64, aa64, arm, ia32}.efi?](#) *Nathan Whitehorn*
- [Jenkins build is back to stable : FreeBSD HEAD #511](#) *jenkins-admin at FreeBSD.org*
- [EARLY AP STARTUP hangs during boot](#) *Gary Jennejohn*
- [\[PATCH\] randomized delay in locking primitives, take 2](#) *Mateusz Guzik*
- [\[PATCH\] randomized delay in locking primitives, take 2](#) *Konstantin Belousov*
- [Jenkins build is back to normal : FreeBSD HEAD sparc64 #185](#) *jenkins-admin at FreeBSD.org*

# Reduce False Alert

- Be more careful before sending
- Pre-send script
  - <https://github.com/freebsd/freebsd-ci/blob/master/scripts/email-ext/pre-send.groovy>
  - Filter out the internal errors of the jenkins cluster

# Notification Contents

- Use email-ext to customize mail body

# Example: Build Failed Mail

FreeBSD\_HEAD\_i386 - Build #3987 - Failure:

Build information: [https://jenkins.FreeBSD.org/job/FreeBSD\\_HEAD\\_i386/3987/](https://jenkins.FreeBSD.org/job/FreeBSD_HEAD_i386/3987/)  
Full change log: [https://jenkins.FreeBSD.org/job/FreeBSD\\_HEAD\\_i386/3987/changes](https://jenkins.FreeBSD.org/job/FreeBSD_HEAD_i386/3987/changes)  
Full build log: [https://jenkins.FreeBSD.org/job/FreeBSD\\_HEAD\\_i386/3987/console](https://jenkins.FreeBSD.org/job/FreeBSD_HEAD_i386/3987/console)

Change summaries:

306148 by jpaetzel:  
Update oce driver to 11.0.50.0

Submitted by: Venkat Duvvuru <[venkatkumar.duvvuru@broadcom.com](mailto:venkatkumar.duvvuru@broadcom.com)>

The end of the build log:

[...truncated 190386 lines...]

```
--- oce_if.o ---
/usr/src/sys/modules/oce/../../dev/oce/oce_if.c:45:10: fatal error: 'oce_user.h' file not found
#include "oce_user.h"
 ^
1 error generated.
*** [oce_if.o] Error code 1

bmake[4]: stopped in /usr/src/sys/modules/oce
```



# Template for Failed/Unstable Build Job

`$PROJECT_NAME - Build #${BUILD_NUMBER} - ${BUILD_STATUS}:`

`Build information: ${BUILD_URL}`  
`Full change log: ${BUILD_URL}changes`  
`Full build log: ${BUILD_URL}console`

`Change summaries:`

`${CHANGES, format="%r by %a:\n%m\n"}`

`The end of the build log:`

`${BUILD_LOG}`

# Example: Test Failed Mail

FreeBSD\_HEAD-tests - Build #1746 - Still Unstable:

Build information: [https://jenkins.FreeBSD.org/job/FreeBSD\\_HEAD-tests/1746/](https://jenkins.FreeBSD.org/job/FreeBSD_HEAD-tests/1746/)  
Full change log: [https://jenkins.FreeBSD.org/job/FreeBSD\\_HEAD-tests/1746/changes](https://jenkins.FreeBSD.org/job/FreeBSD_HEAD-tests/1746/changes)  
Full build log: [https://jenkins.FreeBSD.org/job/FreeBSD\\_HEAD-tests/1746/console](https://jenkins.FreeBSD.org/job/FreeBSD_HEAD-tests/1746/console)

Change summaries:

No changes

The failed test cases:

2 tests failed.

FAILED: sys.mqueue.mqueue\_test.mqtest3

Error Message:

atf-check failed; see the output of the test for details

FAILED: sys.mqueue.mqueue\_test.mqtest4

Error Message:

atf-check failed; see the output of the test for details

# Template for Failed/Unstable Test Job

`$PROJECT_NAME - Build #${BUILD_NUMBER} - ${BUILD_STATUS}:`

`Build information: ${BUILD_URL}`  
`Full change log: ${BUILD_URL}changes`  
`Full build log: ${BUILD_URL}console`

Change summaries:

`${CHANGES, format="%r by %a:\n%m\n"}`

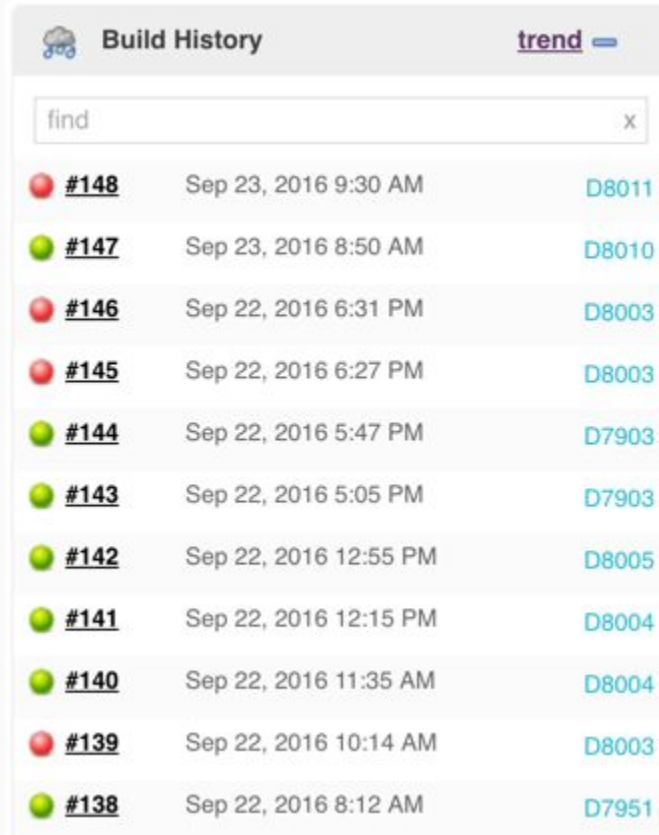
The failed test cases:

`${FAILED_TESTS, showStack="false", showMessage="true", maxTests=100}`

# Integration with Code Review System

- Phabricator Differential Plugin
  - From Uber
    - <https://github.com/uber/phabricator-jenkins-plugin>
    - Good readme.md, just follow it
  - Supports only git (for now, patch for svn is preparing)
    - <https://github.com/lwhsu/phabricator-jenkins-plugin/tree/scm>
    - Basically provide option to select the main SCM
    - Conditionally issue SCM-specified options to arc

# Patch Number Attached to each Build



The screenshot displays a 'Build History' table with a search bar at the top. The table lists 11 builds, each with a status indicator (red or green circle), a build number, a timestamp, and a patch number. The patch numbers are consistently attached to the build numbers.

| Status | Build Number | Timestamp             | Patch Number |
|--------|--------------|-----------------------|--------------|
| Red    | #148         | Sep 23, 2016 9:30 AM  | D8011        |
| Green  | #147         | Sep 23, 2016 8:50 AM  | D8010        |
| Red    | #146         | Sep 22, 2016 6:31 PM  | D8003        |
| Red    | #145         | Sep 22, 2016 6:27 PM  | D8003        |
| Green  | #144         | Sep 22, 2016 5:47 PM  | D7903        |
| Green  | #143         | Sep 22, 2016 5:05 PM  | D7903        |
| Green  | #142         | Sep 22, 2016 12:55 PM | D8005        |
| Green  | #141         | Sep 22, 2016 12:15 PM | D8004        |
| Green  | #140         | Sep 22, 2016 11:35 AM | D8004        |
| Red    | #139         | Sep 22, 2016 10:14 AM | D8003        |
| Green  | #138         | Sep 22, 2016 8:12 AM  | D7951        |

# Patch Information in Build Page

## Build #17 (Sep 3, 2016 2:24:56 PM)



Revision: 49365  
No changes.



Started by remote host 2001:1900:2254:206a::16:75



This was a build of [D7749](#) by unknown (unknown)

Igor fix

Reviewers: bcr, wblock

Reviewed By: bcr, wblock

Subscribers: wblock, bcr

Differential Revision: <https://reviews.freebsd.org/D7749>



Checkstyle: [66,114 warnings](#) from one analysis.

- [1 fixed warning](#)

# Patch Build Status



**Diff Detail**

**Repository** rS FreeBSD src repository


**Lint** ★ Lint OK



**Unit** ★ No Unit Test Coverage

**Build Status**  **Buildable 5112**


-  Build 5205: CI src build Jenkins
-  Build 5204: arc lint + arc unit




**Build Status**  **Buildable 5112**

-  Build 5205: CI src build Jenkins
-  Build 5204: arc lint + arc unit



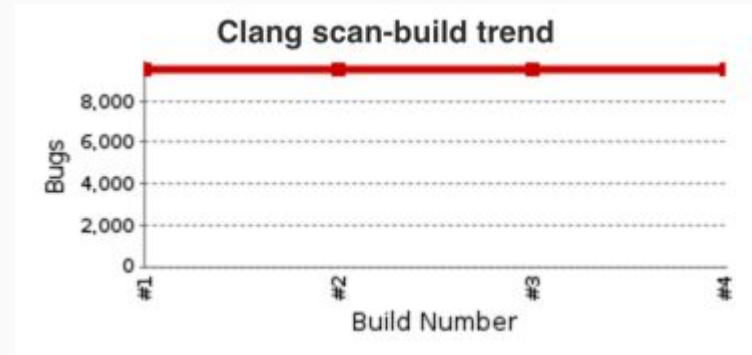
**Build Status**  **Buildable 5172**

-  Build 5294: CI src build Jenkins

# Clang scan-build

- Static analysis tool provided by clang
  - <http://clang-analyzer.llvm.org/scan-build.html>
- Clang Scan-Build Plugin
- `bsd.clang-analyze.mk`
  - Imported from NetBSD

```
make analyze \
CLANG_ANALYZE_OUTPUT_DIR=clangScanBuildReports \
CLANG_ANALYZE_OUTPUT=html
```





# Clang scan-build Bug Report

Jenkins > FreeBSD-head-scan\_build > #4 > Clang scan-build bugs

[ENABLE AUTO REFRESH](#)

## Clang scan-build bug report for build #4

| Group       | Type                                                                 | File                                                                     | Path Length | Description                                                                                                                                                                                                    |                         |
|-------------|----------------------------------------------------------------------|--------------------------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| Security    | Potential insecure memory buffer bounds restriction in call 'strcpy' | /workspace/src/usr.sbin/ctm/ctm_rmail/ctm_rmail.c                        | 1           | Call to function 'strcpy' is insecure as it does not provide bounding of the memory buffer. Replace unbounded copy functions with analogous functions that support length arguments such as 'strncpy'. CWE-119 | <a href="#">Details</a> |
| Dead store  | Dead assignment                                                      | /workspace/src/sys/modules/sym/././dev/sym/sym_hipd.c                    | 1           | Value stored to 'f1' is never read                                                                                                                                                                             | <a href="#">Details</a> |
| Dead store  | Dead assignment                                                      | /workspace/src/sys/modules/sound/sound/././dev/sound/pcm/mixer.c         | 1           | Value stored to 'ret' is never read                                                                                                                                                                            | <a href="#">Details</a> |
| Security    | Potential insecure memory buffer bounds restriction in call 'strcpy' | /workspace/src/usr.bin/less/././contrib/less/filename.c                  | 1           | Call to function 'strcpy' is insecure as it does not provide bounding of the memory buffer. Replace unbounded copy functions with analogous functions that support length arguments such as 'strncpy'. CWE-119 | <a href="#">Details</a> |
| Logic error | Dereference of null pointer                                          | /workspace/src/lib/ncurses/panelw/./././contrib/ncurses/panel/p_bottom.c | 4           | Access to field '_begy' results in a dereference of a null pointer (loaded from field 'win')                                                                                                                   | <a href="#">Details</a> |
| Dead store  | Dead assignment                                                      | /workspace/src/sys/modules/drm/radeon/./././dev/drm/r600_cp.c            | 1           | Value stored to 'num_backends' is never read                                                                                                                                                                   | <a href="#">Details</a> |

# Detailed HTML Output

```
697 /*
698 * Recheck that "." entry in the vdp directory points
699 * to the inode we looked up before vdp lock was
700 * dropped.
701 */
702 error = ufs_lookup_ino(pdp, NULL, cnp, &ino1);
703 if (error) {
704 43 ← Assuming 'error' is 0 →
705 44 ← Taking false branch →
706 vput(tdp);
707 return (error);
708 }
709 if (ino1 != ino) {
710 45 ← Taking false branch →
711 vput(tdp);
712 goto restart;
713 }
714 *vpp = tdp;
715 46 ← Dereference of null pointer (loaded from variable 'vpp')
```

# Igor + Checkstyle

- `textproc/igor`
  - By Warren Block ([wblock@FreeBSD.org](mailto:wblock@FreeBSD.org))
  - Automated proofreader for text files, man pages, and DocBook SGML source files



- Checkstyle
  - A tool to help programmers write Java code that adheres to a coding standard
  - Output an XML can be parsed by Jenkins Checkstyle Plugin

We added a new option (-X) to igor to output checkstyle XML

# Checkstyle Result

Jenkins > FreeBSD-doc-head-igor > #18 > Checkstyle Warnings

- Back to Project
- Status
- Changes
- Console Output
- View Build Information
- Environment Variables
- Checkstyle Warnings**
- Embeddable Build Status
- Previous Build

## CheckStyle Result

### Warnings Trend

| All Warnings | New Warnings       | Fixed Warnings     |
|--------------|--------------------|--------------------|
| 66116        | <a href="#">45</a> | <a href="#">45</a> |

### Summary

| Total | High Priority | Normal Priority       | Low Priority |
|-------|---------------|-----------------------|--------------|
| 66116 | 0             | <a href="#">66116</a> | 0            |

### Details

**Folders** | Files | Warnings | Details | New | Fixed

| Source Folder                                                  | Total | Distribution |
|----------------------------------------------------------------|-------|--------------|
| <a href="#">doc/en_US.ISO8859-1/articles/bsd-gpl</a>           | 113   | ■            |
| <a href="#">doc/en_US.ISO8859-1/articles/building-products</a> | 641   | ■            |
| <a href="#">doc/en_US.ISO8859-1/articles/committers-guide</a>  | 7     | ■            |
| <a href="#">doc/en_US.ISO8859-1/articles/contributing</a>      | 144   | ■            |
| <a href="#">doc/en_US.ISO8859-1/articles/contributors</a>      | 2     | ■            |
| <a href="#">doc/en_US.ISO8859-1/articles/cups</a>              | 39    | ■            |
| <a href="#">doc/en_US.ISO8859-1/articles/explaining-bsd</a>    | 225   | ■            |
| <a href="#">doc/en_US.ISO8859-1/articles/filtering-bridges</a> | 215   | ■            |
| <a href="#">doc/en_US.ISO8859-1/articles/fonts</a>             | 91    | ■            |
| <a href="#">doc/en_US.ISO8859-1/articles/freebsd-questions</a> | 236   | ■            |

# Checkstyle Result Trend

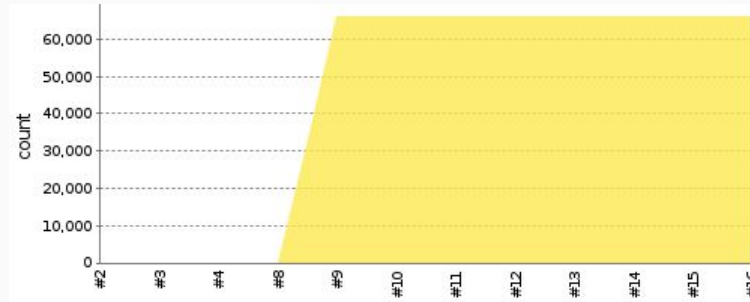
- Compare with previous build



Checkstyle: [66,117 warnings](#) from one analysis.

- [7 new warnings](#)
- [16 fixed warnings](#)

- Overall Trend



# Compiler Warnings

Jenkins > FreeBSD-stable-11-amd64-build > #31 > LLVM/Clang Warnings

- [Back to Project](#)
- [Status](#)
- [Changes](#)
- [Console Output](#)
- [View as plain text](#)
- [View Build Information](#)
- [Environment Variables](#)
- [LLVM/Clang Warnings](#)**
- [Embeddable Build Status](#)
- [Previous Build](#)

## LLVM/Clang Warnings

### Warnings Trend

| All Warnings | New Warnings | Fixed Warnings |
|--------------|--------------|----------------|
| 853          | <u>4</u>     | <u>4</u>       |

### Summary

| Total | High Priority | Normal Priority | Low Priority |
|-------|---------------|-----------------|--------------|
| 853   | <u>2</u>      | <u>851</u>      | 0            |

### Details

- Folders**
- Files
- Categories
- Warnings
- Details
- New
- Fixed
- High
- Normal

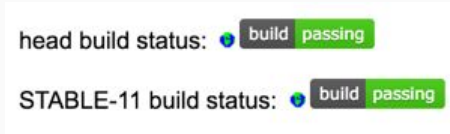
| Source Folder                                                                              | Total | Distribution |
|--------------------------------------------------------------------------------------------|-------|--------------|
| -                                                                                          | 116   |              |
| <a href="#">usr/obj/usr/src/lib32/usr/include/netinet</a>                                  | 1     |              |
| <a href="#">usr/obj/usr/src/lib32/usr/include/sys</a>                                      | 1     |              |
| <a href="#">usr/obj/usr/src/tmp/usr/include/netinet</a>                                    | 1     |              |
| <a href="#">usr/obj/usr/src/tmp/usr/include/sys</a>                                        | 1     |              |
| <a href="#">usr/src/cddl/lib/libzfs/./././cddl/contrib/opensolaris/lib/libzfs/common</a>   | 30    |              |
| <a href="#">usr/src/cddl/sbin/zfs/./././cddl/contrib/opensolaris/cmd/zfs</a>               | 25    |              |
| <a href="#">usr/src/cddl/sbin/zpool/./././cddl/contrib/opensolaris/cmd/zpool</a>           | 17    |              |
| <a href="#">usr/src/cddl/usr.bin/zstreamdump/./././contrib/opensolaris/cmd/zstreamdump</a> | 14    |              |
| <a href="#">usr/src/cddl/usr.bin/ztest/./././contrib/opensolaris/cmd/ztest</a>             | 17    |              |

# Compiler Warnings Trend



# Build Status Badge

- <https://wiki.freebsd.org/arm64>:



- <https://<job url>/badge/icon>
- <https://<job url>/lastCompletedBuild/badge/icon>



# Other Jenkins Plugins Used

- **SCM Sync configuration**
  - Use post-commit hook to notify administrators
- **SafeRestart**
  - Schedule restart jenkins when all current jobs complete
  - Save and resume the build queue
- **Green balls**
  - People like green
  - Everything is fine

# Epilogue

# Summary

- Continuous Integration does help development of the FreeBSD project
- Hope these experience and codes can also help downstream projects

# Future Work

- Have you to work on testing FreeBSD!
- CI for ports
  - Collaboration with "redports"
  - Automatically "exp-run"
- Check for reproducible build
- More tests, even some are not enabled by default
  - Dtrace
- Build for project branches
  - Make testing feature branches easier
- Performance tests
- Work with other projects

# Acknowledgement

- [jenkins-admin@FreeBSD.org](mailto:jenkins-admin@FreeBSD.org)
- The FreeBSD Foundation
- [clusteradmin@FreeBSD.org](mailto:clusteradmin@FreeBSD.org)
- [phabic-admin@FreeBSD.org](mailto:phabic-admin@FreeBSD.org)
- People on -testing, -current, -stable mailing lists