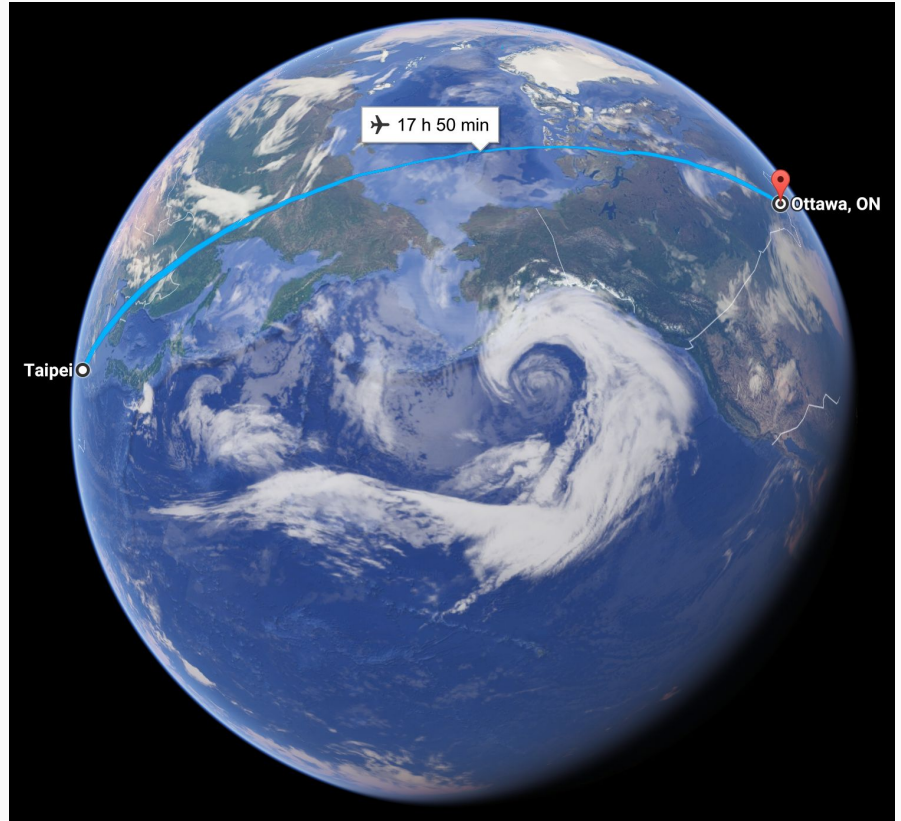# Continuous Integration of The FreeBSD Project

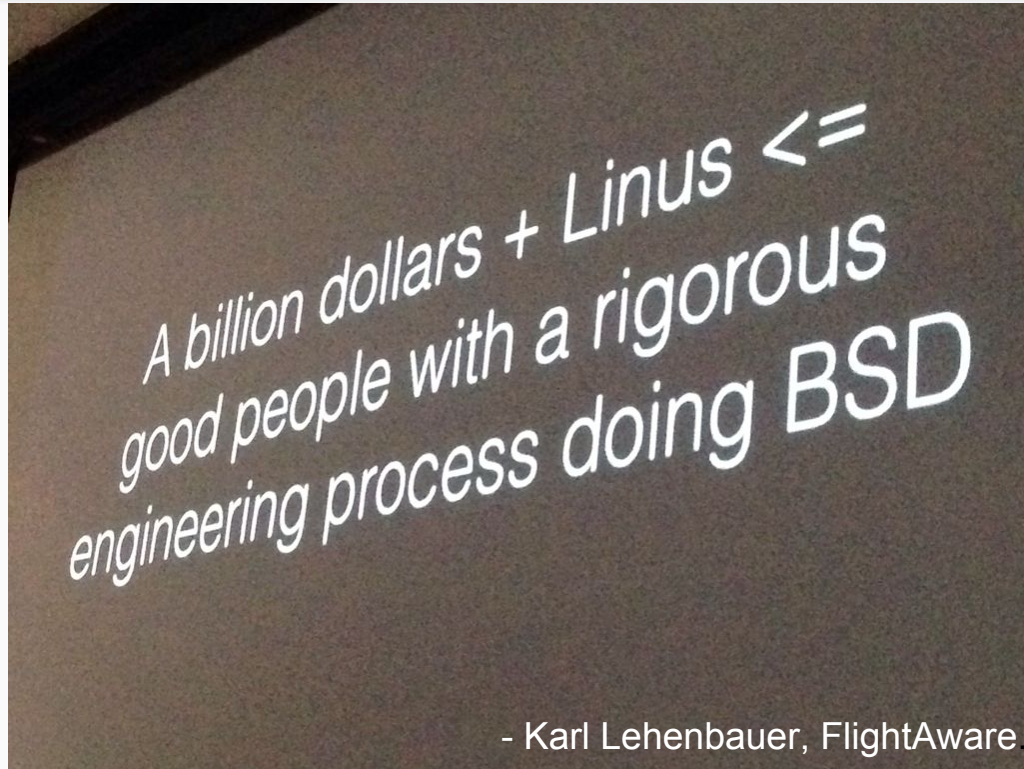Li-Wen Hsu <lwhsu@FreeBSD.org>
https://lwhsu.org

Something about Me

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

https://www.google.com/maps/dir/Taipei,+Taiwan/Ottawa,+ON,+Canada

BSDCan 2014 Keynote

A billion dollars + Linus <= good people with a rigorous engineering process doing BSD

- Karl Lehenbauer, FlightAware

https://twitter.com/bsdcan/status/467298506504683520

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.

https://media.giphy.com/media/l0MYSpvx4pnsoMNz2/giphy.gif

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

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

We Do This from Begining

- 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

What We Do

A good CI system should provide:

- 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 buildable
- 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 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

	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

2013, jenkins-admin@FreeBSD.org

- Founded by Craig Rodrigues in late 2013
  - Current Members:
    - Baptiste Daroussin (bapt@), Brad Davis (brd@), Brooks Davis (brooks@), 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, Ahmed Kamal
- First working group was in BSDCan 2014
- Discussions continued in following conferences
  - EuroBSDCon 2016, AsiaBSDCon 2017, BSDCan 2017 (yesterday!)
- More information: https://wiki.FreeBSD.org/Jenkins
  - TODO items: https://wiki.FreeBSD.org/Jenkins/TODO

Jenkins

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

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

2016, https://CI.FreeBSD.org

- Started in last summer, right after BSDCan 2016
- Also based on Jenkins
- Experiment for some new ideas and features
- Artifact server introduced
  - Pass artifact between stages in a pipeline
  - Open to the public for doing more tests
- Job template
  - Make it easier to add new CI jobs without knowing jenkins configuration
- Codes have been merged back to freebsd/freebsd-ci repository
  - https://github.com/freebsd/freebsd-ci

head-amd64-* Jobs on CI.FreeBSD.org
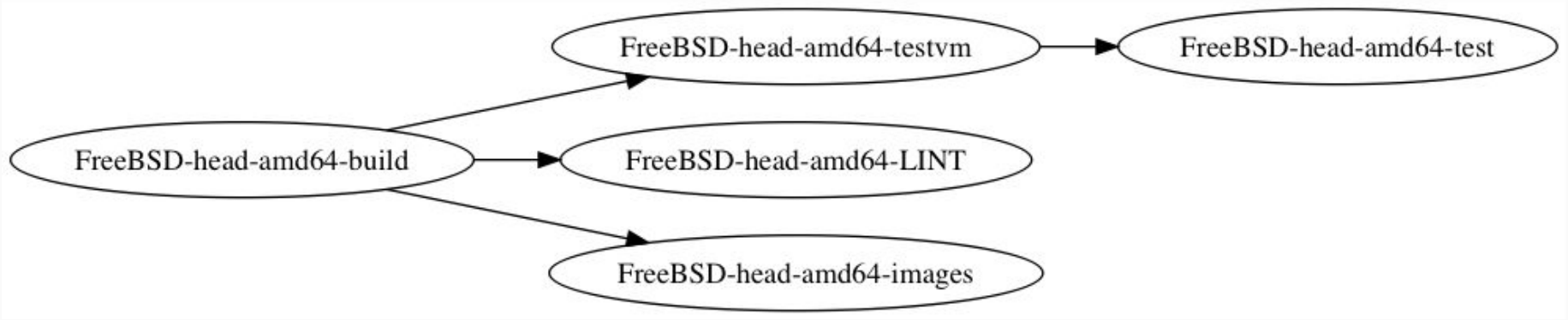
Automatic Build on https://CI.FreeBSD.org

- *-build jobs
  - scripts/build/build-world-kernel.sh
  - Generalized for different versions and architectures
  - make buildworld & buildkernel
  - Build distribution files
- *-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-X1kPkSYNmlEdTB5RjlFbkk

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 RISC-V architecture we use QEMU

Putting Them Together

- Create virtual machine image
    - Pre-install kyua package and test files (under /usr/tests)
    - Customize /etc/rc.local to:
        - 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 (-3) , 64 skipped (-81)

6,023 tests (±0)

Took 31 min.

All Tests

Package	Duration	Fail	(diff)	Skip	(diff)	Pass	(diff)	Total	(diff)
bin.cat	61 ms	0		0		3		3	
bin.date	0.89 sec	0		0		39		39	
bin.dd	0.16 sec	0		0		3		3	
bin.expr	0.25 sec	0		0		14		14	
bin.ls	6.8 sec	0		0		35		35	
bin.mv	0.36 sec	0		0		1		1	
bin.pax	95 ms	0		0		1		1	
bin.pkill	55 sec	0		0		28		28	
bin.sh.builtins	3.9 sec	0		0		163		163	

Failed Test Case Display

Failed

sys.geom.class.gate.ggate_test.ggatel_file (from (test-report.xml))

Failing for the past 3 builds (Since 🟡#1505)

Took 60 ms.

Error Message

```
work md5 checksum didn't match
```

Standard Output

```
Executing command [ ggatel create -u 0 work ]
```

Standard Error

```
Test case metadata
------------------
```

Test Result Trend

Project FreeBSD-head-amd64-test

[Recent Changes](#)

[Latest Test Result](#) (1 failure / -3)

Upstream Projects

● [FreeBSD-head-amd64-testvm](#)

Permalinks

- [Last build (#1508), 34 min ago](#)
- [Last stable build (#1504), 8 hr 22 min ago](#)
- [Last successful build (#1507), 3 hr 14 min ago](#)
- [Last failed build (#1387), 7 days 7 hr ago](#)
- [Last unstable build (#1507), 3 hr 14 min ago](#)
- [Last unsuccessful build (#1507), 3 hr 14 min ago](#)
- [Last completed build (#1507), 3 hr 14 min ago](#)

Test Result Trend
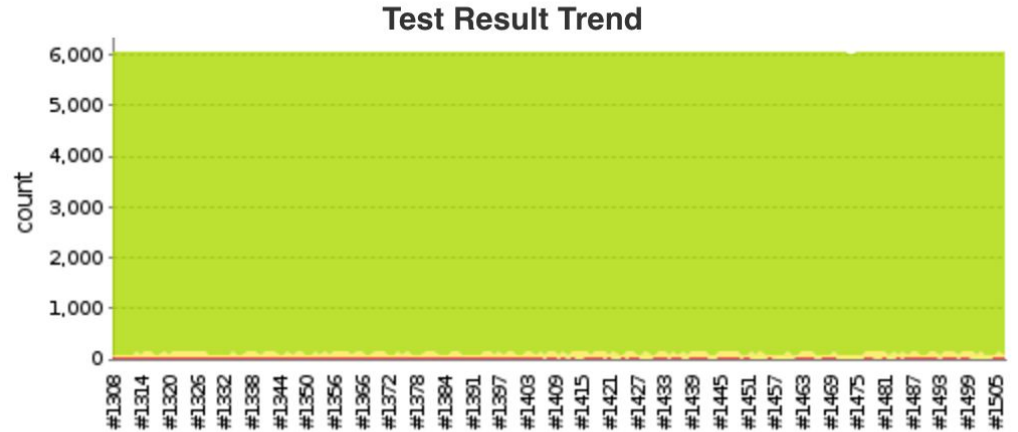
[(just show failures)](#) [enlarge](#)

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

- ftpes://artifact.ci.FreeBSD.org
  - Serves files upload from jobs
    - Through Jenkins "Publish Over FTP" Plugin
    - Add FTP over TLS support
- https://artifact.ci.FreeBSD.org
  - Serves files download for downstream jobs in pipeline or external users
  - snapshots/
    - \<branch\>/\<svn_revision\>/\<target\>/\<target_arch\>
      - head/r123456/amd64/amd64

Open Configurations

Make Creating New Job Easier

- Not everyone knows (and has to know) how to configure Jenkins
- Build jobs have most parts in common
- 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

Jenkins Job Builder

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

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/freebsd/freebsd-ci/tree/master/scripts/jail
- Simplify clean 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 and configs:
  - 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 restless Jenkins executes it around the clock

Example: FreeBSD-head-aarch64-build

- jail.conf

```
TARGET=amd64
TARGET_ARCH=amd64
WITH_32BIT=0
OSRELEASE=11.0-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 with patch from external
- `QUARANTINE=1` in jail.conf
- Config jail to be an isolated environment
  - Remove internet connection after required packages installed
- Limit job resource from job configuration
  - 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 plugin to customize mail body

Template for Failed/Unstable Build Jobs

```
$PROJECT_NAME - Build #$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: Build Failed Mail

```
FreeBSD_HEAD_i386 - Build #3987 - Failure:

Build information: https://jenkins.FreeBSD.org/job/FreeBSD_HEAD_i386/3987/
Full change log: https://jenkins.FreeBSD.org/job/FreeBSD_HEAD_i386/3987/changes
Full build log: 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_at_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 Test Jobs

```
$PROJECT_NAME - Build #$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}
```

Example: Test Failed Mail

```
FreeBSD_HEAD-tests - Build #1746 - Still Unstable:

Build information: https://jenkins.FreeBSD.org/job/FreeBSD_HEAD-tests/1746/
Full change log: https://jenkins.FreeBSD.org/job/FreeBSD_HEAD-tests/1746/changes
Full build log: 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
```
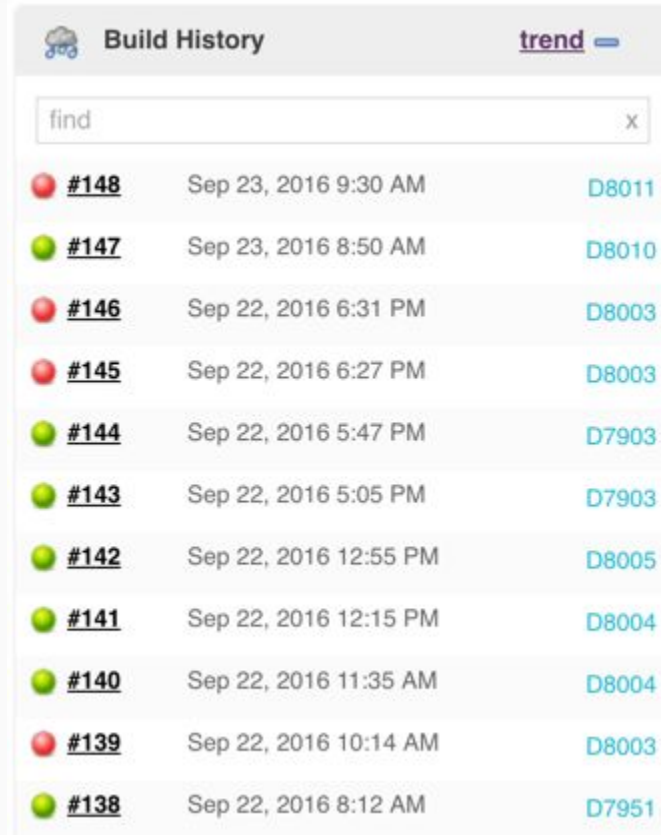
https://lists.freebsd.org/pipermail/freebsd-current/2015-December/058742.html

Integration with Code Review System

- https://ci.freebsd.org/job/phabric-FreeBSD-head-amd64-build
- Phabricator Differential Plugin
  - From Uber
    - https://github.com/uber/phabricator-jenkins-plugin
    - Good readme.md
  - We patched it to support Subversion
    - https://github.com/uber/phabricator-jenkins-plugin/pull/214
    - Basically provide option to select the main SCM
    - Conditionally issue SCM-specified options to arc

Patch Number Attached to each Build

Build History   trend —

find   X

🔴 **#148**	Sep 23, 2016 9:30 AM	D8011
🟢 **#147**	Sep 23, 2016 8:50 AM	D8010
🔴 **#146**	Sep 22, 2016 6:31 PM	D8003
🔴 **#145**	Sep 22, 2016 6:27 PM	D8003
🟢 **#144**	Sep 22, 2016 5:47 PM	D7903
🟢 **#143**	Sep 22, 2016 5:05 PM	D7903
🟢 **#142**	Sep 22, 2016 12:55 PM	D8005
🟢 **#141**	Sep 22, 2016 12:15 PM	D8004
🟢 **#140**	Sep 22, 2016 11:35 AM	D8004
🔴 **#139**	Sep 22, 2016 10:14 AM	D8003
🟢 **#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

On Phabricator:

Clang scan-build

- https://ci.freebsd.org/job/FreeBSD-head-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
```
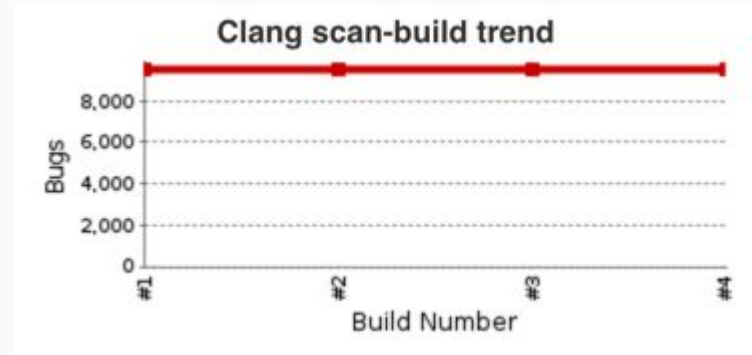

Clang scan-build trend

Clang scan-build Bug Report

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 'strlcpy'. CWE-119	Details
Dead store	Dead assignment	/workspace/src/sys/modules/sym/../../dev/sym/sym_hipd.c	1	Value stored to 'f1' is never read	Details
Dead store	Dead assignment	/workspace/src/sys/modules/sound/sound/../../../dev/sound/pcm/mixer.c	1	Value stored to 'ret' is never read	Details
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 'strlcpy'. CWE-119	Details
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')	Details
Dead store	Dead assignment	/workspace/src/sys/modules/drm/radeon/../../../dev/drm/r600_cp.c	1	Value stored to 'num_backends' is never read	Details

56

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) {
```

        43 ← Assuming 'error' is 0 →

        44 ← Taking false branch →

```
704                  vput(tdp);
705                  return (error);
706          }
707          if (ino1 != ino) {
```

        45 ← Taking false branch →

```
708                  vput(tdp);
709                  goto restart;
710          }
711
712          *vpp = tdp;
```

        46 ← Dereference of null pointer (loaded from variable 'vpp')

Igor + Checkstyle

- **textproc/igor**
  - By Warren Block <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

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	45	45

Summary

Total	High Priority	Normal Priority	Low Priority
66116	0	66116	0

Details

Folders	Files	Warnings	Details	New	Fixed

Source Folder	Total	Distribution
doc/en_US.ISO8859-1/articles/bsdl-gpl	113	▪
doc/en_US.ISO8859-1/articles/building-products	641	▬
doc/en_US.ISO8859-1/articles/committers-guide	7	▪
doc/en_US.ISO8859-1/articles/contributing	144	▪
doc/en_US.ISO8859-1/articles/contributors	2	▪
doc/en_US.ISO8859-1/articles/cups	39	▪
doc/en_US.ISO8859-1/articles/explaining-bsd	225	▪
doc/en_US.ISO8859-1/articles/filtering-bridges	215	▪
doc/en_US.ISO8859-1/articles/fonts	91	▪
doc/en_US.ISO8859-1/articles/freebsd-questions	236	▪

59

Checkstyle Result Trend

- ● Compare with previous build

- ● Overall Trend

Compiler 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	4	4

Summary

Total	High Priority	Normal Priority	Low Priority
853	2	851	0

Details

Folders	Files	Categories	Warnings	Details	New	Fixed	High	Normal

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

61

Compiler Warnings Trend

LLVM/Clang Warnings Trend

Build Status Badge

- https://wiki.freebsd.org/arm64:
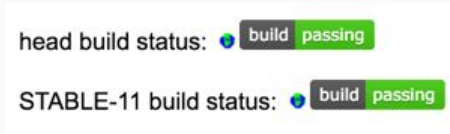
- https://riscv.org/software-tools/freebsd/

- 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

Jenkins REST API

Most Jenkins URLs can be append `"/api"` to get REST API document

- Append `"/api/json"` for JSON
- Append `"/api/json?pretty=true"` for human readable
- Get the latest good-to-build revision: (jq package needed)
  - `curl -s`
    `https://ci.freebsd.org/job/FreeBSD-head-amd64-build/lastStableBuild/api/json | jq '.changeSet.revisions[0].revision'`

Tinderbox view

- https://ci.freebsd.org/tinderbox/
- By foundation intern, Siva Mahadevan

	head	stable/11	stable/10
aarch64	2017-06-09 17:28 UTC *r319756* details	2017-06-09 01:20 UTC *r319728* details	N/A
amd64	2017-06-09 16:40 UTC *r319755* details	2017-06-09 00:33 UTC *r319728* details	2017-06-08 17:09 UTC *r319701* details
i386	2017-06-09 17:26 UTC *r319756* *(failing since r319660)* last successful build | details	2017-06-09 00:46 UTC *r319728* details	2017-06-08 17:31 UTC *r319701* details
riscv64	2017-06-09 17:41 UTC *r319756* details	N/A	N/A
sparc64	2017-06-09 17:27 UTC *r319756* details	2017-06-09 00:33 UTC *r319728* details	2017-06-08 17:40 UTC *r319701* details

Last updated: Fri Jun 09 2017 14:15:13 GMT-0400 (EDT)

Epilogue

Summary

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

Future Work

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

Acknowledgement

- jenkins-admin@FreeBSD.org
- The FreeBSD Foundation
- clusteradmin@FreeBSD.org
- phabic-admin@FreeBSD.org
- People on -testing, -current, -stable mailing lists