Jenkins, Bhyve, and Webdriver: Continuous Integration testing on FreeNAS

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What is Jenkins?

• System which provides tools for Continuous Integration, Testing
• Open source (MIT licensed)
• Written by Kohsuke Kawaguchi
How do I install it?

pkg install devel/jenkins

• Depends on OpenJDK
• Needs a few entries in /etc/rc.conf
• Additional installation notes: http://forums.freebsd.org
<table>
<thead>
<tr>
<th>#</th>
<th>Status</th>
<th>Name</th>
<th>Last Success</th>
<th>Last Failure</th>
<th>Last Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Building</td>
<td>FreeNAS</td>
<td>2 hr 10 min - #214</td>
<td>1 day 2 hr - #209</td>
<td>1 hr 4 min</td>
</tr>
<tr>
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<td>2 days 21 hr - #111</td>
<td>44 min</td>
</tr>
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<td>20 hr - #708</td>
<td>N/A</td>
<td>47 min</td>
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<td>Building</td>
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<td>4 days 22 hr - #10</td>
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<td>6 min 25 sec</td>
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<td>Jenkins2</td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>Idle</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
How do I configure it?

• Easy to use web interface for configuration
• Functionality extensible via 3rd party plugins (over 700)
Where do I get help?

- [http://jenkins-ci.org](http://jenkins-ci.org), active community
- Books
- Conferences
- Consulting companies, [http://cloudbees.com](http://cloudbees.com)
Jenkins User Conference 2013
How do I use it?
How am I trying to use Jenkins?

- Developer
- SCM (git)
- Build
- Test
- Deploy
BHyve

• BSD Hypervisor, in FreeBSD 10
• works great for booting/testing images
• Python pexpect over serial interface to drive installer
• thanks to Neel, Peter
Webdriver

• Framework for automated web app testing
• Built into Firefox
• I'm using Python Splinter library to interface with Webdriver: http://splinter.cobrateam.info
Webdriver example using Python splinter library

```python
from splinter import Browser

browser = Browser()
browser.visit("http://www.yahoo.com")
browser.find_by_id("p_13838465-p").fill("BSDCan 2014")
browser.find_by_id("search-submit").click()
```
Special Thanks

- FreeBSD ports team
- BHyve team
FreeNAS and TrueNAS

- #1 Open-Source NAS software
- Take a look and try it out!

http://www.freenas.org
http://www.ixsystems.com/freenas
Jenkins and Bhyve:
Continuous Integration for FreeBSD

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Presentation Overview

• Introduction to Jenkins and Continuous Integration (CI)
• Describe how Jenkins was set up in FreeBSD cluster
Jenkins
What is Jenkins?

• Continuous Integration tool implemented in Java
• written by Kohsuke Kawaguchi at Sun
Continuous Integration
What is Continuous Integration?

- Developer commits code changes
- System verifies that code builds
- System verifies that code passes tests
- Code is deployed
Jenkins in the FreeBSD cluster
Motivation

• Use more modern development tools in FreeBSD
• Help improve quality of FreeBSD
• Take advantage of large Jenkins ecosystem
Setting up Jenkins in the FreeBSD cluster
Task #1: Set up machine

- clusteradm@freebsd.org provided:
- vmhost.freebsd.org:
  - 16G RAM, 1.8TB disks
  - Intel E5620, 16 CPU cores
  - FreeBSD 11
Task #2: Set up VM's

- Two 200GB disk images created
- Image 1: jenkins-9.freebsd.org (FBSD 9)
- Image 2: jenkins-10.freebsd.org (FBSD 10)
- Run VM's under BSD Hypervisor (BHyve)
Task #3: Create rc.d scripts

• rc.d scripts start VM's on boot of vmhost
• VM's send console output to /dev/nmdm
• Example to connect to VM console: 
  
cu -l /dev/nmdm0B
Task #4: Install Jenkins in VM's

- pkg install devel/jenkins
- OpenJDK pulled in as dependency
- configure some settings in /etc/rc.conf
- service jenkins start
Task #5: Set up nginx

- DNS CNAME: jenkins → jenkins-9
- nginx https configured with SSL certificate
VM Host

vmhost.freebsd.org (FreeBSD 11)

jenkins-9.freebsd.org (Bhyve VM)  jenkins-10.freebsd.org (Bhyve VM)
jenkins-9.freebsd.org VM

Web request

jenkins-9.freebsd.org (FreeBSD 9)

Nginx proxy

Jenkins Java VM
Task #6: Set up authentication

- Jenkins authentication via LDAP used
- Configured via Jenkins web UI
- FreeBSD LDAP servers at Yahoo used
LDAP authentication

jenkins-9.freebsd.org (FreeBSD 9)

Nginx proxy ➔ Authenticate (ldaps://) ➔ Jenkins Java VM

Web request ➔ LDAP server at Yahoo
Task #7: Set up builds

- Set up “free-form builds” via Jenkins web UI
- On Unix, “free-form” builds executed via “/bin/sh -xe”, if first line lacks “#!” (shebang)
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<thead>
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<th>Last Failure</th>
<th>Last Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Building</td>
<td>FreeBSD_stable</td>
<td>6 hr 27 min</td>
<td>3 days 15 hr</td>
<td>56 min</td>
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<tr>
<td>2</td>
<td>Idle</td>
<td>FreeBSD_HEAD</td>
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<td>12 hr</td>
<td>1 hr 24 min</td>
</tr>
<tr>
<td>3</td>
<td>Idle</td>
<td>FreeBSD_HEAD</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td>Idle</td>
<td>FreeBSD_HEAD</td>
<td>7 hr 59 min</td>
<td>N/A</td>
<td>9 min 25 sec</td>
</tr>
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<td>5</td>
<td>Building</td>
<td>FreeBSD_HEAD</td>
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<tr>
<td>6</td>
<td>Idle</td>
<td>FreeBSD_stable</td>
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<tr>
<td>7</td>
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<tr>
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<td>FreeBSD_stable</td>
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</tr>
<tr>
<td>9</td>
<td>Idle</td>
<td>FreeBSD_stable_9</td>
<td>3 hr 3 min</td>
<td>N/A</td>
<td>18 min</td>
</tr>
</tbody>
</table>

Legend: RSS for all, RSS for failures, RSS for just latest builds
What do we have so far?
Implementation status of CI

- Latest project status:
  http://wiki.freebsd.org/Jenkins
What's next?
Next steps

- Integrate with Julio Merino's Kyua framework at BSDCan
- Set up more builds
- Boot results of builds in VM's
- Coverity integration
Where do I find out more?
Further information

• Project page:
  http://wiki.freebsd.org/Jenkins

• Contact us:
  freebsd-testing@FreeBSD.org

• Join in, and help out!
Special Thanks

- jenkins-admin@freebsd.org:
- Craig Rodrigues, rodrigc@ (project lead)
- Li-Wen Hsu, lwhsu@, (port maintainer)
- Steve Kreuzer, skreuzer@ (devops ninja)
- Steve Wills, swills@, (port maintainer)
- R. Tyler Croy, tyler@, (Jenkins guru)
Special Thanks

- `clusteradm@freebsd.org`
- Sean Bruno, `sbruno@freebsd.org`
- Peter Wemm, `peter@freebsd.org`
- Glen Barber, `gjb@freebsd.org`