



**February 28 – March 1, 2012**

## A 30 Minute Project Makeover Using Continuous Integration

by

JL Gray

Gordon McGregor

Verilab, Inc.



# Agenda

- Motivation
- Selecting a CI Server
- Setup
- Our Problem, Our Solution

# Agenda

- Motivation
- Selecting a CI Server
- Setup
- Our Problem, Our Solution

# Scenarios

- You make a check-in, but...
  - Did you commit everything?
  - Did something break when you merged code?
  - Did someone else break the build first?
- You check out a clean build that doesn't work...
  - Is it broken for anyone else?
  - Which check-in broke the build?

## What if...

- You knew the pass/fail status of every check-in?
- You knew how stable a particular build target has been over time?
- You were notified instantly when someone checked in code that broke the build?

# Solution: Continuous Integration

- Run regressions each time a check-in is made
- Report exact details of regression failures
- Identify who caused the problem in the first place



## Basic Requirement 2

- Simulation run script must return non-zero exit status upon failure.



## Basic Requirement 3

- There is no basic requirement 3... that's it!

# Objections to CI

- Takes a lot of licenses
- Too much time to debug failures
- Takes too long to run
- Too hard to set up
- Now I can't check in my unfinished/broken code...
- Requires IT/Management approval

# Objections Addressed

## Objection

- Takes a lot of licenses
- Too much time to debug failures
- Takes too long to run
- Too hard to set up
- Now I can't check in my unfinished/broken code...
- Requires IT/Management approval

## Resolution

- Limit license use
- Easier to debug incremental failures
- Limit to 10-15 minutes
- You didn't read our paper, did you?
- Use a branch
- Not if you use Jenkins!

# Agenda

- Motivation
- Selecting a CI Server
- Making the Case
- Setup
- Conclusion

# CI with Jenkins

[www.jenkins-ci.org](http://www.jenkins-ci.org)

“That was easy!”



=



# Jenkins

# Agenda

- Motivation
- Selecting a CI Server
- Setup
- Our Problem, Our Solution

15 of N

Page generated: Feb 25, 2012 4:53:24 PM [Jenkins ver. 1.451](#)



 [Help us localize this page](#)

# Configure Project

UVM Rampup Config [Jenkins]

Jenkins

search

jlgray | log out

Jenkins » DVCon 2012 » UVM Rampup

Back to Dashboard

Status

Changes

Workspace

Build Now

Delete Project

Configure

Git Polling Log

Build History (trend)

#15 Feb 24, 2012 8:04:03 PM

#14 Feb 23, 2012 5:37:04 AM

#13 Feb 23, 2012 5:34:04 AM

#12 Feb 23, 2012 5:31:07 AM

#11 Feb 23, 2012 5:26:05 AM

#10 Feb 23, 2012 5:24:14 AM

#9 Feb 23, 2012 5:16:22 AM

#8 Feb 23, 2012 5:14:56 AM

#7 Feb 23, 2012 4:15:05 AM

#6 Feb 23, 2012 3:57:07 AM

Project name

UVM Rampup

Description

Preview

☐ Discard Old Builds

☐ Trac website

☐ This build is parameterized

☐ Disable Build (No new builds will be executed until the project is re-enabled.)

☐ Execute concurrent builds if necessary

Advanced Project Options

Advanced...

Source Code Management

☐ CVS
 ☒ Git

Repositories

Repository URL

/sysadm/git/i2c\_uvm\_proj.git

Advanced...

Save

19 of N

# Polling and Build Execution

UVM Rampup Config [Jenkins]

☐ Subversion

**Build Triggers**

☐ Build after other projects are built

☐ Trigger builds remotely (e.g., from scripts)

☐ Build periodically

☒ Poll SCM

Schedule

 Do you really mean "every minute" when you say "\* \* \* \* \*"? Perhaps you meant "0 \* \* \* \*

**Build**

 **Execute shell**

Command

See [the list of available environment variables](#)

**Post-build Actions**

☐ Aggregate downstream test results

# JUnit Configuration

UVM Rampup Config [Jenkins]

./runsim;

See [the list of available environment variables](#)

Delete

Add build step ▼

**Post-build Actions**

- ☐ Aggregate downstream test results
- ☐ Archive the artifacts
- ☐ Build other projects
- ☒ Publish JUnit test result report
 

Test report XMLs 

[Fileset 'includes'](#) setting that specifies the generated raw XML report files, such as 'myproject/target/test-reports/\*.xml'.  
 Basedir of the fileset is [the workspace root](#).

☐ Retain long standard output/error
- ☐ Publish Javadoc
- ☐ Record fingerprints of files to track usage
- ☐ Git Publisher
- ☐ E-mail Notification

Save

# Understanding Build Results

UVM Rampup [Jenkins]

Jenkins

jlgray | log out

[Jenkins](#) » [DVCon 2012](#) » [UVM Rampup](#)
ENABLE AUTO REFRESH

[Back to Dashboard](#)
[Status](#)
[Changes](#)
[Workspace](#)
[Build Now](#)
[Delete Project](#)
[Configure](#)
[Git Polling Log](#)

Project UVM Rampup

[Workspace](#)
[Recent Changes](#)
[Latest Test Result \(2 failures / ±0\)](#)

Test Result Trend

Build #	Failures	Status
#9	6	Failure
#10	6	Failure
#11	0	Success
#12	2	Failure
#13	2	Failure
#14	2	Failure
#15	2	Failure

[add description](#)
[Disable Project](#)

Build History (trend)

#15	Feb 24, 2012 8:04:03 PM
#14	Feb 23, 2012 5:37:04 AM
#13	Feb 23, 2012 5:34:04 AM
#12	Feb 23, 2012 5:31:07 AM
#11	Feb 23, 2012 5:26:05 AM
#10	Feb 23, 2012 5:24:14 AM
#9	Feb 23, 2012 5:16:22 AM
#8	Feb 23, 2012 5:14:56 AM
#7	Feb 23, 2012 4:15:05 AM
#6	Feb 23, 2012 3:57:07 AM

Permalinks

- [Last build \(#15\), 21 hr ago](#)
- [Last stable build \(#11\), 2 days 11 hr ago](#)
- [Last successful build \(#15\), 21 hr ago](#)
- [Last failed build \(#8\), 2 days 12 hr ago](#)
- [Last unstable build \(#15\), 21 hr ago](#)
- [Last unsuccessful build \(#15\), 21 hr ago](#)

Gray/McGregor, Verilab, Inc.

22 of N

# Test Failures

UVM Rampup #15 Test Results [Jenkins]

## Jenkins

search ? jlgray | log out

Jenkins » DVCon 2012 » UVM Rampup » #15 » Test Results [ENABLE AUTO REFRESH](#)

[Back to Project](#)  
[Status](#)  
[Changes](#)  
[Console Output](#)  
[Edit Build Information](#)  
[History](#)  
[Polling Log](#)  
[Git Build Data](#)  
[No Tags](#)  
[Test Result](#)  
[Previous Build](#)

### Test Result

2 failures (±0)

6 tests (±0)  
 Took 4 min 19 sec.  
[add description](#)

### All Failed Tests

Test Name	Duration	Age
>>> <a href="#">regression.program_and_read_test</a>	7 sec	1
>>> <a href="#">regression.program_and_write_test</a>	50 sec	1

### All Tests

Package	Duration	Fail	(diff)	Skip	(diff)	Total	(diff)
(root)	4 min 19 sec	2		0		6	

[Help us localize this page](#)

Page generated: Feb 25, 2012 5:22:31 PM [Jenkins ver. 1.451](#)





# Bug Found by SCM Change

UVM Rampup #6 [Jenkins]

Jenkins

search

jlgray | log out

Jenkins » DVCon 2012 » UVM Rampup » #6

ENABLE AUTO REFRESH

[Back to Project](#)
[Status](#)
[Changes](#)
[Console Output](#)
[Edit Build Information](#)
[Polling Log](#)
[Git Build Data](#)
[No Tags](#)
[Previous Build](#)
[Next Build](#)

Build #6 (Feb 23, 2012 3:57:07 AM)

Changes

1. adding some more detail to the top\_env.sh (detail)

Started by an SCM change

Revision: dc49f0352390985a39d5cb8791df4e4460776a1c

- origin/HEAD
- origin/master

Delete this build

Started 2 days 13 hr ago

Took 10 sec

[add description](#)

[Help us localize this page](#)

Page generated: Feb 25, 2012 5:25:57 PM

[Jenkins ver. 1.451](#)

# The Culprit



**Jenkins**

Jenkins » UVM Rampup » #6

[Back to Project](#) [Status](#) [Changes](#) [Console Output](#) [Edit Build Information](#) [Polling Log](#) [Git Build Data](#) [No Tags](#) [Previous Build](#) [Next Build](#)

**Changes**

**Summary**

1. adding some more detail to the top\_env.sv ([details](#))

**Commit dc49f0352390985a39d5cb8791df4e4460776a1c by gordon.mcgregor**  
adding some more detail to the top\_env.sv

i2c\_master\_slave\_core\_proj/sv/top\_env.sv

[Help us localize this page](#)

Page generated: Feb 25, 2012 5:36:51 PM [Jenkins ver. 1.451](#)

I pity the fool...

# Agenda

- Motivation
- Selecting a CI Server
- Setup
- Our Problem, Our Solution

# Our Problem

- Significant time wasted debugging bad check-ins
- Completion of key milestones delayed
- No project management support to force quality
- Solution couldn't require management or IT support

# Experimental Solution

- Use Jenkins
- Required Java and... that's it!
- Built-in web server
- Basic integration with Perforce and our scripting environment for problematic regression target took ~30-45 minutes

# Experimental Results

- Able to contact offending committers when problems arose without them having to know about CI
- Gradually started sharing results of CI reports with rest of engineering team and management
- Benefits quickly became evident to rest of team and management
- Additional targets added

# Questions?

- Verilab website ([www.verilab.com](http://www.verilab.com))
- JL Gray
  - [jl.gray@verilab.com](mailto:jl.gray@verilab.com)
  - [www.coolverification.com](http://www.coolverification.com)
  - Twitter: jlgray
- Gordon McGregor
  - [gordon.mcgregor@verilab.com](mailto:gordon.mcgregor@verilab.com)
  - Twitter: GordonMcGregor