Agitar® SOFTWARE

Accelerate Software Delivery with Continuous Integration and Testing

JaSST'08 Tokyo

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Agenda

- [x] What is Continuous Integration
- [x] Continuous Integration Practices
- [x] Impact of Continuous Integration
- [x] Toolset

Agenda

- **What is Continuous Integration**
- Continuous Integration Practices
- Impact of Continuous Integration
- Toolset

Continuous Integration is About Reducing the Cost of Mistakes

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- Manual CI
  - practice of frequently integrating my work with work of the team
- Automated CI
  - practice of giving **automated feedback** as rapidly as possible following a change

Common goal – lower the cost of failure

Model of Finding Bugs Manually

Simple assumption

1. Testing a feature takes 2 min

2. Investigation & reporting a bug takes 10 min

   Setup, bug investigation, and reporting take time away from test design and execution

Simple conclusion

In a 90 min session,
we can run 45 features tests
— as long as we don't find any bugs...

(example from Michael Bolton, DevelopSense.com)

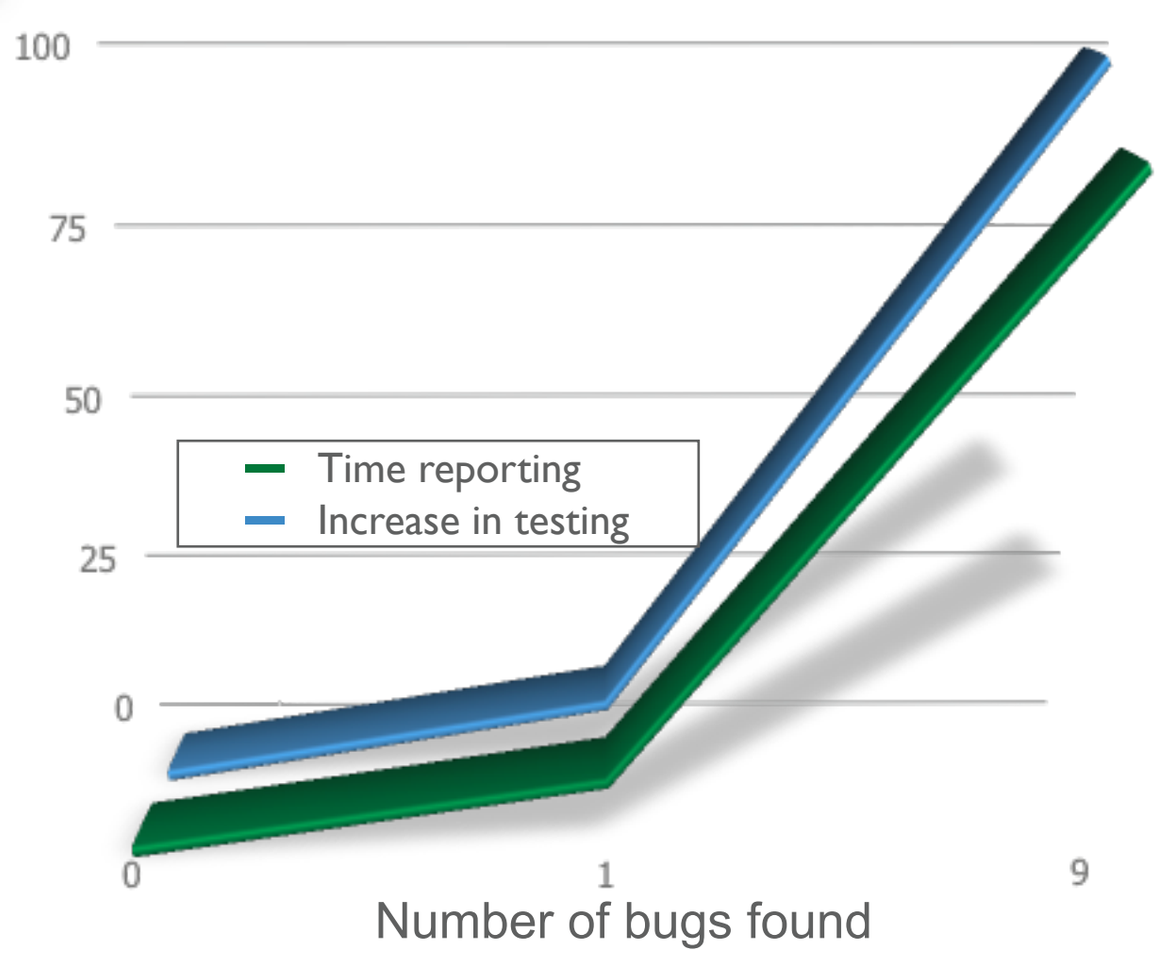
Finding Bugs Manually Costs Time

90 minute testing session, 45 features tests

Number of bugs found	Time spent reporting bugs (minutes)	Increase in testing time
0	0	0
1	10	11%
9	90	100%

And what about other costs of those bugs…?

- ☑ The engineering time to investigate
- ☑ The time to retest
- ☑ The bugs hidden behind bugs



CI Feedback Empowers Fixing Problems Early

- ☑ Code rules pass
- ☑ Code compiles
- ☑ Unit tests pass
- ☑ System tests pass
- ☑ Installer created
- ☑ Deployment successful

...

People are generally interested in being good citizens.

– Alistair Cockburn

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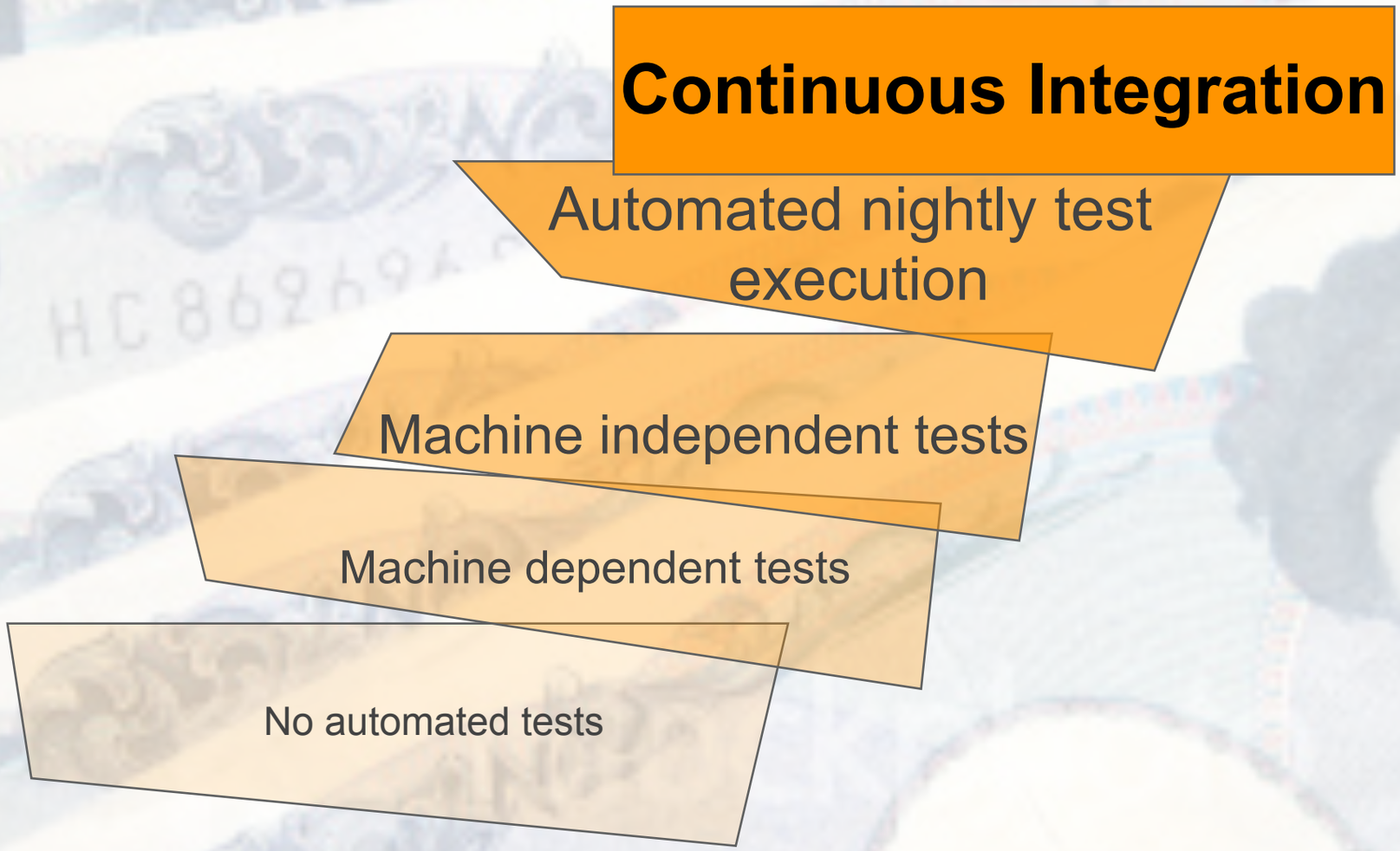
- What is Continuous Integration
- **Continuous Integration Practices**
- Impact of Continuous Integration
- Toolset

CI Practices with Examples from Agitar

- [x] Invest in tests
- [x] Minimize feedback cycles
- [x] Use multiple feedback mechanisms

Invest in Tests



Imperfect tests, run frequently, are much better than perfect tests that are never written at all.

– Martin Fowler

Use Multiple Builds to Minimize Feedback Cycles

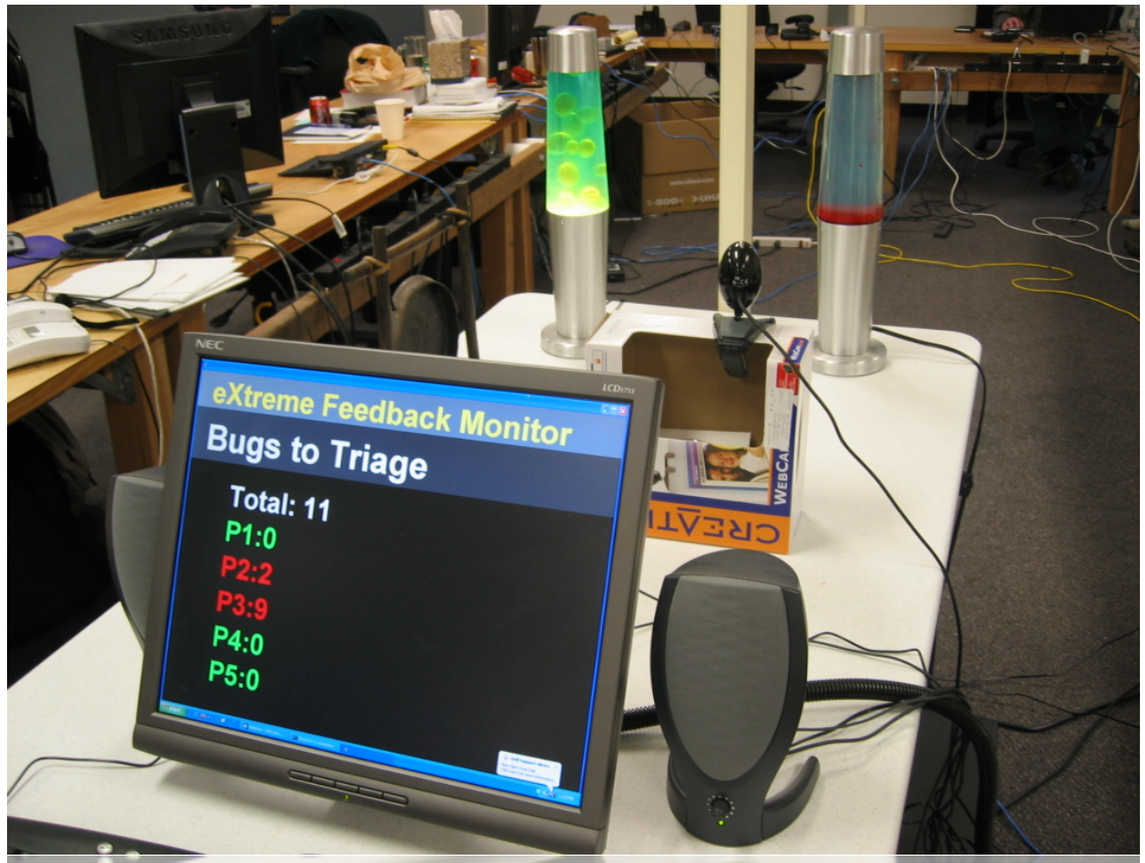
- "quick" build
  - compiles + fast tests
  - feedback < 10 minutes
- system tests
  - feedback < 1 hour
- nightly tests
- (official build)

Agitar Makes Extensive Use of Multiple Build Cycles

- ☑ 14 servers dedicated to CI
  - 8 instances of CruiseControl
  - 6 machines for distributed agitation
- ☑ 106 builds defined
  - Average 7 builds per day per module
  - Coverage on multiple branches and operating systems
- ☑ Continuous releases to QA
  - No special test builds required

Multiple Feedback Mechanisms Serve Multiple Goals

- Information radiators keep the team in sync
  - Lava lamps
  - eXtreme Feedback Monitor
- Feedback at the desktop for personal access
  - Browser plugins, widgets
  - Emails
- Detailed reports for analysis
  - JSP reporting application
  - Managed testing



Lava Lamps & XFM as Information Radiators

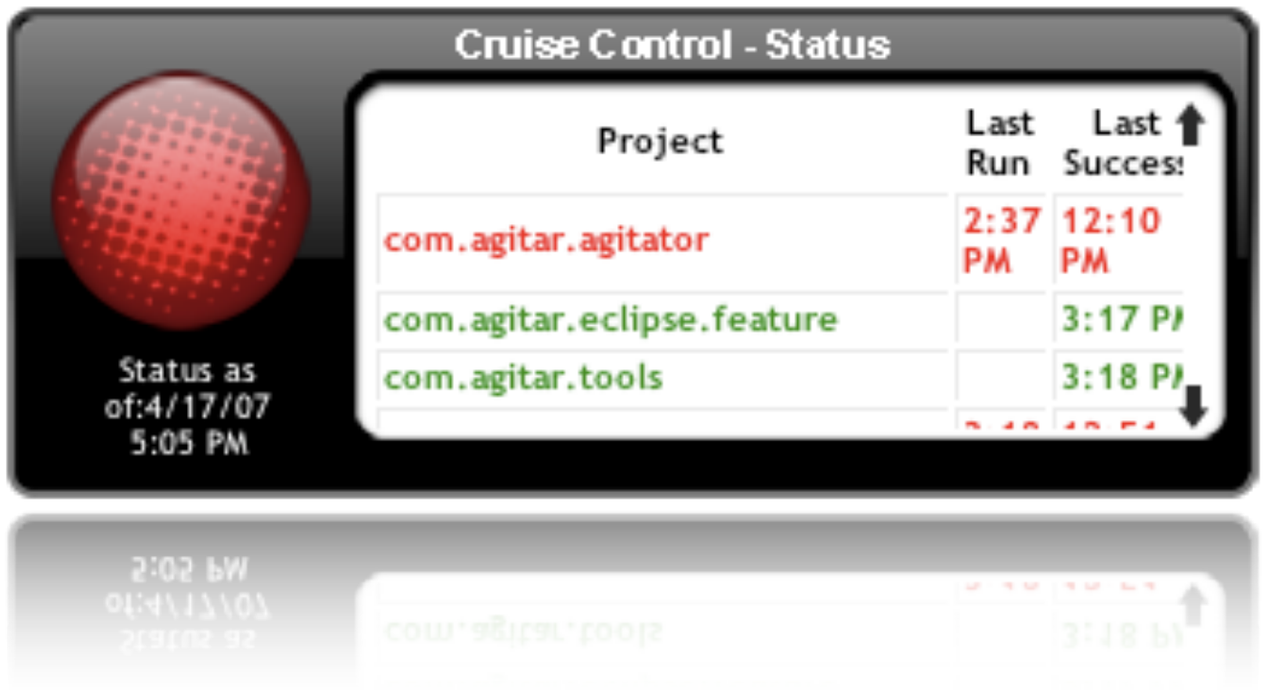
Quick Desktop Access to Information

Firefox CruiseControl plugin

com.agitar.eclipse.tde		09/18/2006 12:42:49
com.agitar.eclipse.tes...		09/18/2006 12:20:58
com.agitar.eclipse.tes...		09/18/2006 12:25:30
com.agitar.enterprise		09/18/2006 13:24:16
com.agitar.experts.common		09/18/2006 12:44:58
com.agitar.experts.hib...		09/18/2006 12:45:26
com.agitar.experts.j2ee		09/18/2006 12:43:30
com.agitar.experts.log4j		09/18/2006 12:46:58
com.agitar.experts.spring		09/18/2006 12:46:20
com.agitar.experts.struts		09/18/2006 12:44:07
com.agitar.knowledge		09/18/2006 13:46:35
com.agitar.mockingbird		09/18/2006 13:46:24
com.agitar.testrunner		09/15/2006 15:50:25
com.agitar.tools		09/18/2006 13:39:22
data_service		09/18/2006 13:48:41
eclipse-plugins		09/18/2006 13:49:34
org.agitar.mock		09/18/2006 13:49:05
org.testrabbit.client		09/18/2006 13:45:06
org.testrabbit.client....		09/18/2006 13:45:16
org.testrabbit.client....		09/18/2006 13:47:57
qe.support		09/18/2006 13:48:50
test.smoke.agitator		09/18/2006 13:34:22
test.smoke.tiger	*	09/18/2006 13:49:39
test.utilities		09/18/2006 13:45:47
tutorial		09/18/2006 13:48:24
tutorial.j2ee		09/18/2006 13:48:06
tutorial.spring		09/18/2006 13:48:33
unittest.java5	*	09/18/2006 13:45:32
xes		09/18/2006 13:49:59

/13:54:27

Desktop widget



Failure Email Gives Actionable Information

Cc:
Subject: quick_dashboard Build Failed

View results here -> http://mob3:8080/cruisecontrol/buildresults/quick_dashboard?log=log20050204131038

BUILD FAILED

Ant Error Message: /home/builder/projects/bootstrap/dashboard/build.xml:402: Tests failed
Date of build: 02/04/2005 13:10:38
Time to build: 43 seconds
Last changed: 02/04/2005 13:02:24
Last log entry: quick_agitator

Errors/Warnings: (1)

Since fork is false, ignoring memoryMaximumSize setting.

Unit Tests: (74)

failure	testGetPackageTCIs	com.agitar.dashboard.CoverageResultsTest

Unit Test Error Details: (1)

Test: testGetPackageTCIs
Class: com.agitar.dashboard.CoverageResultsTest
Type: junit.framework.AssertionFailedError
Message: expected:<1> but was:<0>

```
junit.framework.AssertionFailedError: expected:<1> but was:<0>
        at com.agitar.dashboard.CoverageResultsTest.testGetPackageTCIs(CoverageResultsTest.java:85)
        at sun.reflect.NativeMethodAccessorImpl.invoke0(Native Method)
        at sun.reflect.NativeMethodAccessorImpl.invoke(NativeMethodAccessorImpl.java:39)
        at sun.reflect.DelegatingMethodAccessorImpl.invoke(DelegatingMethodAccessorImpl.java:25)
```

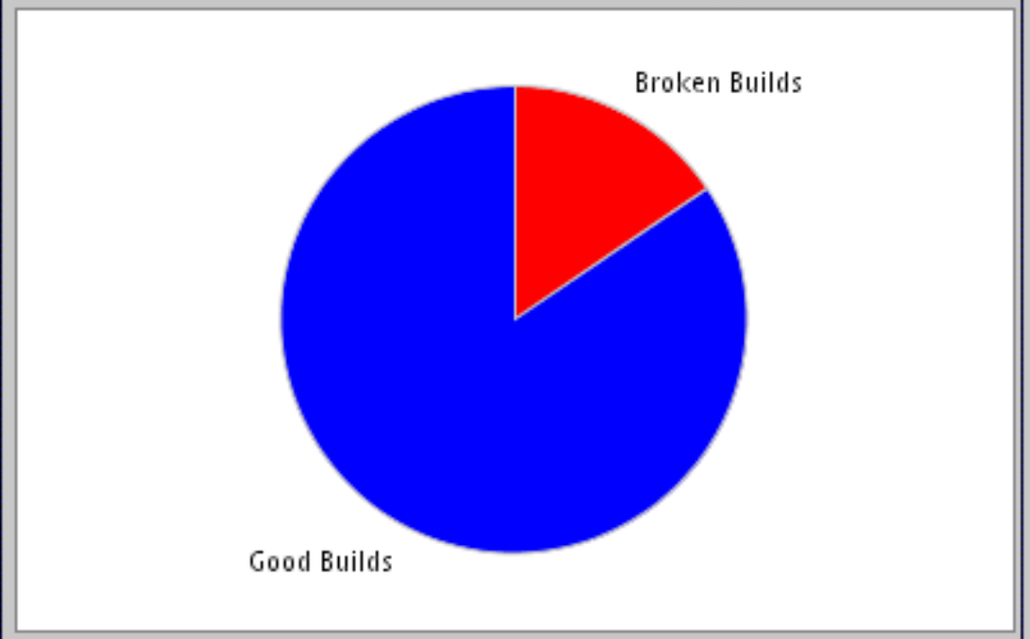
Modifications since last build: (10)

add	cc-quick_agitator	log20050204130224Lbuild.4156	quick_agitator

CruiseControl Report for Build Metrics

Number of Build Attempts	4983
Number of Broken Builds	775
Number of Successful Builds	4208

Breakdown of build types



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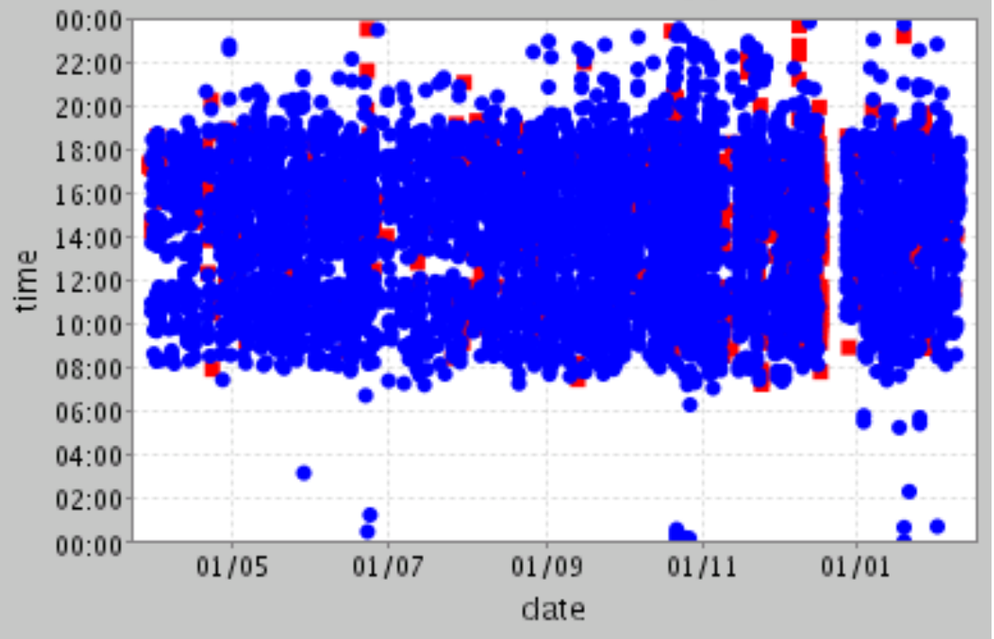


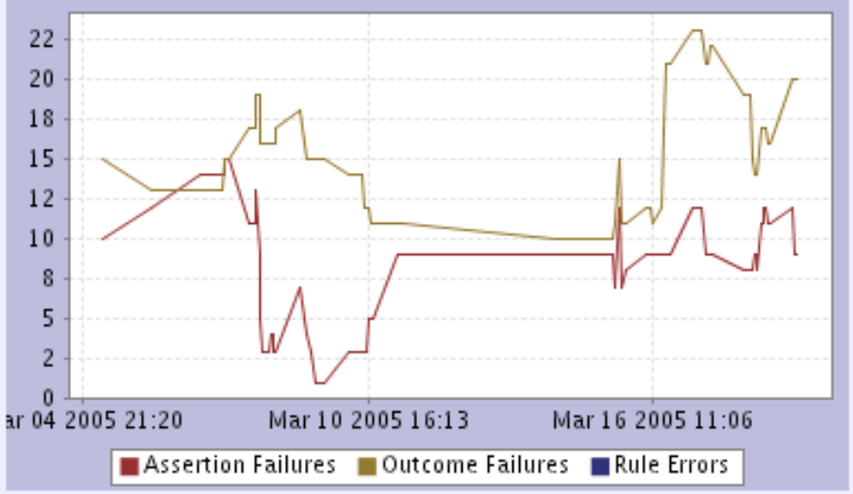
Management Email Gives Visibility into High Level Trends

Agitar Management Dashboard

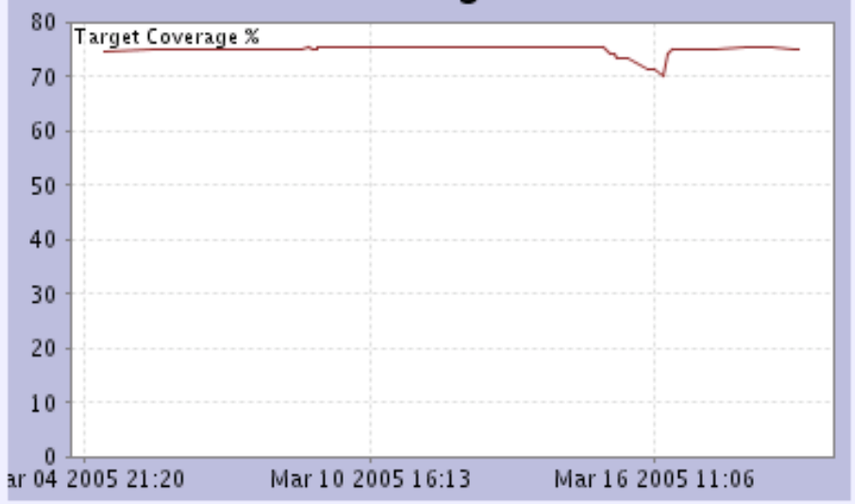
Project cc_agitator *[3/19/05 9:51 AM]*

Trends

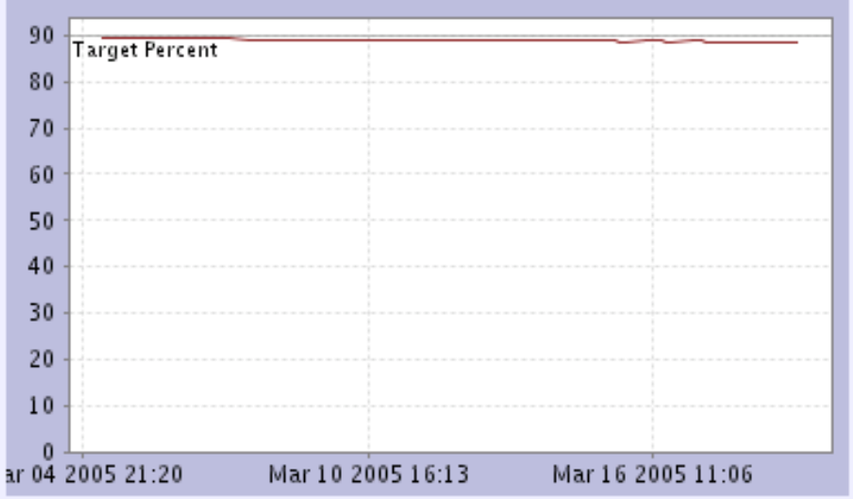
Test Failures



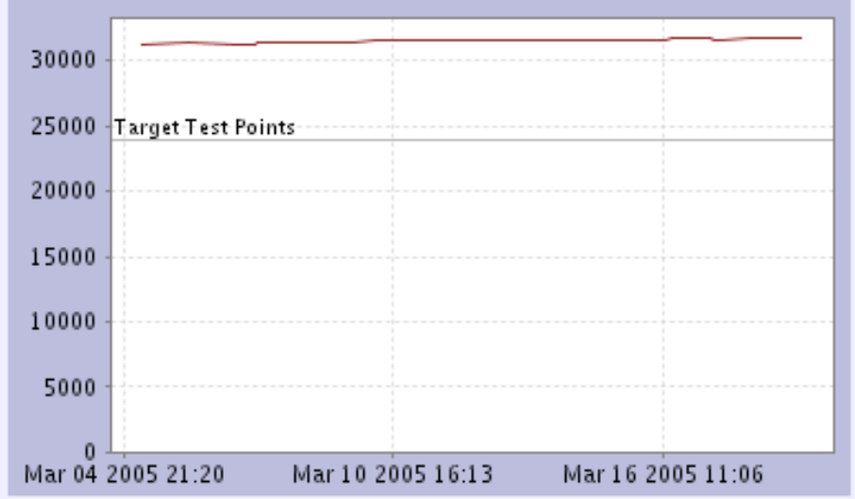
Coverage %



% Classes with Test Points



Test Points



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- **Impact of Continuous Integration**
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Impact of Continuous Integration in the Literature

36% reduction in defect rate

when integration/regression testing at each code check-in

"Trade-offs between Productivity and Quality in Selecting Software Development Practices", IEEE Software, Sept-Oct 2003

Impact of Continuous Integration with Agitar Customers

- **90% reduction in bugs reaching QA**
  Major municipal gas utility
- **95% cut in cost of bugs**
  Large retail web site
- **90% cut in defect remediation cost**
  Global supplier of healthcare equipment

Impact of Continuous Integration at Agitar Software

- **Faster time-to-market**
  - More features **and** higher quality
- **Agility in the marketplace**
  - added new functionality 2 weeks before ship
  - shipped 1 week early
- **Confidence in the process**
  - "Oozing Confidence" (Mike Clark)

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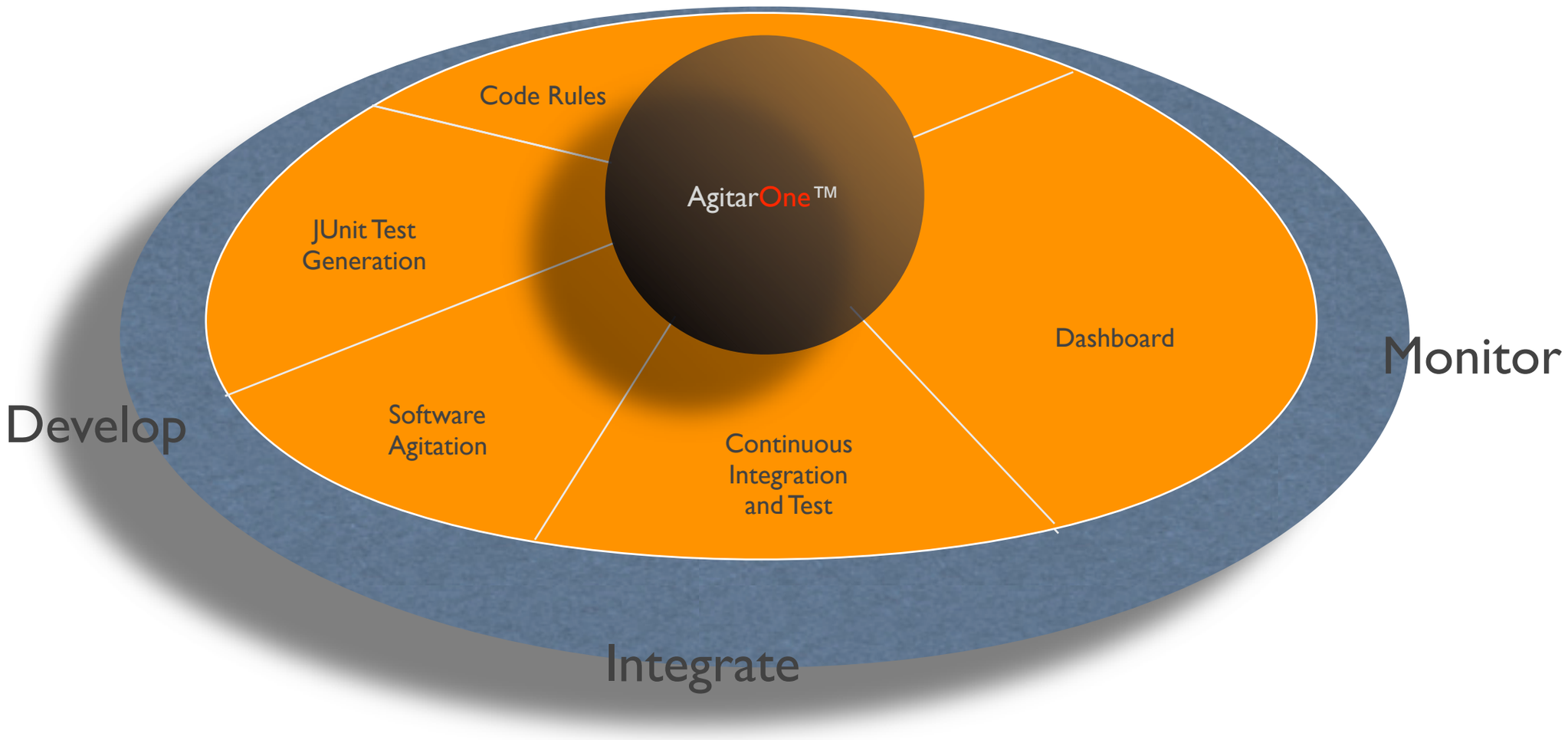
AgitarOne™

AgitarOne™ brings unprecedented automation to the activities of developer testing



Other Tools

- CruiseControl
  - Open Source CI framework
  - ~11K downloads per month
- CruiseControl extensions
  - AgitarOne™ integration
  - 3rd party
  - In-house scripts
- AgitarOne™ ant tasks

Software & Information Resources

cruisecontrol.sourceforge.net	CruiseControl
www.agitar.com	AgitarOne
www.junit.org	JUnit
www.junitfactory.com	JUnitFactory
www.stickyminds.com	CI: An Unlikely Hero
www.martinfowler.com	Continuous Integration
developertesting.com	Continuous Integration, Continuous Agitation A Bad Day With Continuous Integration eXtreme Feedback for Software Development

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