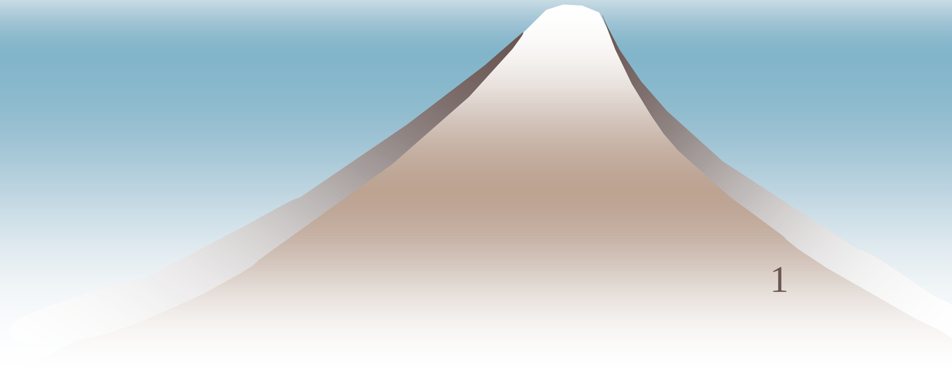
Hudson

or how to do more with less

Kohsuke Kawaguchi



What’s Hudson?

- Hudson is a “continuous integration” server
  - It looks for changes and builds your project
  - It publishes the result
  - It keeps track of how your project is used elsewhere
  - It brings transparency to projects

What’s Hudson?

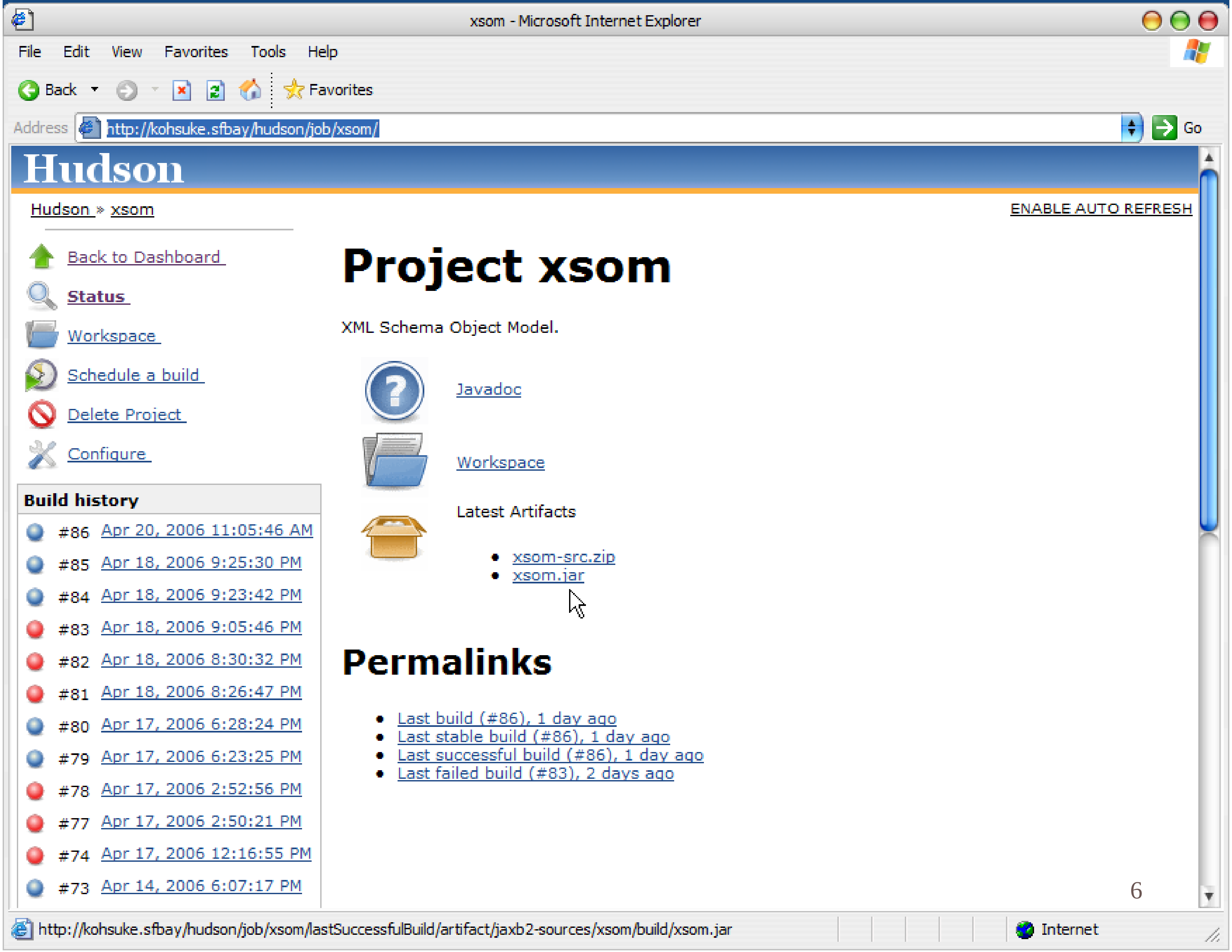
- Evolved with us
  - Started from JAXB, then to web services, SWDP, and now GlassFish
  - Other Sun teams are using it, like NetBeans, Access Manager, SwingLab, OpenDS, JavaFX, etc.
  - Plugins written to cater to our specific needs

More about Hudson

- Open-source project at java.net
  - http://hudson.dev.java.net/
- Extensible architecture
  - Lots of community developed plugins
- Very active
  - 116 person yrs worth of code, FWIW
  - 3 years old, 161 releases to date
  - 30+ committers

What does Hudson do?

- Starts a build whenever a change is made
  - Listen to SCM change notification e-mail
  - Build results available (in few minutes)
  - Other people can then…
    - Download artifacts
    - See javadoc
  - Build failure triggers a notification


xsom - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back
Favorites
Address
Go
Internet

http://kohsuke.sfbay/hudson/job/xsom/

Hudson

Hudson » xsom

ENABLE AUTO REFRESH

- Back to Dashboard
- Status
- Workspace
- Schedule a build
- Delete Project
- Configure

Build history

🔵	#86	Apr 20, 2006 11:05:46 AM
🔵	#85	Apr 18, 2006 9:25:30 PM
🔵	#84	Apr 18, 2006 9:23:42 PM
🔴	#83	Apr 18, 2006 9:05:46 PM
🔴	#82	Apr 18, 2006 8:30:32 PM
🔴	#81	Apr 18, 2006 8:26:47 PM
🔵	#80	Apr 17, 2006 6:28:24 PM
🔵	#79	Apr 17, 2006 6:23:25 PM
🔴	#78	Apr 17, 2006 2:52:56 PM
🔴	#77	Apr 17, 2006 2:50:21 PM
🔴	#74	Apr 17, 2006 12:16:55 PM
🔵	#73	Apr 14, 2006 6:07:17 PM

Project xsom

XML Schema Object Model.

Javadoc

Workspace

Latest Artifacts

- xsom-src.zip
- xsom.jar

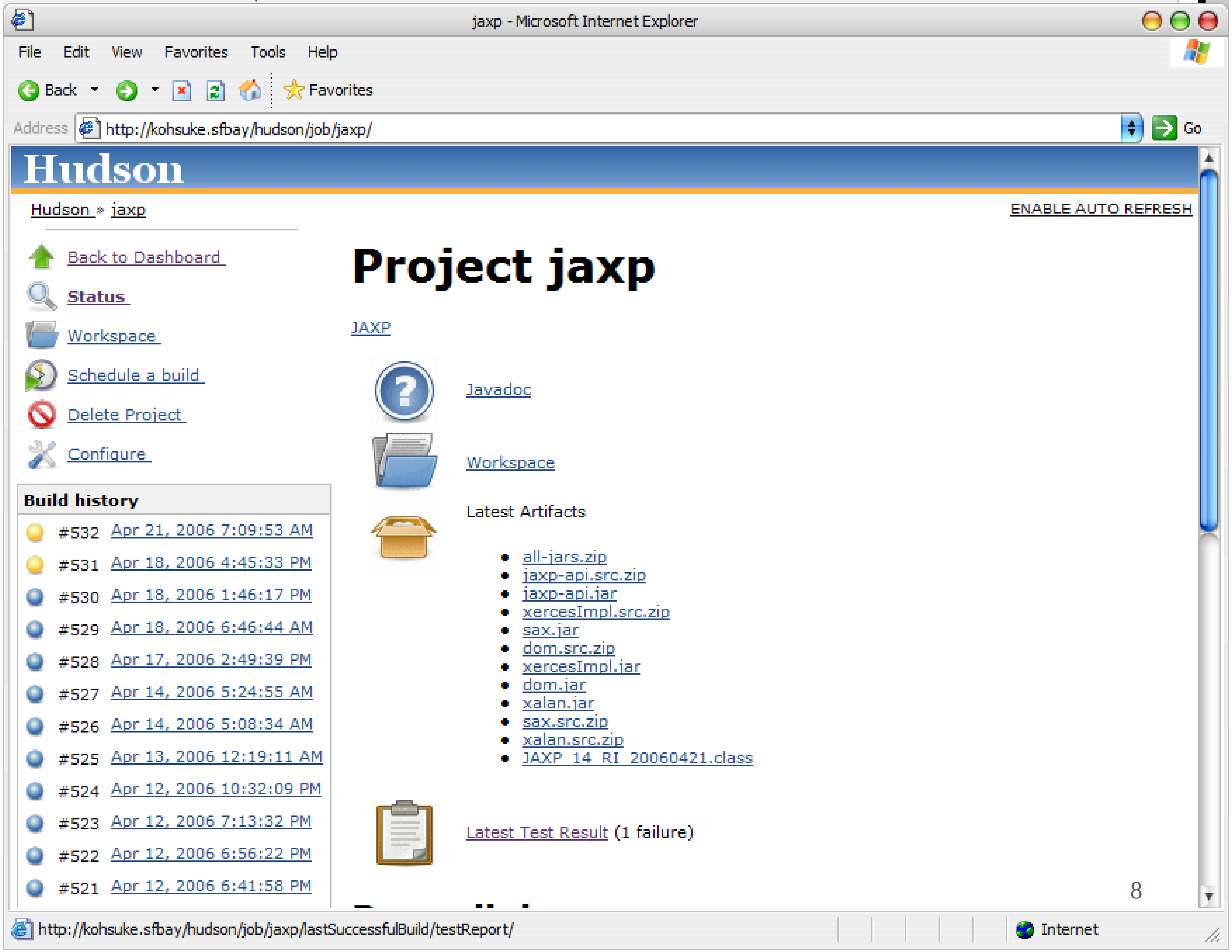
Permalinks

- Last build (#86), 1 day ago
- Last stable build (#86), 1 day ago
- Last successful build (#86), 1 day ago
- Last failed build (#83), 2 days ago

http://kohsuke.sfbay/hudson/job/xsom/lastSuccessfulBuild/artifact/jaxb2-sources/xsom/build/xsom.jar

What does Hudson do?

- Starts a new test whenever a new build is ready
  - Test results become available quickly (depends on how long your test takes)
  - Other people can then...
    - See build stability
    - Analyze failure reports and history
  - Test failure triggers a notification



http://kohsuke.sfbay/hudson/job/jaxp/

Hudson

Hudson » jaxp

ENABLE AUTO REFRESH

- Back to Dashboard
- **Status**
- Workspace
- Schedule a build
- Delete Project
- Configure

Build history

●	#532	Apr 21, 2006 7:09:53 AM
●	#531	Apr 18, 2006 4:45:33 PM
●	#530	Apr 18, 2006 1:46:17 PM
●	#529	Apr 18, 2006 6:46:44 AM
●	#528	Apr 17, 2006 2:49:39 PM
●	#527	Apr 14, 2006 5:24:55 AM
●	#526	Apr 14, 2006 5:08:34 AM
●	#525	Apr 13, 2006 12:19:11 AM
●	#524	Apr 12, 2006 10:32:09 PM
●	#523	Apr 12, 2006 7:13:32 PM
●	#522	Apr 12, 2006 6:56:22 PM
●	#521	Apr 12, 2006 6:41:58 PM

Project jaxp

JAXP

Javadoc

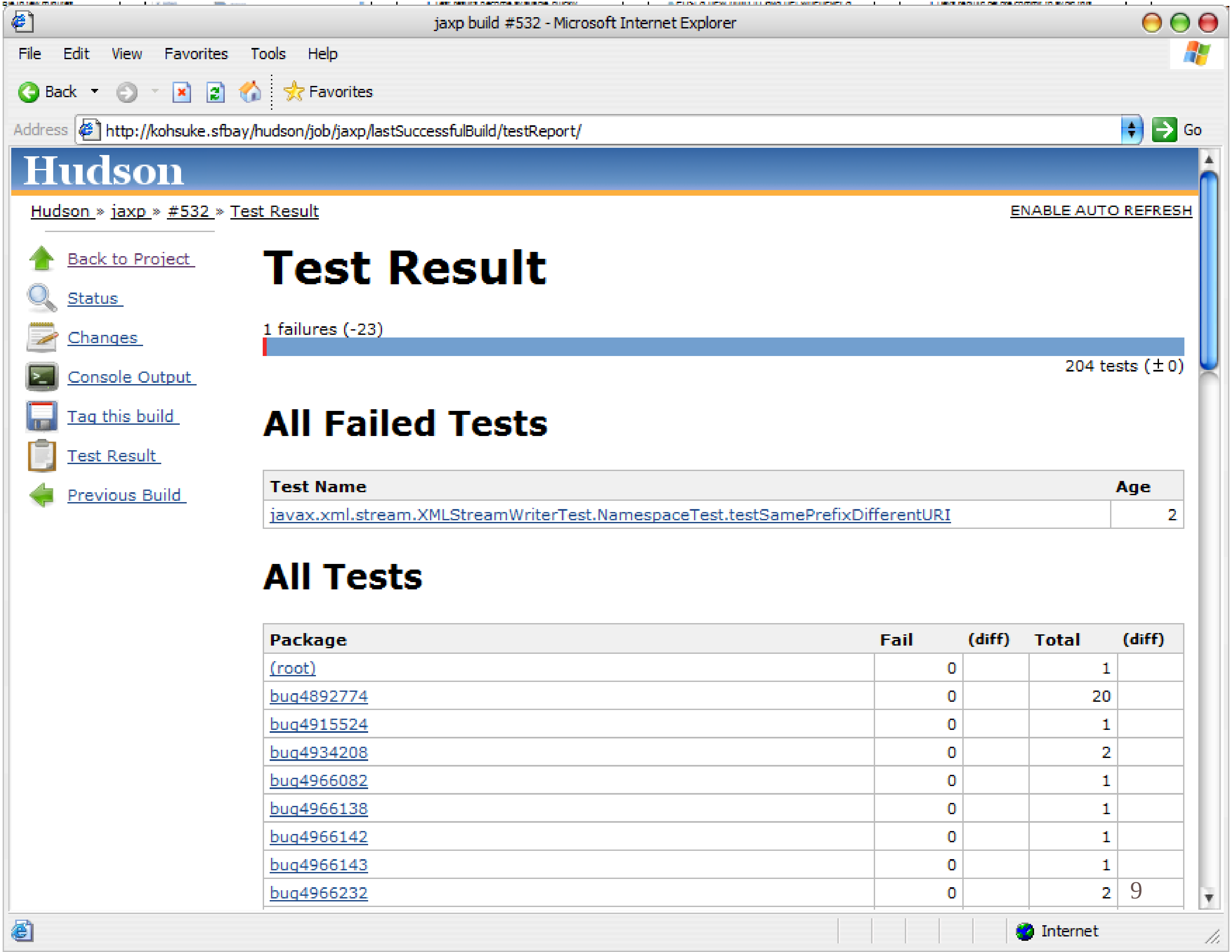
Workspace

Latest Artifacts

- all-jars.zip
- jaxp-api.src.zip
- jaxp-api.jar
- xercesImpl.src.zip
- sax.jar
- dom.src.zip
- xercesImpl.jar
- dom.jar
- xalan.jar
- sax.src.zip
- xalan.src.zip
- JAXP_14_RI_20060421.class

Latest Test Result (1 failure)

http://kohsuke.sfbay/hudson/job/jaxp/lastSuccessfulBuild/testReport/



Test Result

1 failures (-23)

204 tests (± 0)

All Failed Tests

Test Name	Age
javax.xml.stream.XMLStreamWriterTest.NamespaceTest.testSamePrefixDifferentURI	2

All Tests

Package	Fail	(diff)	Total	(diff)
(root)	0		1	
bug4892774	0		20	
bug4915524	0		1	
bug4934208	0		2	
bug4966082	0		1	
bug4966138	0		1	
bug4966142	0		1	
bug4966143	0		1	
bug4966232	0		2	

More Hudson features

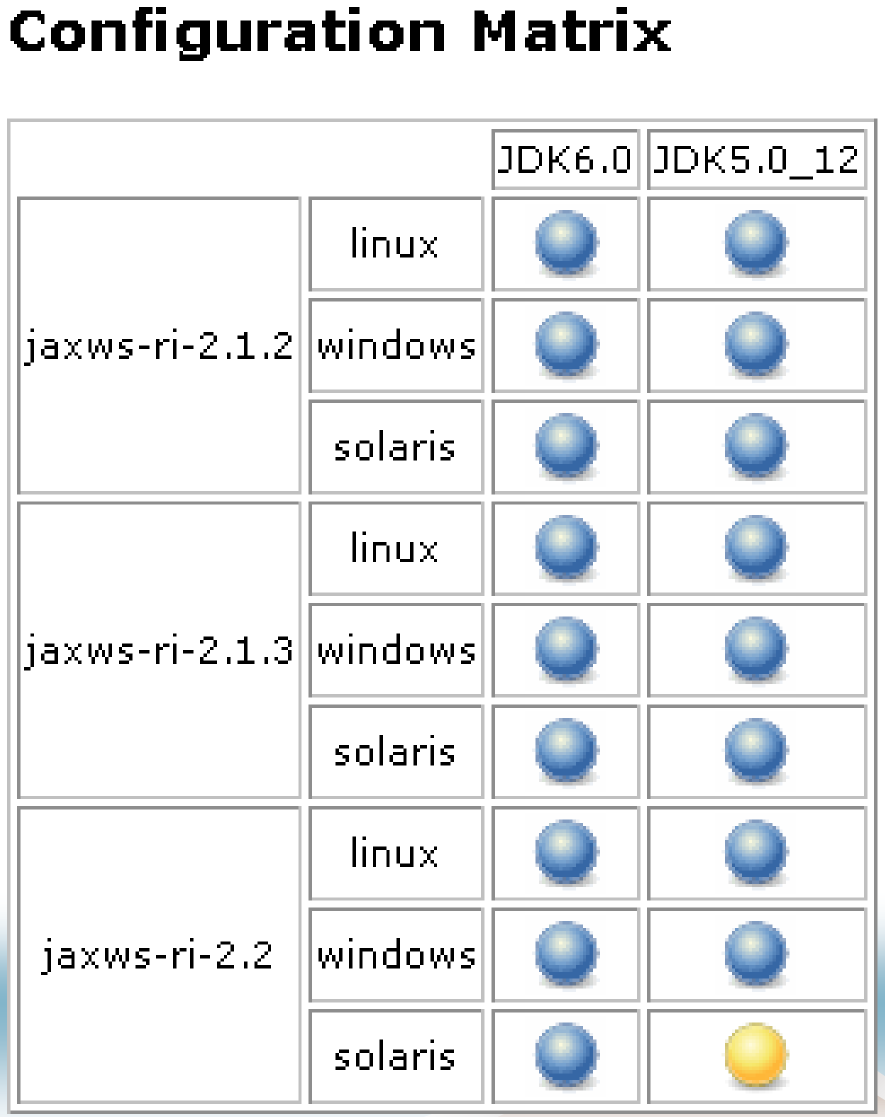
- RSS feeds
- Permalinks to download “latest” bits
  - You can now write a build target to integrate a dependency jar
  - Tests on Hudson can grab the latest RI bits from Hudson
- IM notifications

More Hudson features

- Fire-and-forget batch operation
  - Arbitrary shell script
    - Post a release, push binaries, etc.
  - Tag builds after the fact
    - Build #3269 turns out to be good. Let's tag it
- Post builds to java.net
- Run performance benchmarks

Matrix projects

- Run the same thing on different environments
  - such as different JDKs, different databases, and different OSes
- Aggregate the results



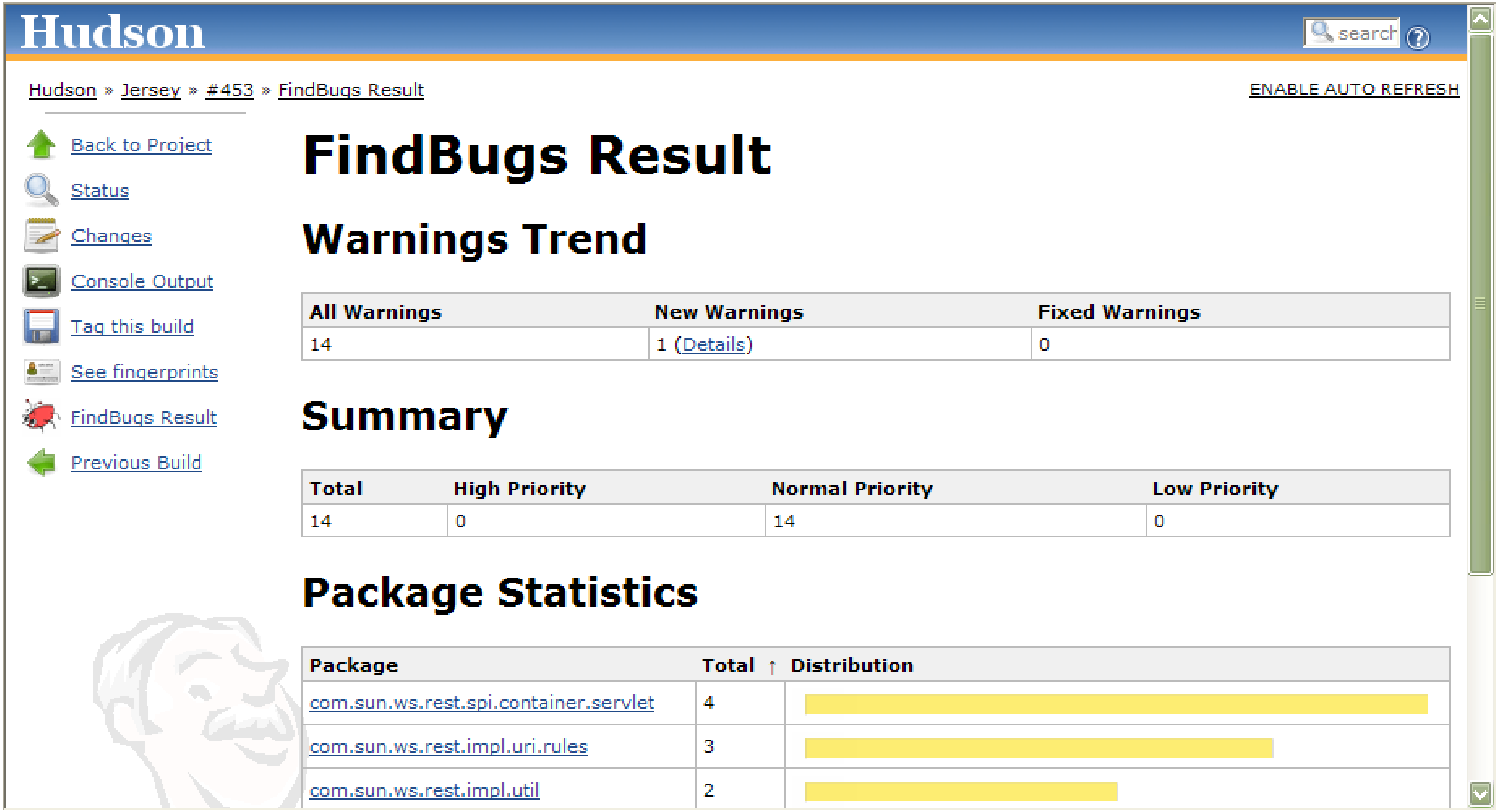
Configuration Matrix

		JDK6.0	JDK5.0_12
jaxws-ri-2.1.2	linux	🔵	🔵
	windows	🔵	🔵
	solaris	🔵	🔵
jaxws-ri-2.1.3	linux	🔵	🔵
	windows	🔵	🔵
	solaris	🔵	🔵
jaxws-ri-2.2	linux	🔵	🔵
	windows	🔵	🔵
	solaris	🔵	🟡

More Hudson features

- Dependency tracking
  - SQE finds a test failure. Dev thinks he just fixed it. Did that fix went into that test run or not?
  - I made a large change. I want to check that the corresponding SQE test result is good
  - We are close to a release. We need tags from all the dependencies. Which versions are we using today?
- Hudson can tell you
  - “JAXB unit test #35 tested JAXB RI #192”
  - “JAX-WS #52 uses JAXB #185 and FI #52”

FindBugs integration



FindBugs Result

Warnings Trend

All Warnings	New Warnings	Fixed Warnings
14	1 (Details)	0

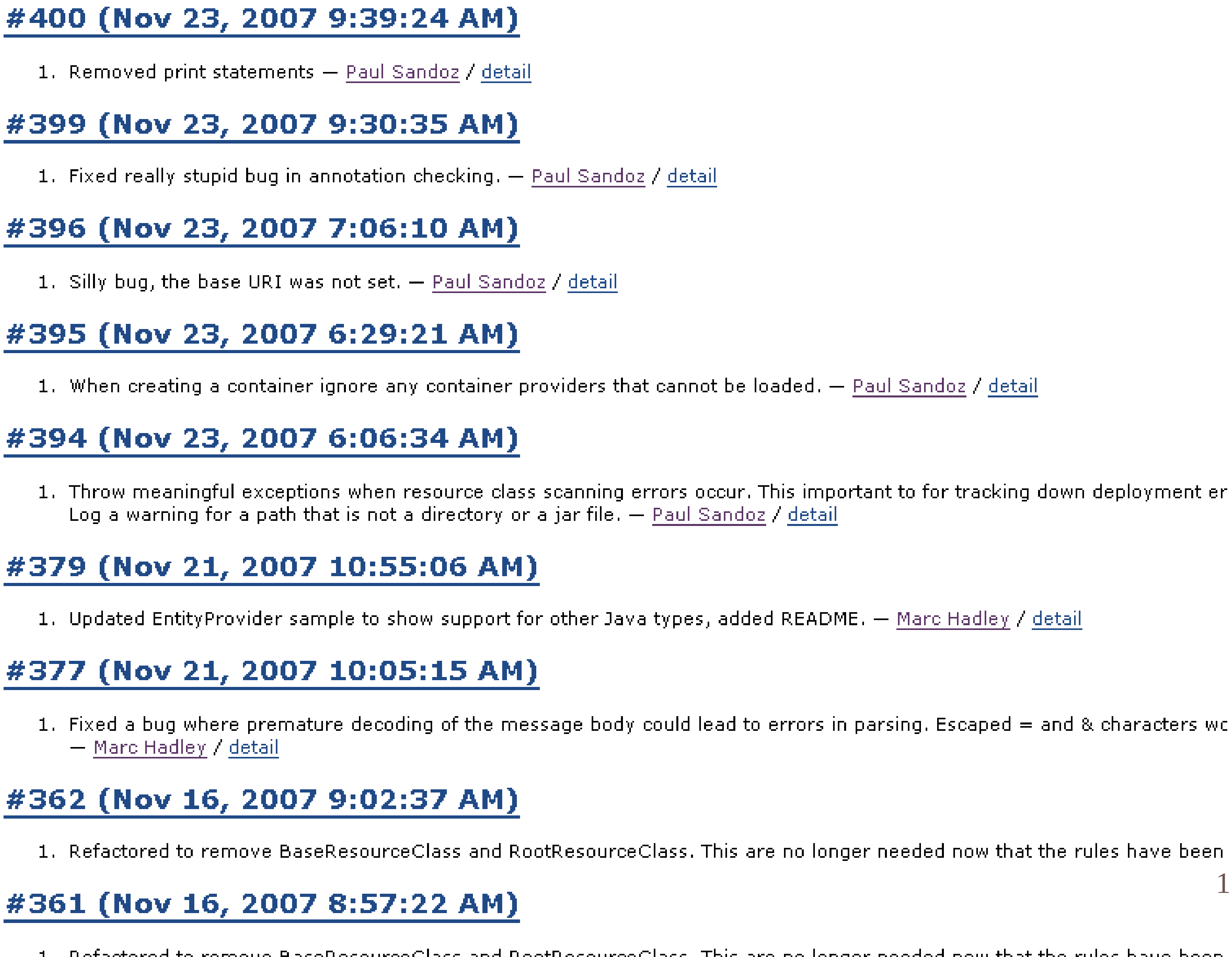
Summary

Total	High Priority	Normal Priority	Low Priority
14	0	14	0

Package Statistics

Package	Total ↑	Distribution
com.sun.ws.rest.spi.container.servlet	4	
com.sun.ws.rest.impl.uri.rules	3	
com.sun.ws.rest.impl.util	2	

Tracking Changes



#400 (Nov 23, 2007 9:39:24 AM)

1. Removed print statements — Paul Sandoz / detail

#399 (Nov 23, 2007 9:30:35 AM)

1. Fixed really stupid bug in annotation checking. — Paul Sandoz / detail

#396 (Nov 23, 2007 7:06:10 AM)

1. Silly bug, the base URI was not set. — Paul Sandoz / detail

#395 (Nov 23, 2007 6:29:21 AM)

1. When creating a container ignore any container providers that cannot be loaded. — Paul Sandoz / detail

#394 (Nov 23, 2007 6:06:34 AM)

1. Throw meaningful exceptions when resource class scanning errors occur. This important to for tracking down deployment er
   Log a warning for a path that is not a directory or a jar file. — Paul Sandoz / detail

#379 (Nov 21, 2007 10:55:06 AM)

1. Updated EntityProvider sample to show support for other Java types, added README. — Marc Hadley / detail

#377 (Nov 21, 2007 10:05:15 AM)

1. Fixed a bug where premature decoding of the message body could lead to errors in parsing. Escaped = and & characters wc
   — Marc Hadley / detail

#362 (Nov 16, 2007 9:02:37 AM)

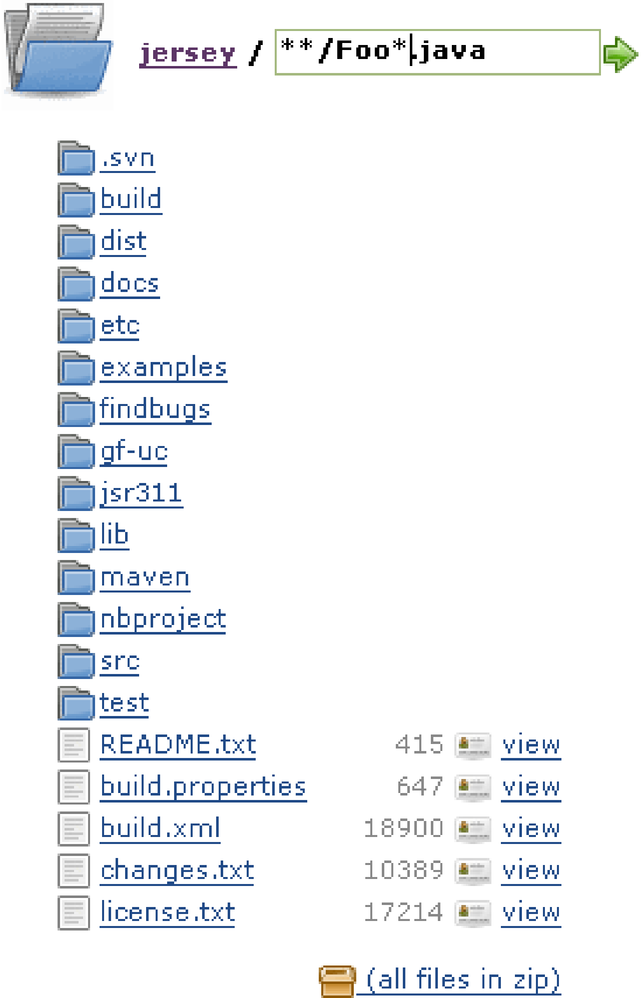
1. Refactored to remove BaseResourceClass and RootResourceClass. This are no longer needed now that the rules have been

#361 (Nov 16, 2007 8:57:22 AM)

1. Refactored to remove BaseResourceClass and RootResourceClass. This are no longer needed now that the rules have been

… and more

Browse workspaces



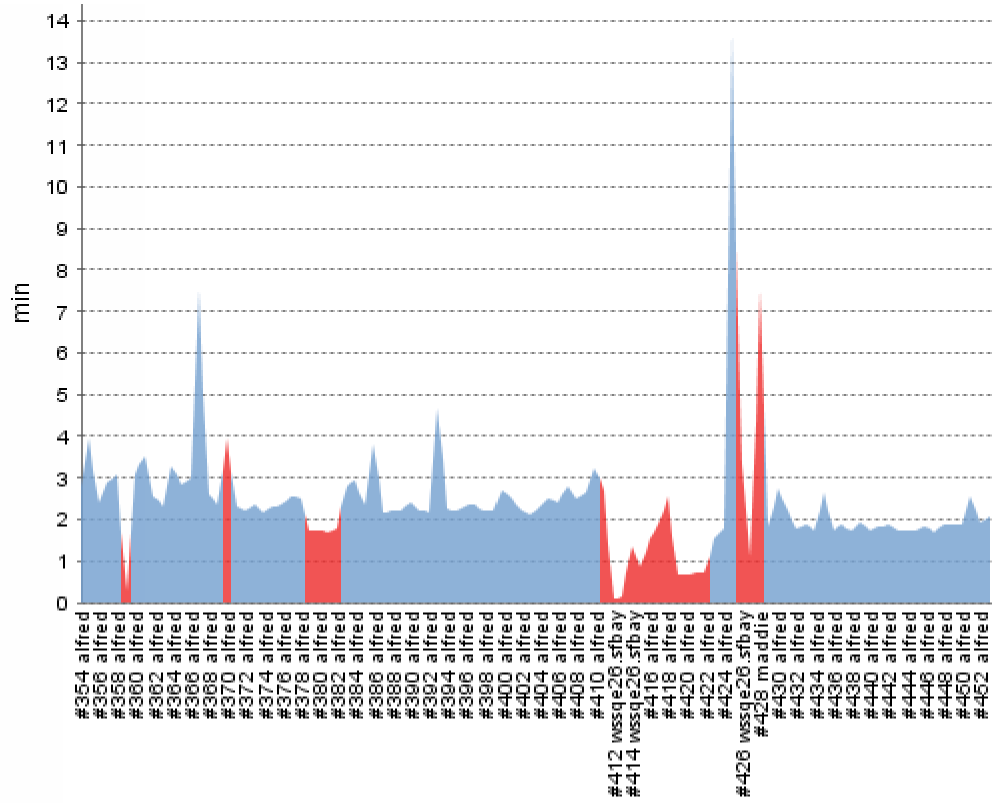
jersey / **/Foo*.java

- .svn
- build
- dist
- docs
- etc
- examples
- findbugs
- gf-uc
- jsr311
- lib
- maven
- nbproject
- src
- test

README.txt	415		view
build.properties	647		view
build.xml	18900		view
changes.txt	10389		view
license.txt	17214		view

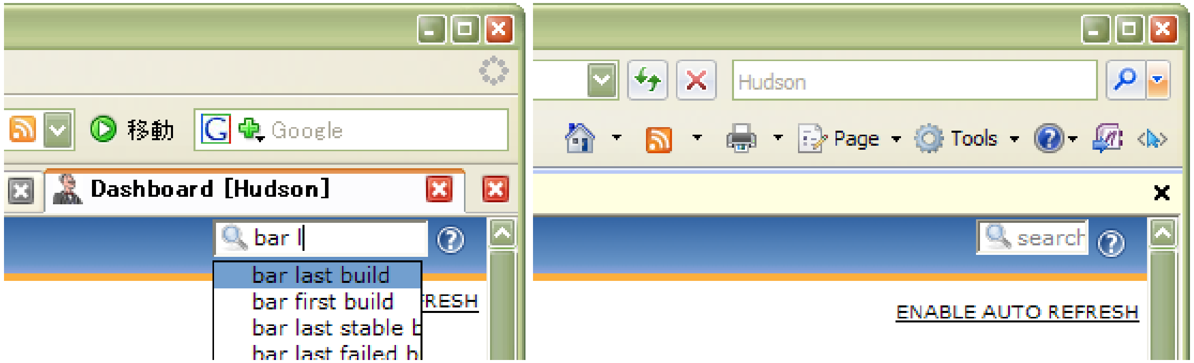
(all files in zip)

Build time trend report

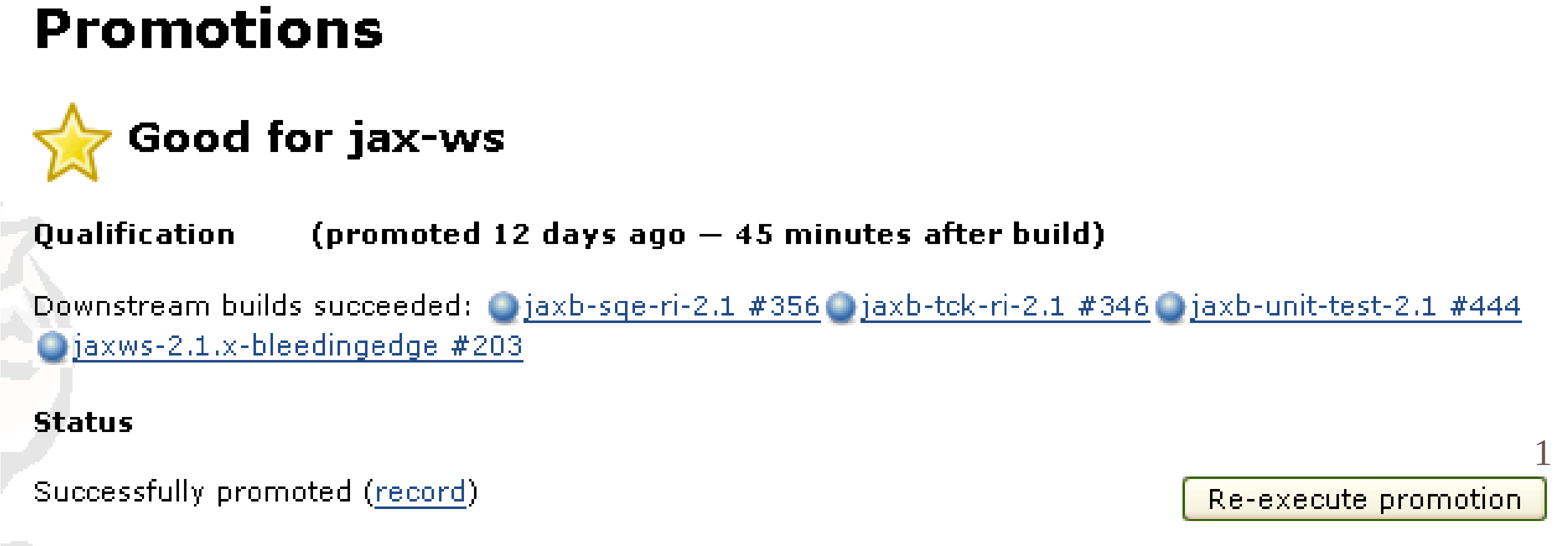


… and more

- OpenSearch



- Build Promotion



Promotions

Good for jax-ws

Qualification **(promoted 12 days ago — 45 minutes after build)**

Downstream builds succeeded: jaxb-sqe-ri-2.1 #356 jaxb-tck-ri-2.1 #346 jaxb-unit-test-2.1 #444 jaxws-2.1.x-bleedingedge #203

Status

Successfully promoted (record)

Re-execute promotion

… and still some more

- Distributed builds
  - Cluster idle workstations in people's office
- More SCM support
  - Subversion, Mercurial (but not TeamWare)
- Kill GF when tests are over
- Emma integration
- JIRA integration

Why do I care?

- Life before Hudson
  - RE nightly build breaks. It blocks SQE
  - Dev rebuilds before commit to avoid this
  - People waste time
- Life after Hudson
  - Dev just commits it right away
  - Dev moves on to work on another thing
  - Hudson will tell you in 5 mins if a build broke

Why do I care?

- Life before Hudson
  - Dev makes a change Monday AM
  - SQE nightly finds a bug Monday night
  - Dev fixes it Tuesday
  - Lot of wasted time
- Life after Hudson
  - Dev makes a change Monday AM
  - Hudson finds a regression 30 mins later
  - Dev can fix it before lunch

Why do I care?

- Life before Hudson
  - SQE test runs every night, results sent out in e-mail
  - After the enthusiasm of the 1st week is gone, nobody looks at them anymore
  - Regressions go unnoticed until it's too late
- Life after Hudson
  - Tests run Hudson after every commit
  - E-mail sent out only when tests start failing
    - So it manages to keep people's attention

Why do I care?

- Life before Hudson
  - PHB says “we need to automate test. Can you take care of that, Ashok?”
  - Ashok sets up a cron job on his machine
  - Ashok takes a long vacation / maternity leave / left company. Nobody knows how to fix that cron job anymore
- Life after Hudson
  - Anyone can see and mofiy project build configuration

Got the idea?

- Automation
- Reduce turn-around time
- Make things transparent
- Remove people from the loop

- Save people's time
- Push jobs to servers, keep workstations idle for you

Hudson and GlassFish v3

Today's problems

- GF build picks up everybody's tip
  - Builds tend to be unstable as project grows
    - Mathematically speaking, the chance of good builds decreases exponentially
  - Discourages commits
    - … because cost of breaking builds is high
  - Encourages local test executions
    - This wastes people's time
  - People need to be extra careful
    - Distract our attention from the real work

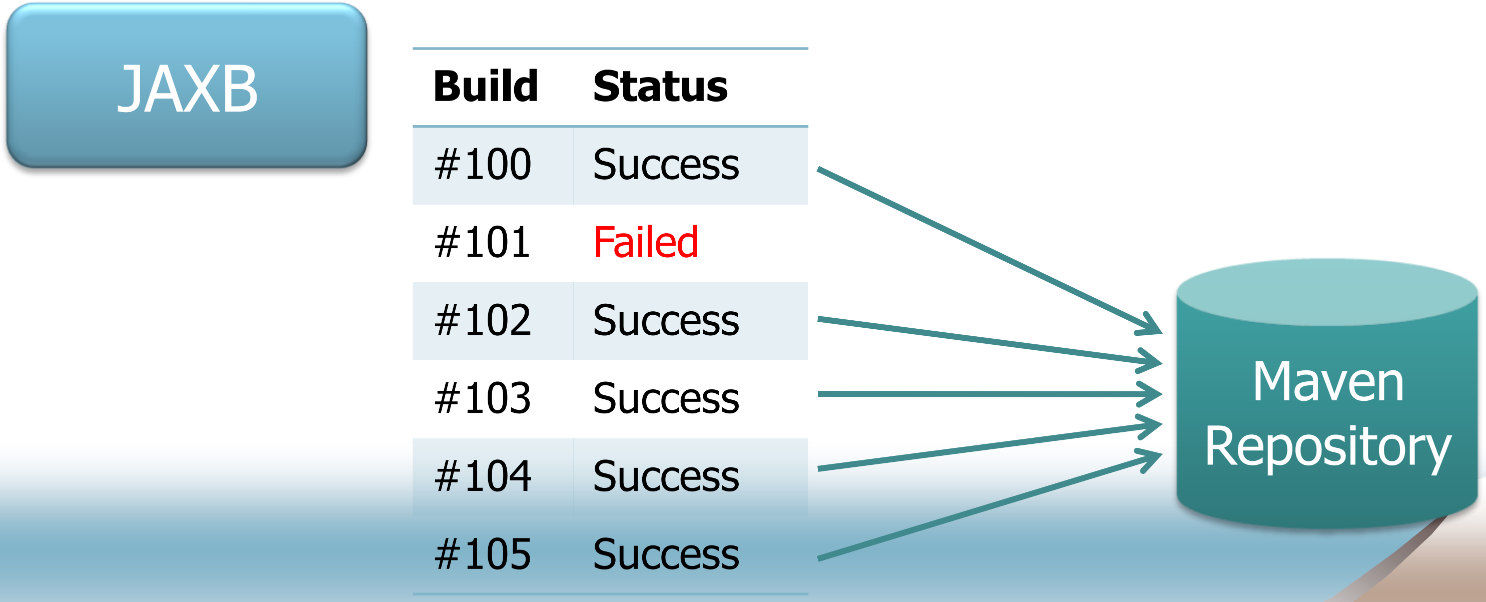
How do we fix this?

Compartmentalize!

- Exploit Maven2 so that we can…
  - Break builds w/o blocking others
  - Emphasize tests at earlier levels

Continuous integration

- Continuously build modules
  - 1st line of defense against bad code
  - Builds get published to GFv3 maven repository
    - By build numbers
    - “Garbage collection” needed to keep disk usage under control



JAXB

Build	Status
#100	Success
#101	Failed
#102	Success
#103	Success
#104	Success
#105	Success

Maven Repository

Continuous integration

- Run tests continuously
  - 2nd line of defense against bad code
  - “tests” maybe unit/SQE tests, or maybe simulated integration build of another module with this new bit

JAXB

Build	Status	Tests
#100	Success	All pass
#101	Failed	
#102	Success	5 failed
#103	Success	All pass
#104	Success	All pass
#105	Success	(in progress)

Continuous integration

- When builds pass certain bars, Hudson updates other POMs to pick up new build
  - IOW, until now other people are protected from your builds
  - Bar may be “never” (=integration is manual)

JAXB

Build	Status	Tests	Action
#100	Success	All pass	Picked by JAX-WS
#101	Failed		
#102	Success	5 failed	
#103	Success	All pass	Picked by JAX-WS
#104	Success	All pass	Picked by JAX-WS
#105	Success	(in progress)	

Continuous integration

- Propagation will work as further bars
  - e.g., update to JAX-WS POM will cause new JAX-WS builds and its test runs, whose results will feed back to JAXB

JAXB

Build	Status	Tests	WS tests
#100	Success	All pass	All pass
#101	Failed		
#102	Success	5 failed	
#103	Success	All pass	3 failed
#104	Success	All pass	All pass
#105	Success	(in progress)	

Continuous integration

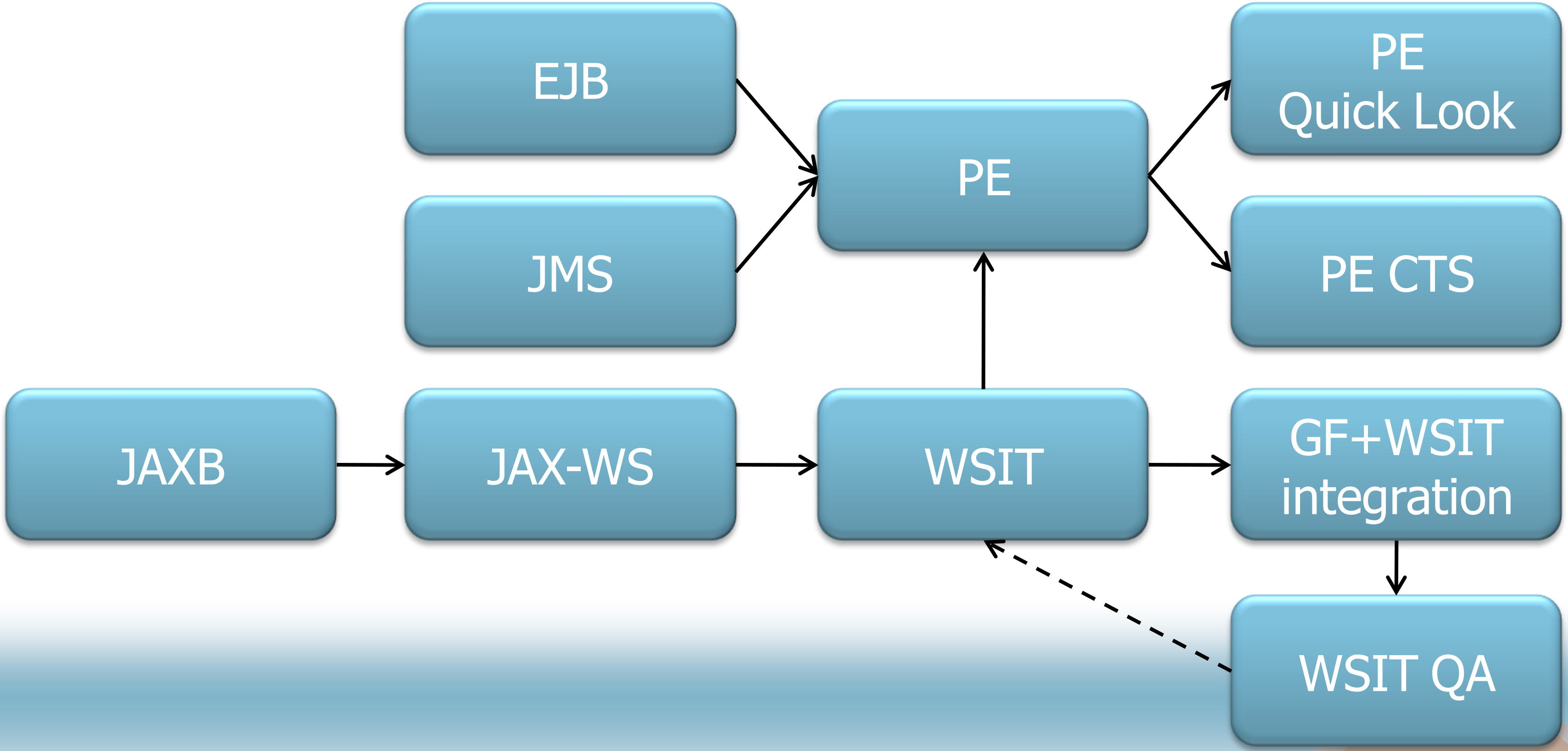
- … and those feed backs can be used to trigger further propagation

JAXB

Build	Status	Tests	WS tests	GF
#100	Success	All pass	All pass	Picked by GF
#101	Failed			
#102	Success	5 failed		
#103	Success	All pass	3 failed	
#104	Success	All pass	All pass	Picked by GF
#105	Success	(in progress)		

Recap

- Think of this as a graph of projects where builds (hence changes) propagate through controlled fashion



Call for Actions

Think about tests

- Emphasis on component-level tests
  - Don’t just test the whole GF
  - Instead, let’s try to test pieces individually
  - Goes hand-in-hand with module systems
- Why?
  - Protect other people from your mistake
  - Give yourself a safety net

Play with our Hudson

- At http://kohsuke.sfbay/hudson/
- A cluster of about two dozen machines
  - Good mixture of Windows, Solaris & Linux
- Many of tools pre-deployed
  - Ant, Maven, JDK4/5/6, SVN, CVS, Hg
- Anyone is welcome, any job is welcome
  - Feel free to create test jobs

Share your machines

- Got any idle workstations that you rarely use?
  - Let Hudson use it when you aren’t using it
  - You can still keep it to yourself when you need it
- Got any old desktops/laptops that you are throwing away?
  - Think about donating to us.

Send me feedback

- Hudson has evolved to meet our needs
  - But only because you guys have told me what you wanted/hated
- Help me fix problems