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Title : Jenkins CI Server

Authored and Presented by : Cybage Software Pvt. Ltd.

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Agenda

- Jenkins – CI server
- Benefits of Jenkins
- How Jenkins works
- How to configure Maven jobs in Jenkins
- Jenkins Build
- Different Plugins In Jenkins
- Jenkins Master Slave
- Jenkins integration with other tools
- Best Practices in Jenkins

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Jenkins – CI Server

- Open source continuous integration build tool
- Automates the build, artifact management and deployment processes
- Streamline the development process for all stakeholders involved
- Easy to install and use
- User interface is simple, intuitive, and visually appealing
- Supports distributed builds using Master/Slave Architecture

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Jenkins - History

- Jenkins - History

  2005 - Hudson was first released by Kohsuke Kawaguchi of Sun Microsystems

  2010 – Oracle bought Sun Microsystems

- Later on , Hudson was renamed to Jenkins
- Oracle continued development of Hudson (as a branch of the original)

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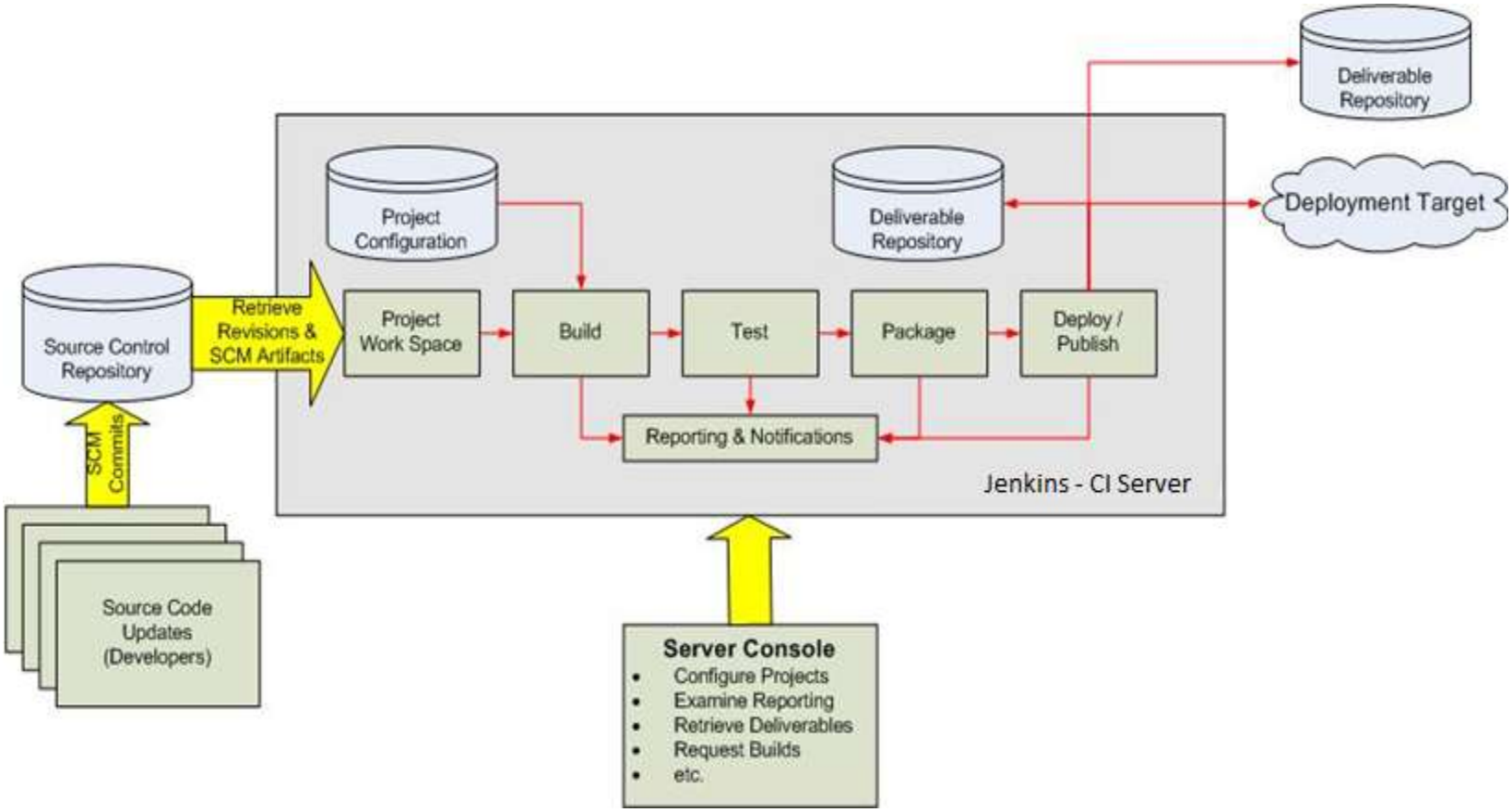
Jenkins – Architecture



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Benefits of Jenkins

- Highly configurable system
- Additional community developed plugins provide more flexibility
- By combining Jenkins with Maven, Ant, Gradle or other Build Automation tools, the possibilities are limitless
- Generate various test reports
- Can be integrated with different Version Control Systems
- Can be integrated with various artifact repositories
- Deploys directly to production or test environments
- Notify stakeholders of build status

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Jenkins Installation

Jenkins Start Page

- Jenkins as Windows Service
- Running Jenkins behind an Apache Server or Application Server
- Running Jenkins as a Stand-Alone Application
  - Download one file – jenkins.war
  - Run one command – java –jar jenkins.war

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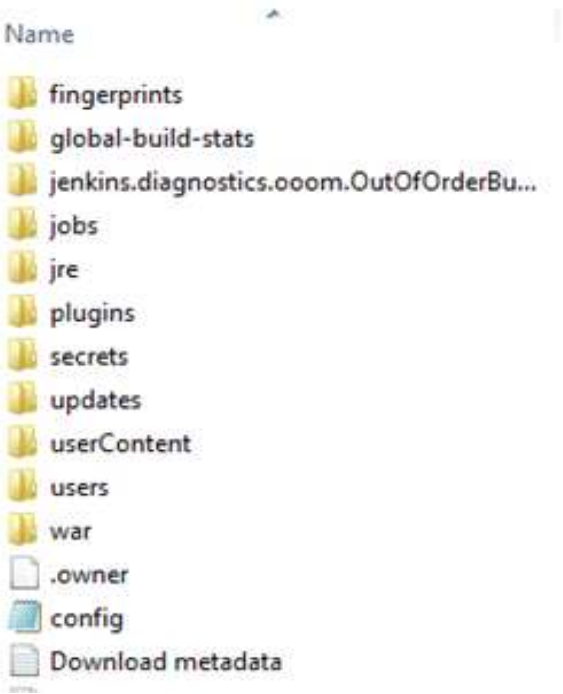
Jenkins Home Directory



- Home directory –Keeps all its important data
- Stores information about build server configuration, build jobs, build artifacts, Installed plugins, user accounts and other useful information
- Default home directory is .jenkins
- Change home directory by JENKINS_HOME environment variable

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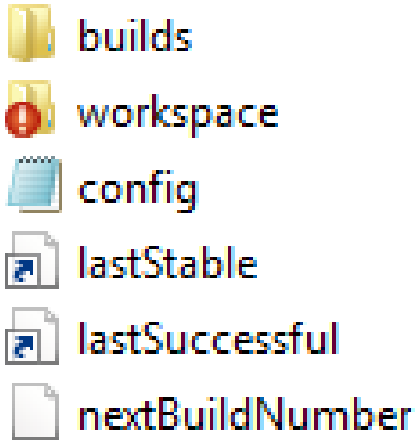
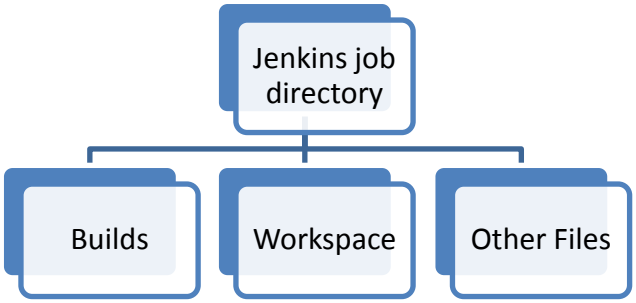
Jenkins Job Directory





- Builds - Build Job's History
- Workspace - Jenkins build job execution directory and contains Source code of Job
- Directory labeled with a timestamp. e.g. "2010-03-12_20-42-05" – Stores Build history and artifacts for particular build

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Jenkins Configuration

- Global level configuration – Common for all jobs

- configurations stored in global config.xml file
- Job level configuration – job specific configuration

- Global level configurations can be override at Job level .
- Job level configurations are stored in directory

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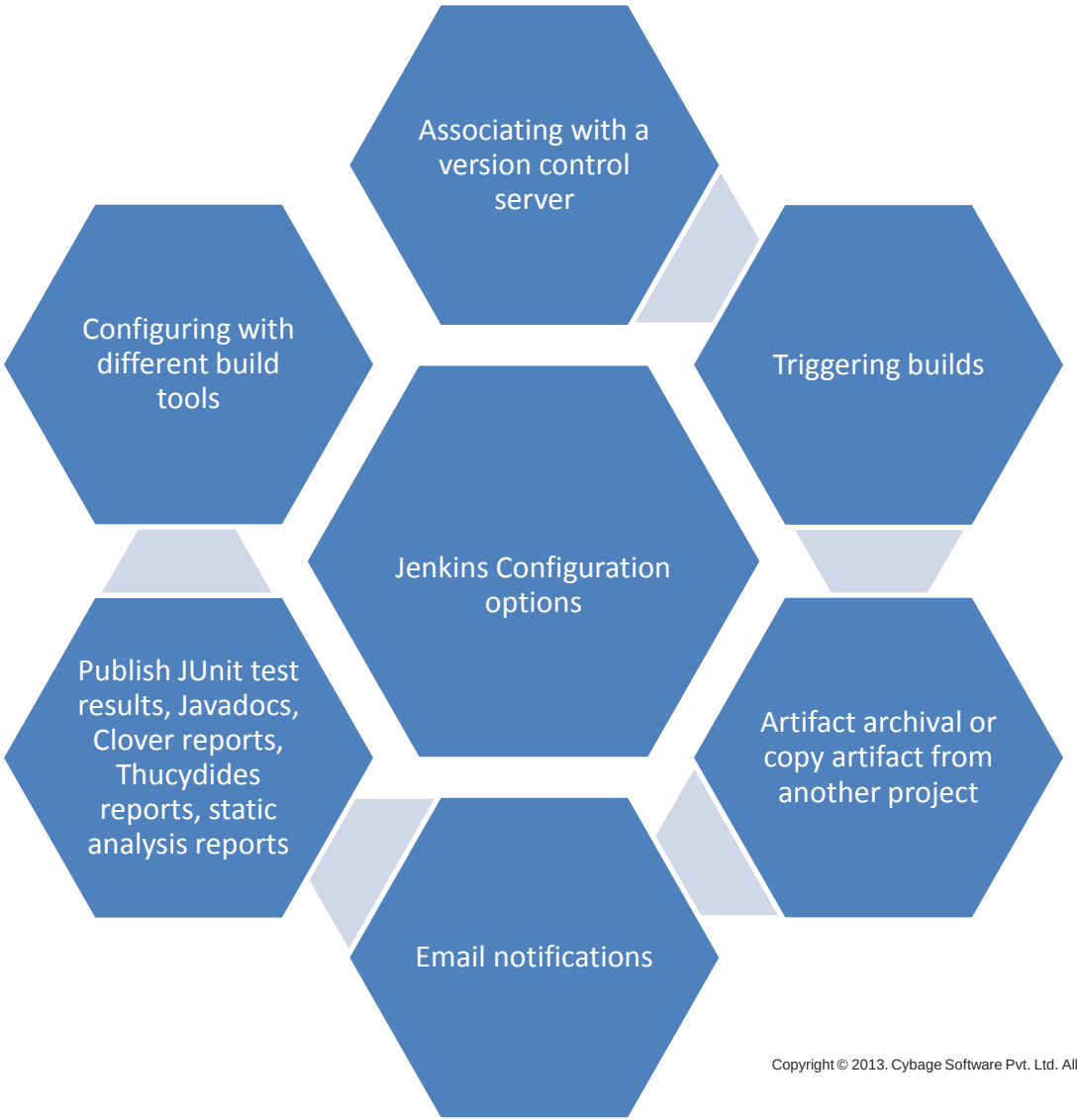
Jenkins Configuration



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How Jenkins works

Job Execution

- Executed automatically by different build triggers
- Executed manually

Building

- Executes the build in an executer
- By default, one executer per core on the build server

Slave build servers

- Useful for building on different environment
- Distribution of load

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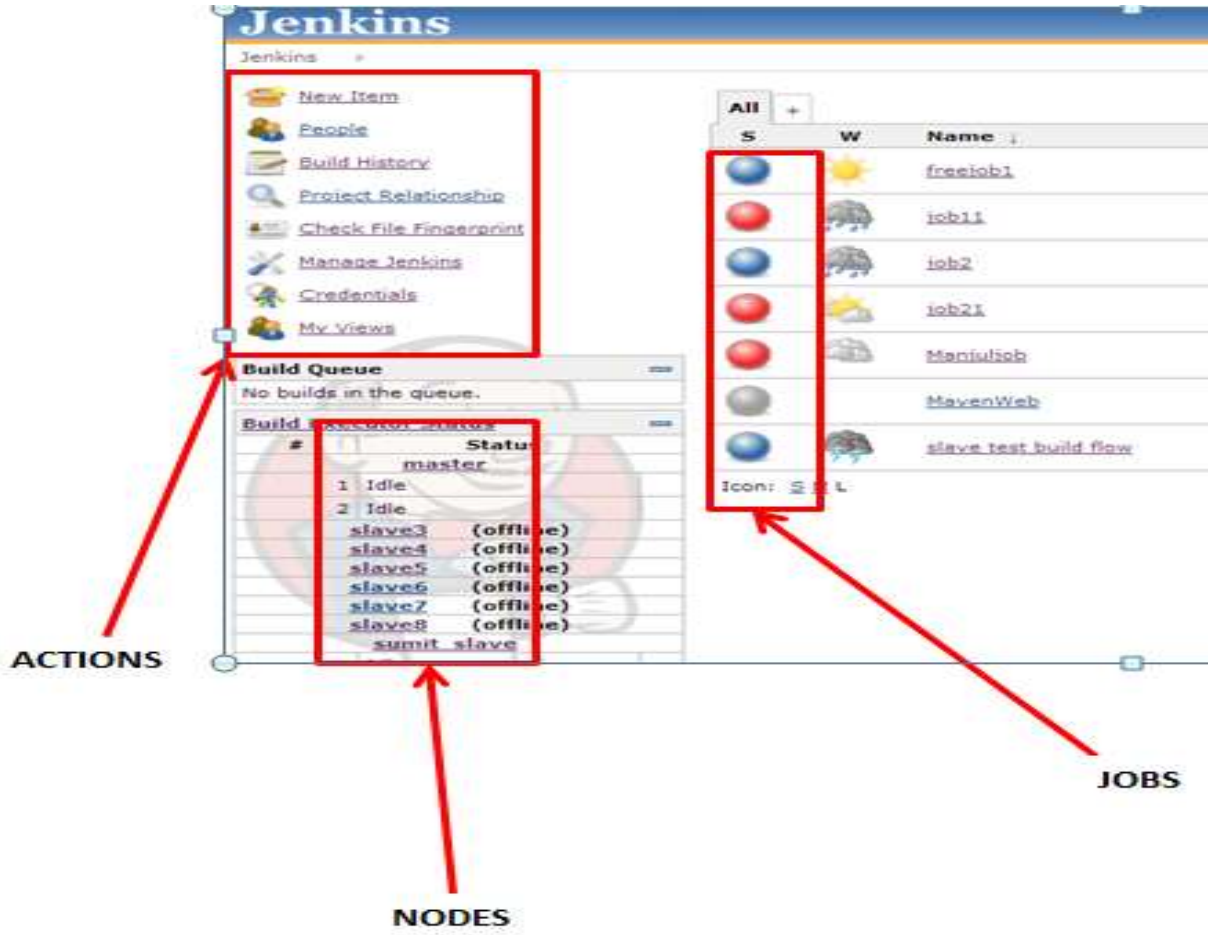
Jenkins User Interface



Build statistics

Shows statistics based on build status.

Build statistics	
Status of the build	**Description**
	Failed
	Unstable
	Success
	Pending
	Disabled
	Aborted
Total builds	All builds

Jobs statistics

Shows statistics based on jobs health.

Jobs statistics	
Job health	**Description**
	No recent builds failed
	20-40% of recent builds failed
	40-60% of recent builds failed
	60-80% of recent builds failed
	All recent builds failed
	Unknown status
Total jobs	All jobs

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Configuring Jenkins

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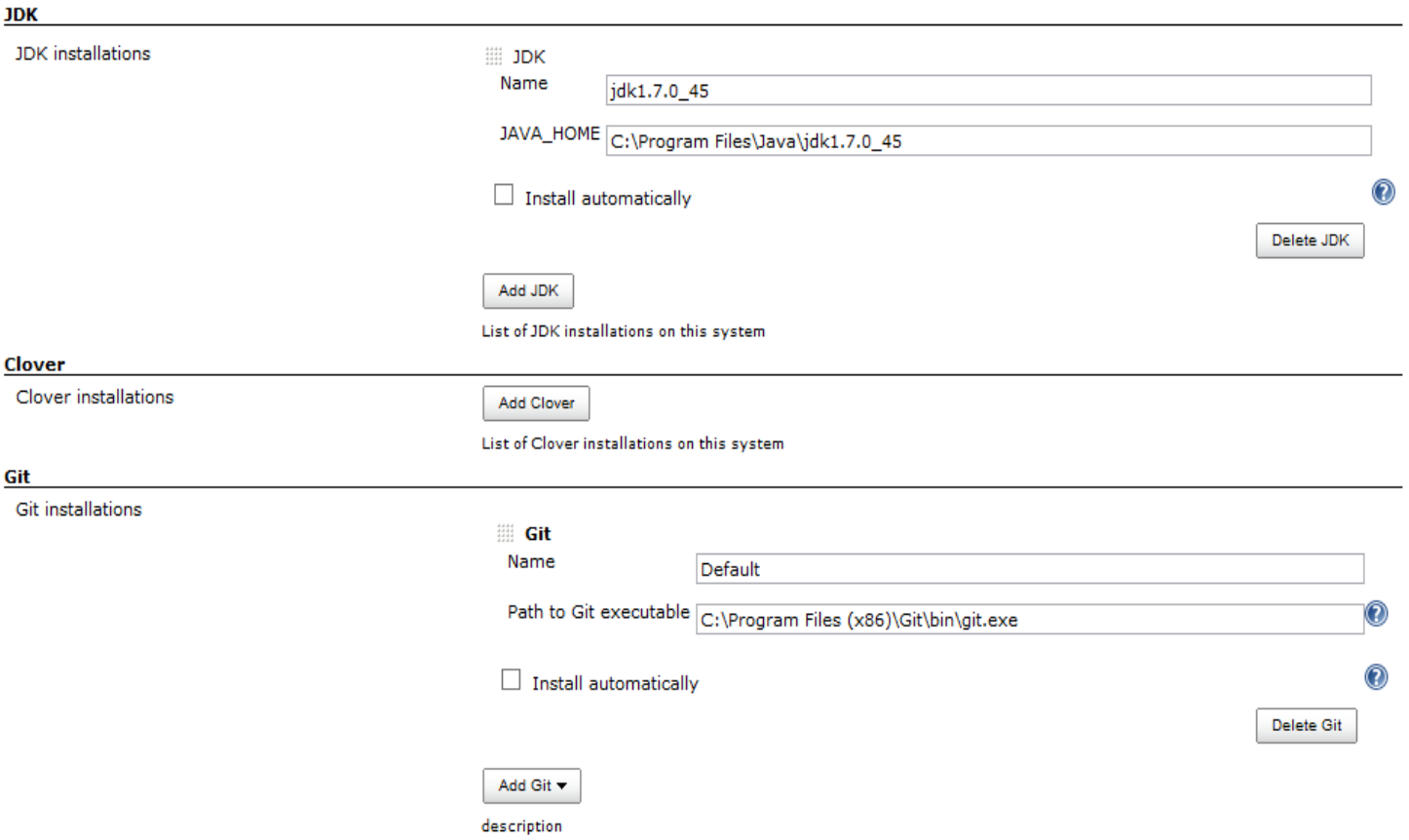
Jenkins global configuration

JDK and GIT settings at global level



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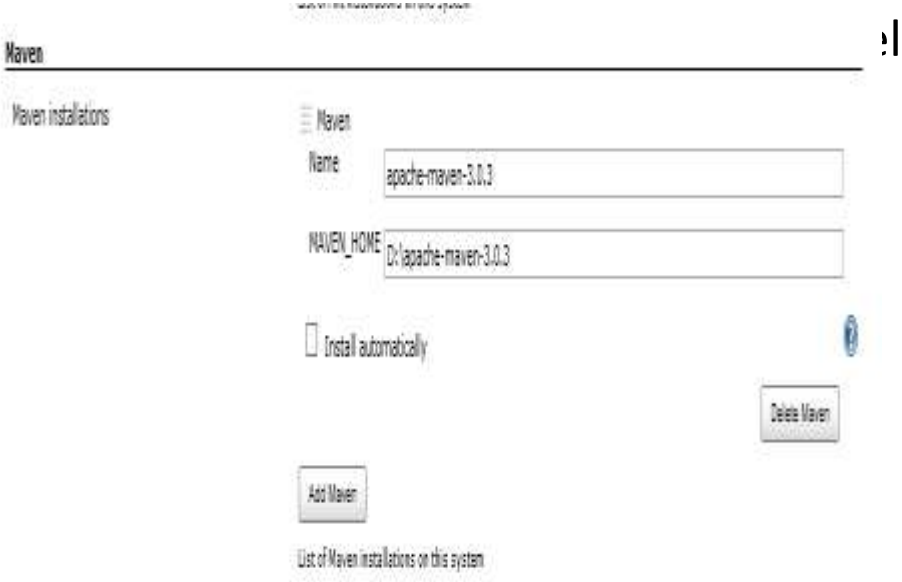
Jenkins global configuration…



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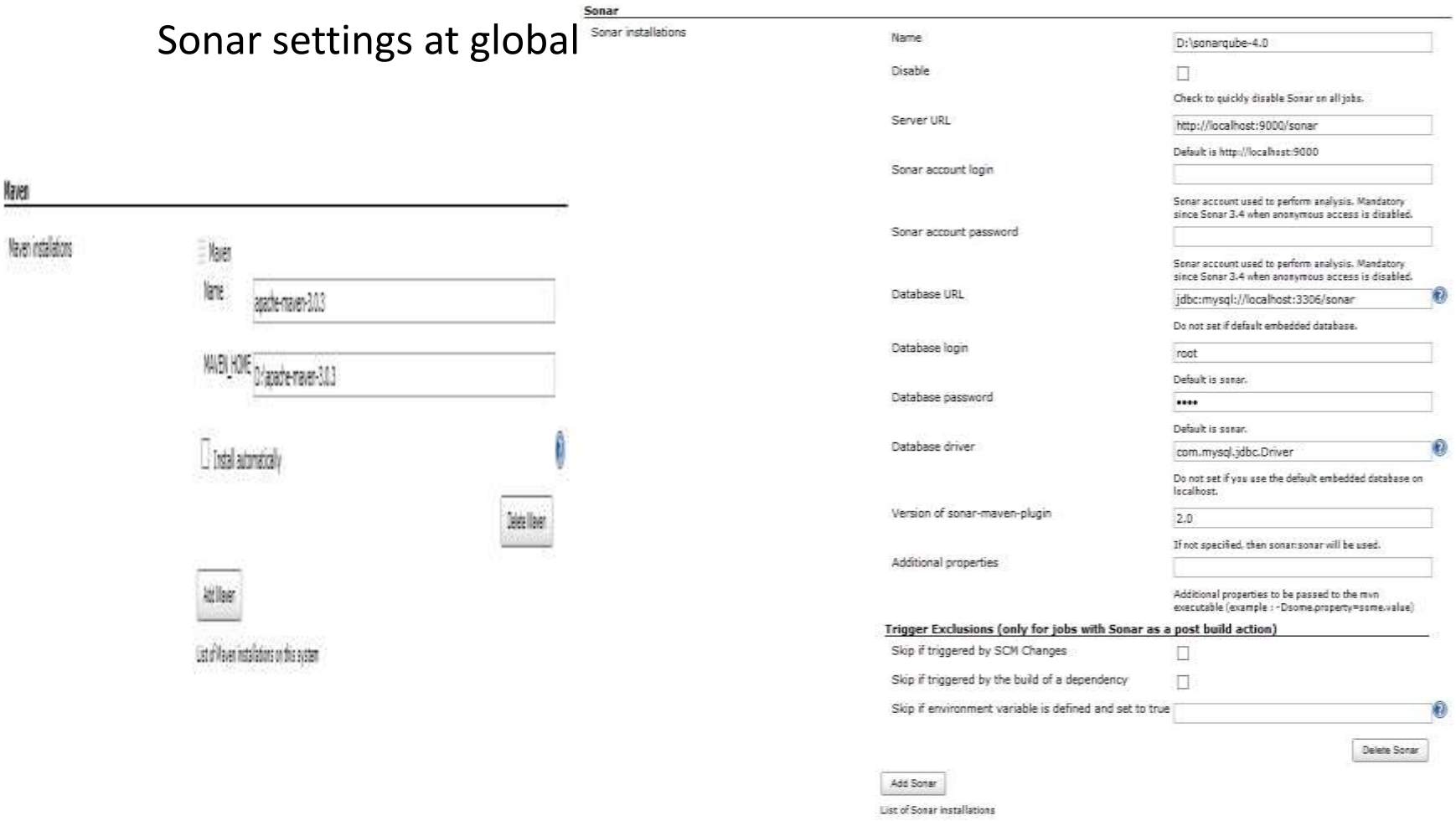
Jenkins global configuration…

Sonar settings at global



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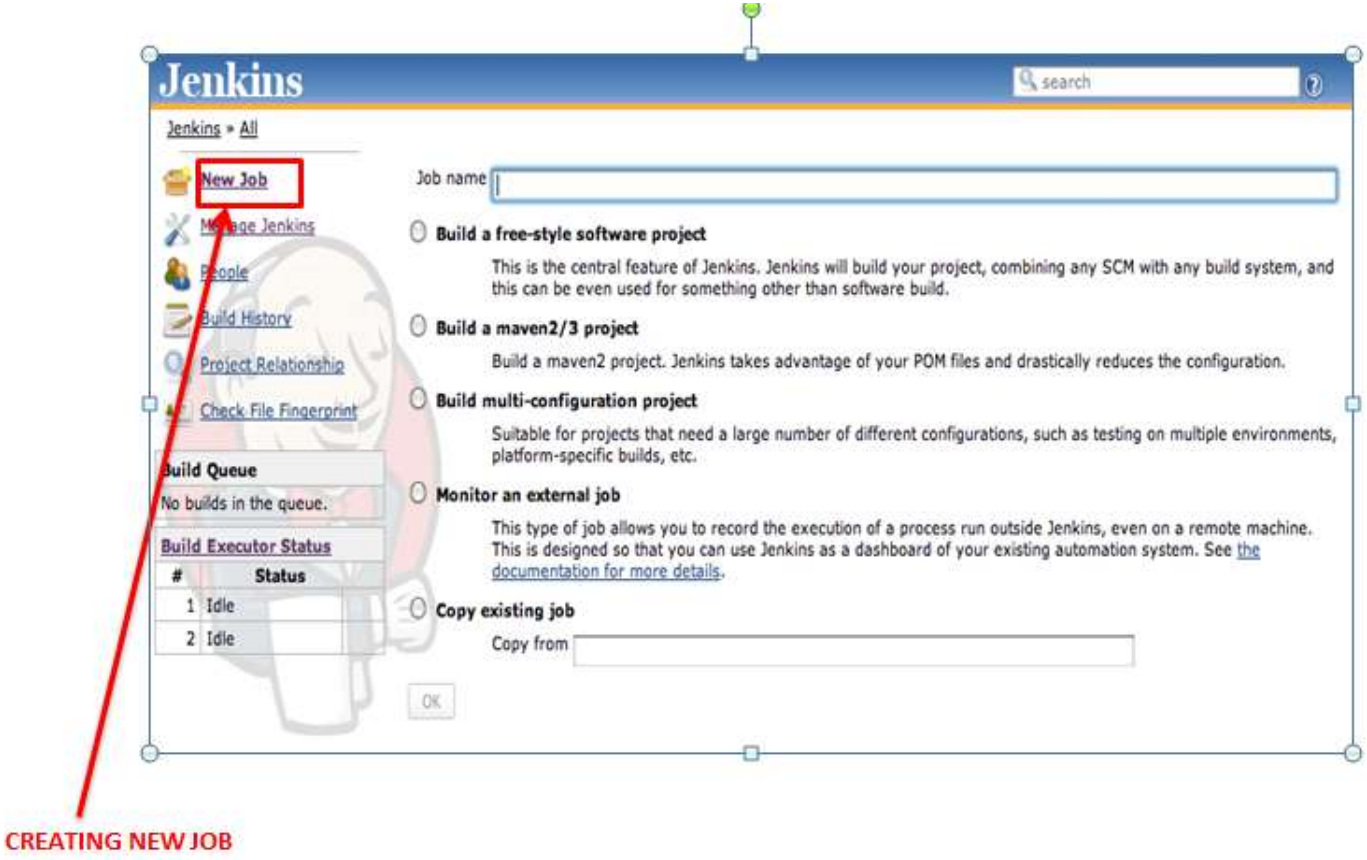
Jenkins Build Job Types



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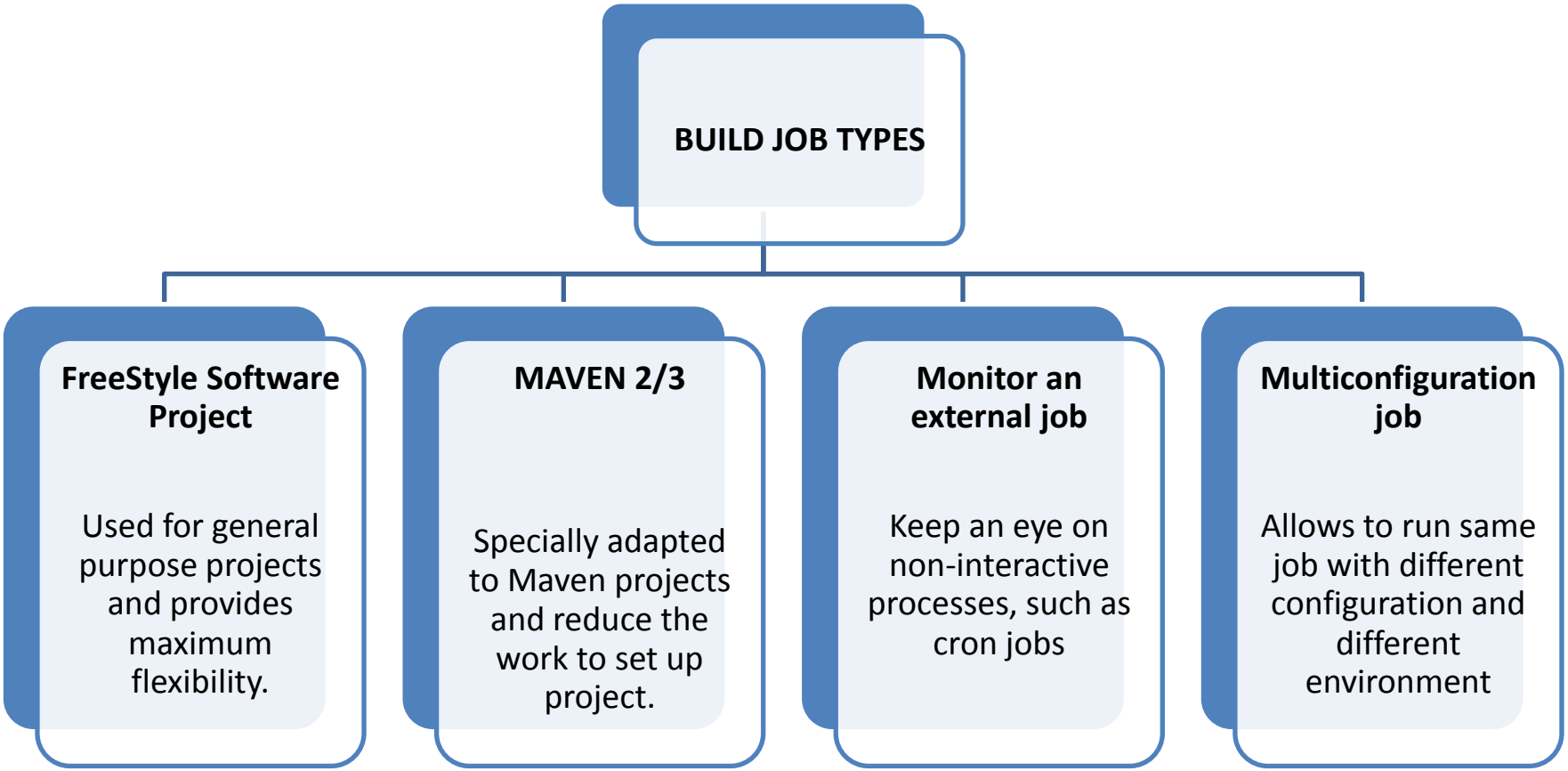
Jenkins Build Job Types…



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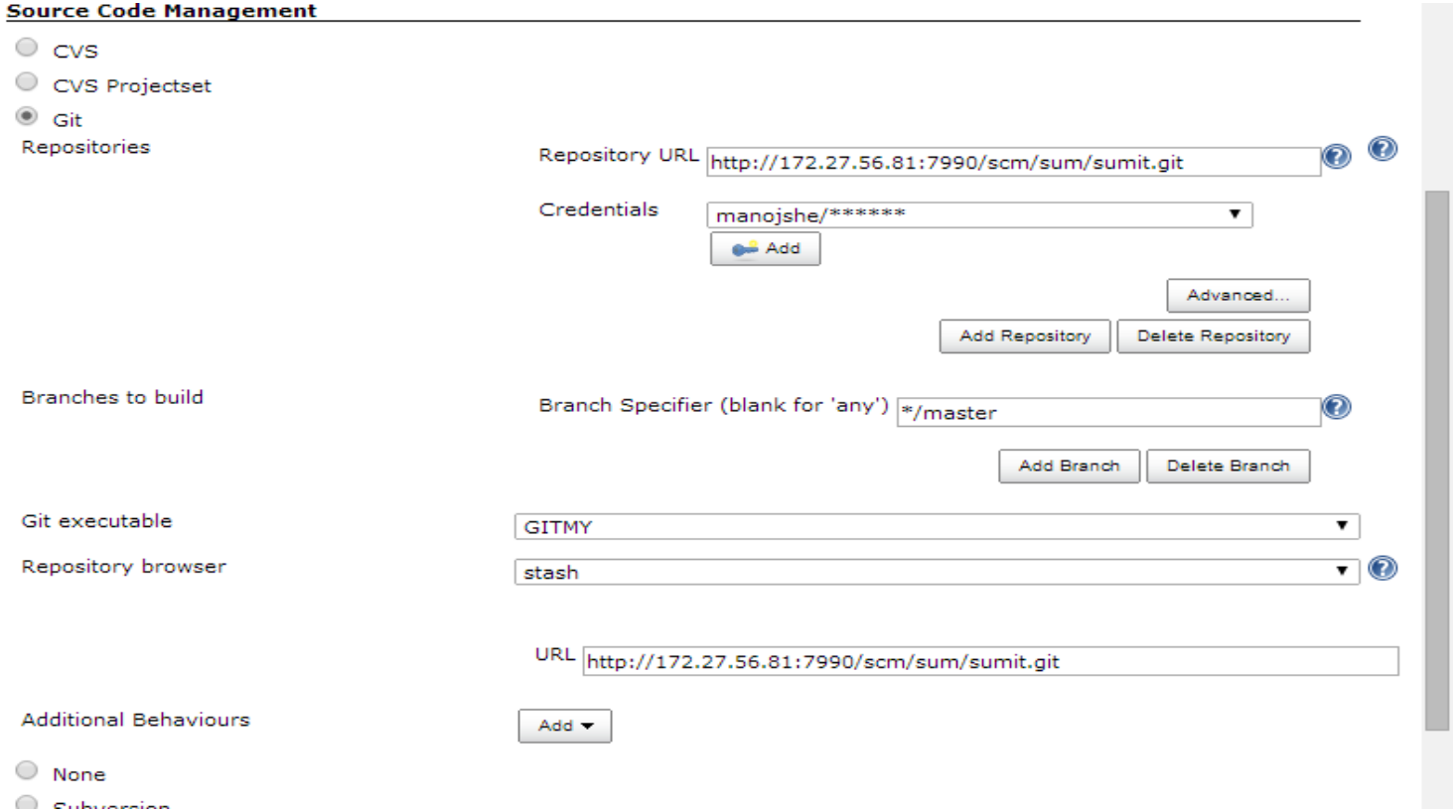
How to configure maven jobs in Jenkins

Configuring repository from stash with Jenkins for maven job



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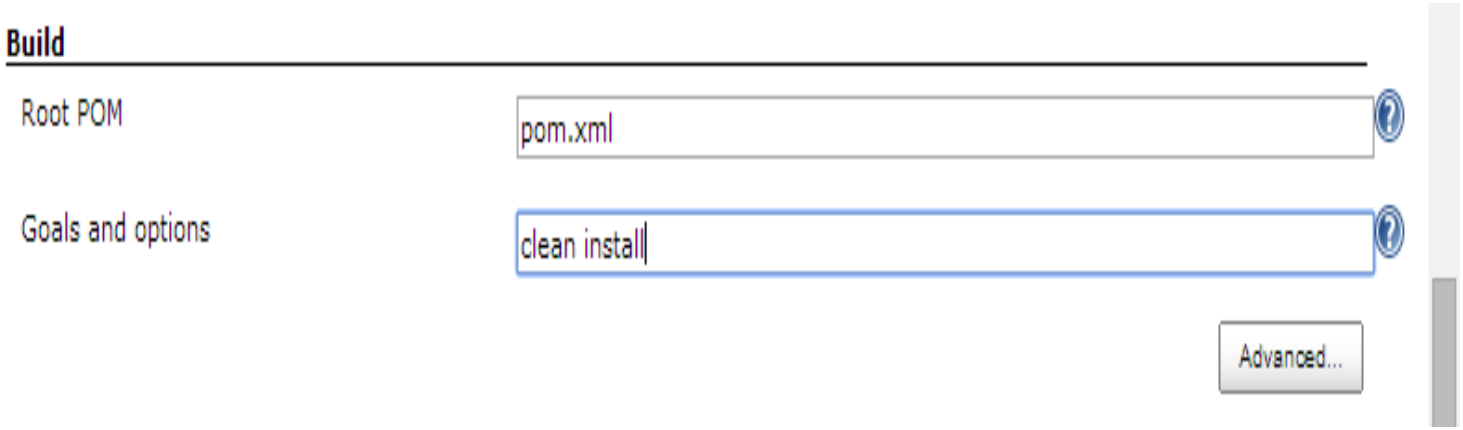
How to configure maven jobs in Jenkins…

- Maven configuration at Job level
- Specify the pom and maven goals that you want to execute



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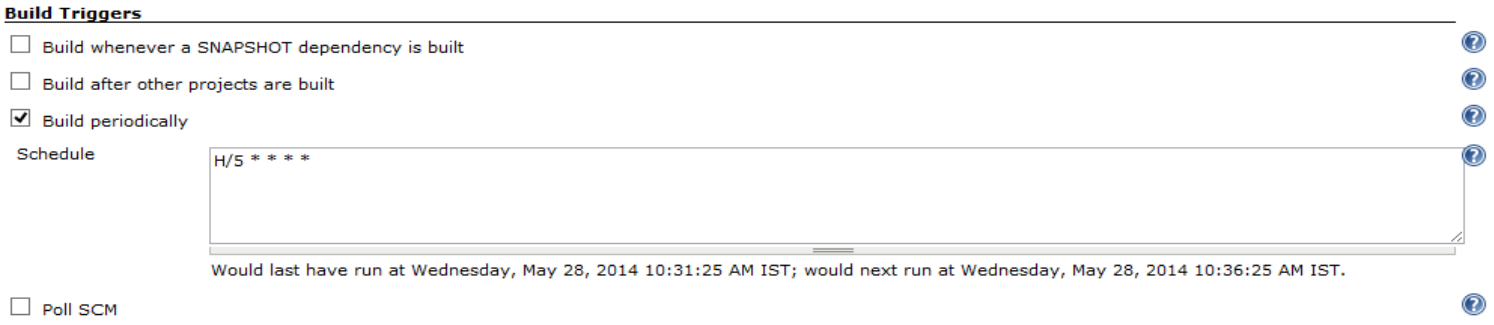
Build Triggers

Build trigger starts execution of the build

Different ways to trigger the build

- Build Periodically
- For scheduling tasks, Jenkins uses a cron-style syntax, consisting of five fields separated by white space in the following format: MINUTE HOUR DOM MONTH DOW



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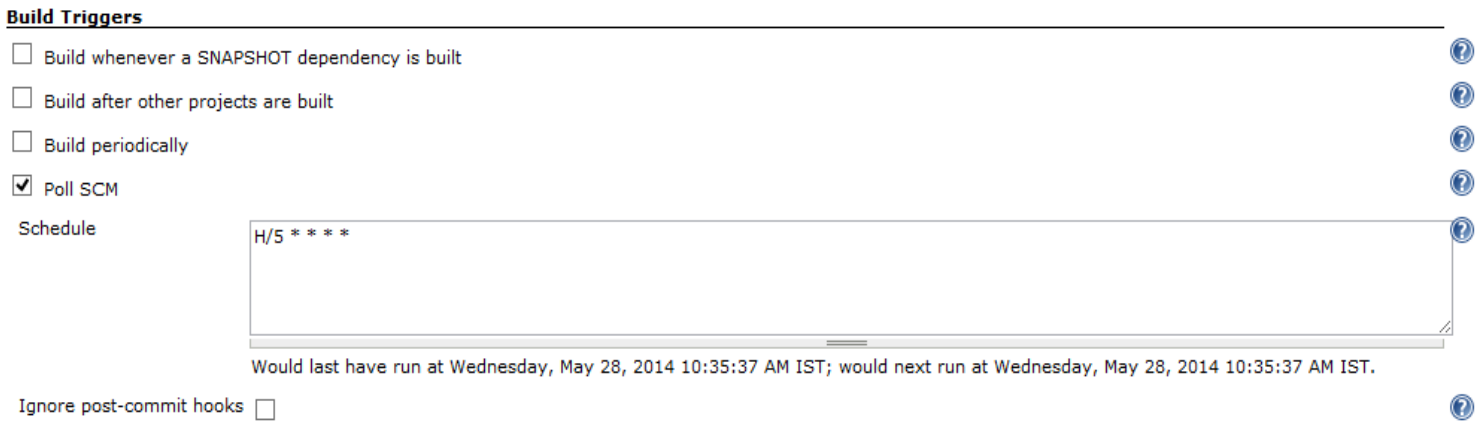
Build Triggers

Different ways to trigger the build

- Poll the SCM for changes – Poll the version controlled repository at the specified intervals and start executing the build if it founds any changes committed to repository.



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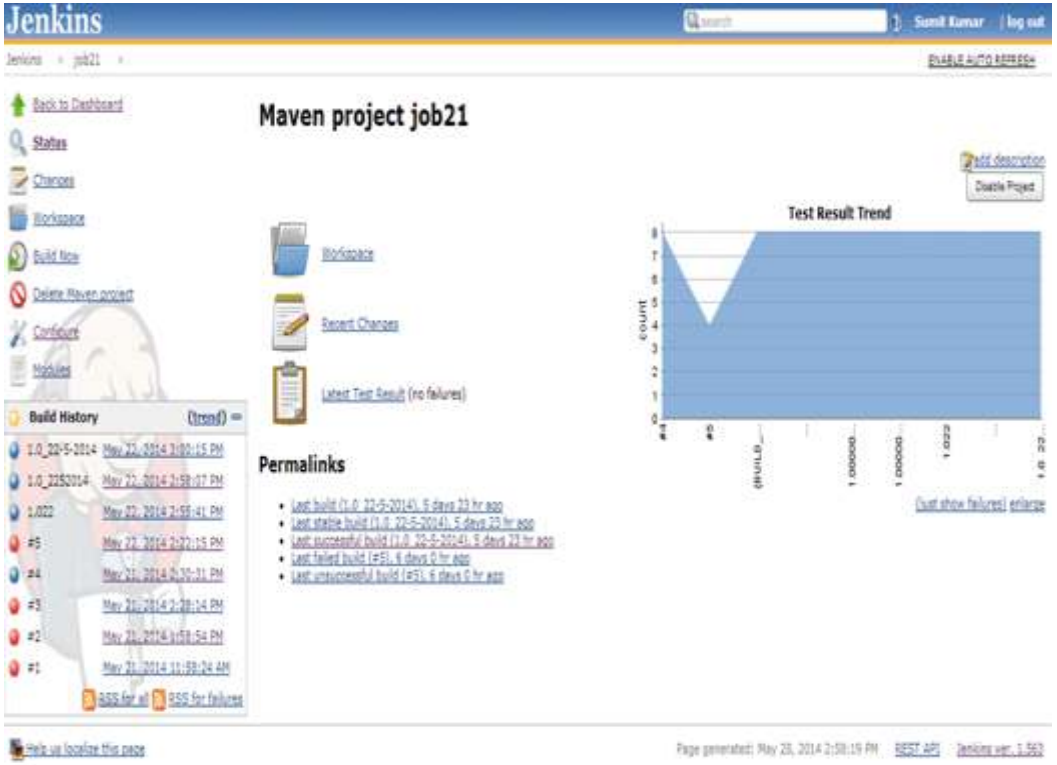
Jenkins Build Job Home Page



Build job home page details -

- Status of the last several builds
- Shows the different reports like Junit test report, clover test coverage report, Sonar report
- Test result trend
- Archived artifacts or copy artifacts from another project

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Post Build Actions- Reports

- Basic reporting features
  - Keeping track of build status
    - Last success and failure
    - “Weather” – Build trend
- Can be enhanced with the use of plugins

Tools	Plugins
Unit Test Framework	Junit, TestNG
Code Coverage	Clover, Cobertura
Static Code Analysis	Sonar

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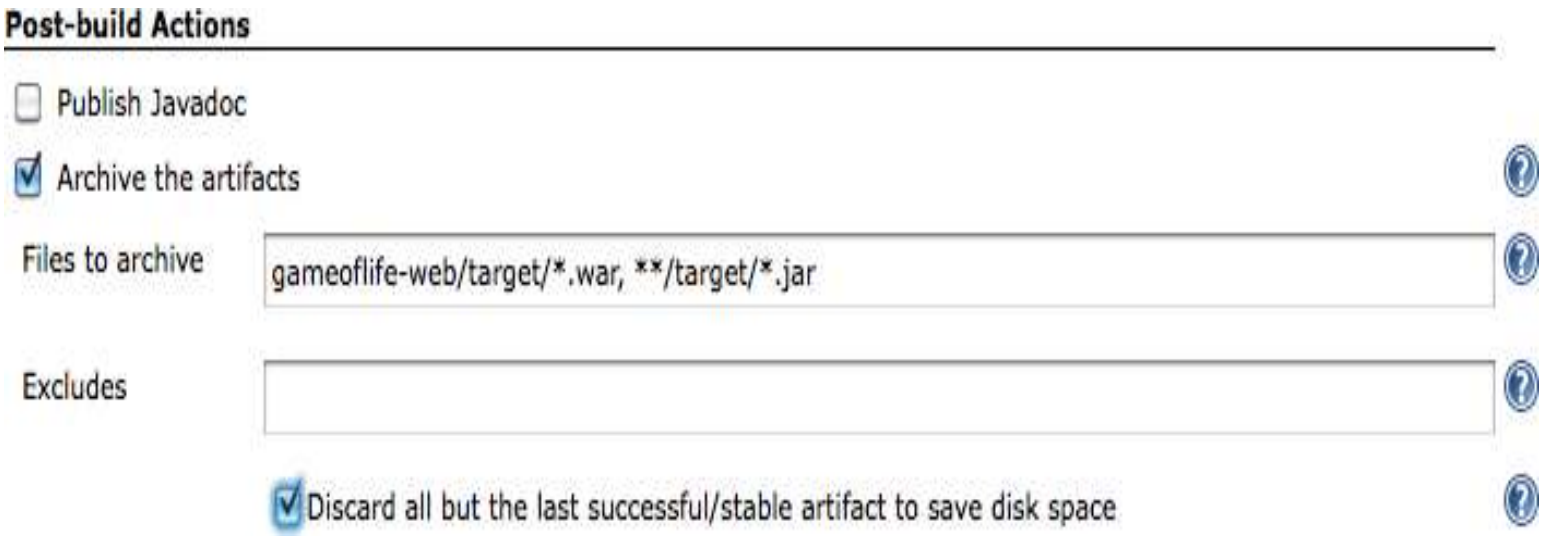
Post Build Actions

- Tasks after build is completed
  - Archiving the artifacts –Displays archived artifacts on the build job home page.



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Post Build Actions…

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Junit Test Report

Tests

Job	Success		Failed		Skipped		Total
	#	%	#	%	#	%	#
Eden-ActiveWorlds	127	100%	0	0%	0	0%	127
Eden-Eden	266	100%	0	0%	0	0%	266
Eden-MondiDinamiciWebservice	155	100%	0	0%	0	0%	155
Eden-Palm	20	100%	0	0%	0	0%	20
Total	568	100%	0	0%	0	0%	568

Test Result

0 failures (±0) , 2 skipped (±0)

1,513 tests (±0)

Module	Fail	(diff)	Total	(diff)
org.apache.httpcomponents:httpclient	0		582	
org.apache.httpcomponents:httpclient-cache	0		920	
org.apache.httpcomponents:httpmime	0		11	

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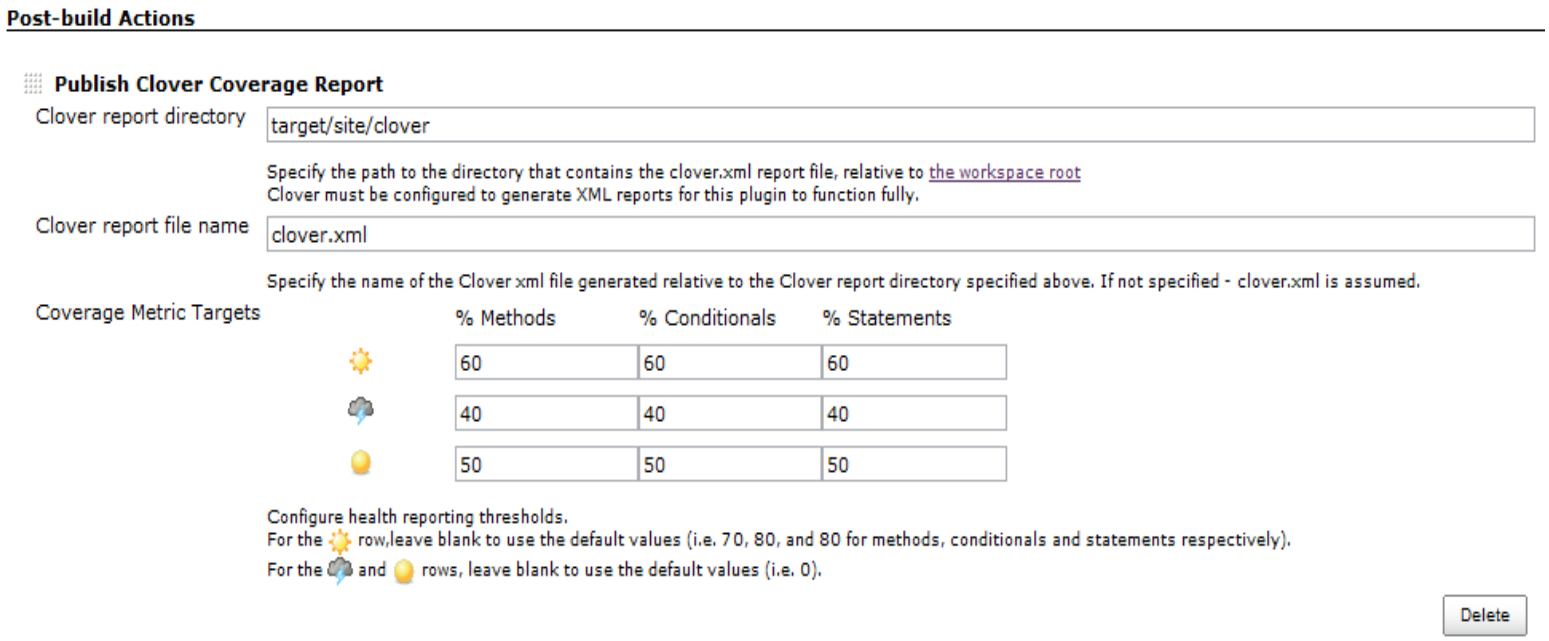
Test Code Coverage : Clover

- Check post build action “Publish Clover Coverage Report” and do the below settings.



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Test Code Coverage : Clover…

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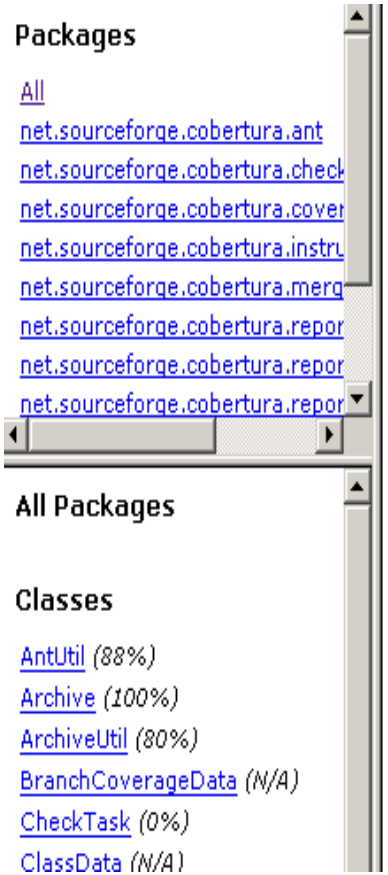
Test Code Coverage : Cobertura



Coverage Report - All Packages

Package	# Classes	Line Coverage		Branch Coverage		Complexity
All Packages	55	75%	1625/2179	64%	472/738	2.319
net.sourceforge.cobertura.ant	11	52%	170/330	43%	40/94	1.848
net.sourceforge.cobertura.check	3	0%	0/150	0%	0/76	2.429
net.sourceforge.cobertura.coveragedata	13	N/A	N/A	N/A	N/A	2.277
net.sourceforge.cobertura.instrument	10	90%	460/510	75%	123/164	1.854
net.sourceforge.cobertura.merge	1	86%	30/35	88%	14/16	5.5
net.sourceforge.cobertura.reporting	3	87%	116/134	80%	43/54	2.882
net.sourceforge.cobertura.reporting.html	4	91%	475/523	77%	156/202	4.444
net.sourceforge.cobertura.reporting.html.files	1	87%	39/45	62%	5/8	4.5
net.sourceforge.cobertura.reporting.xml	1	100%	155/155	95%	21/22	1.524
net.sourceforge.cobertura.util	9	60%	175/291	69%	70/102	2.892
someotherpackage	1	83%	5/6	N/A	N/A	1.2

Report generated by Cobertura 1.9 on 6/9/07 12:37 AM.

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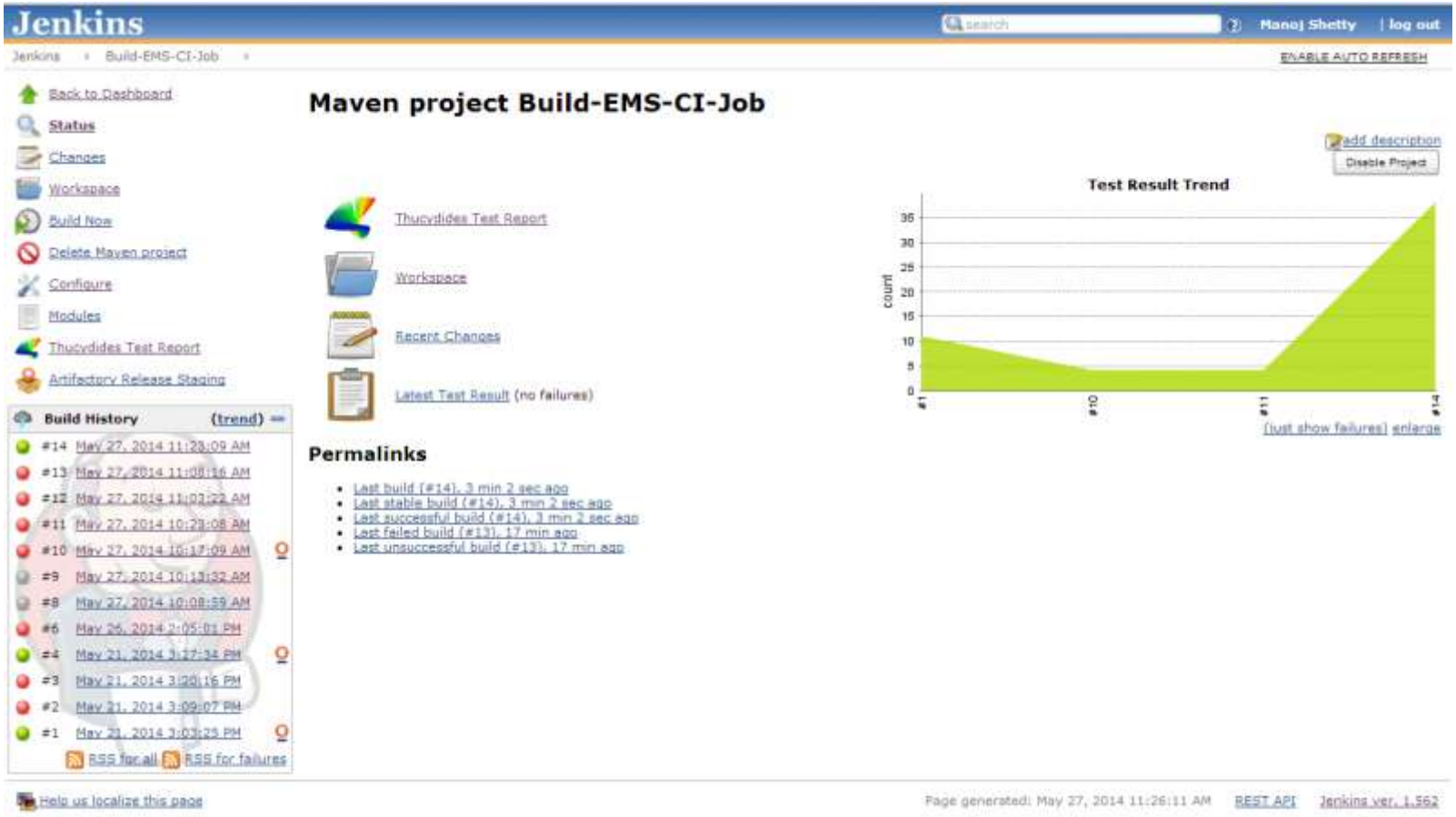
Test Code Coverage : Thucydides



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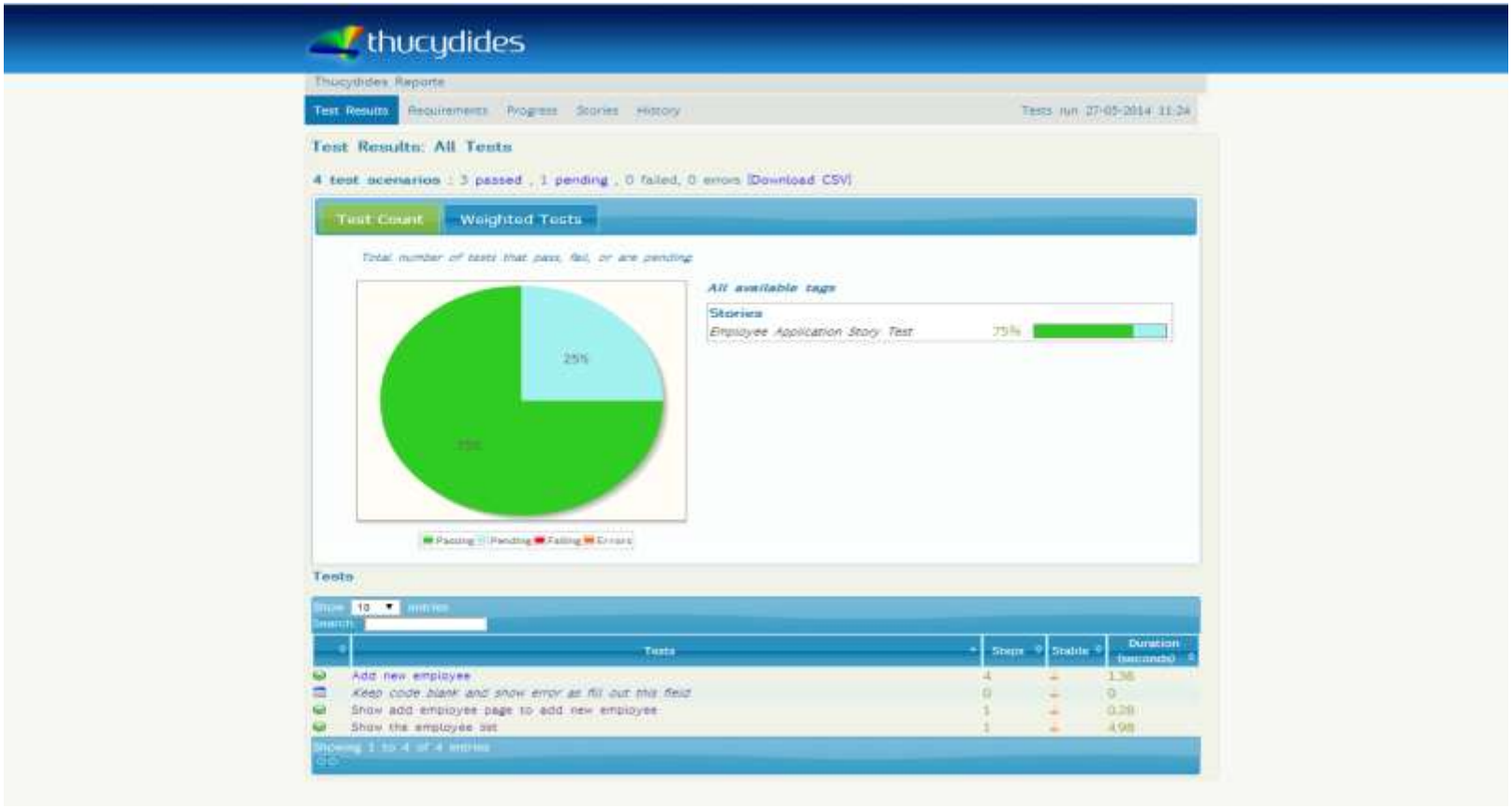
Test Code Coverage : Thucydides…



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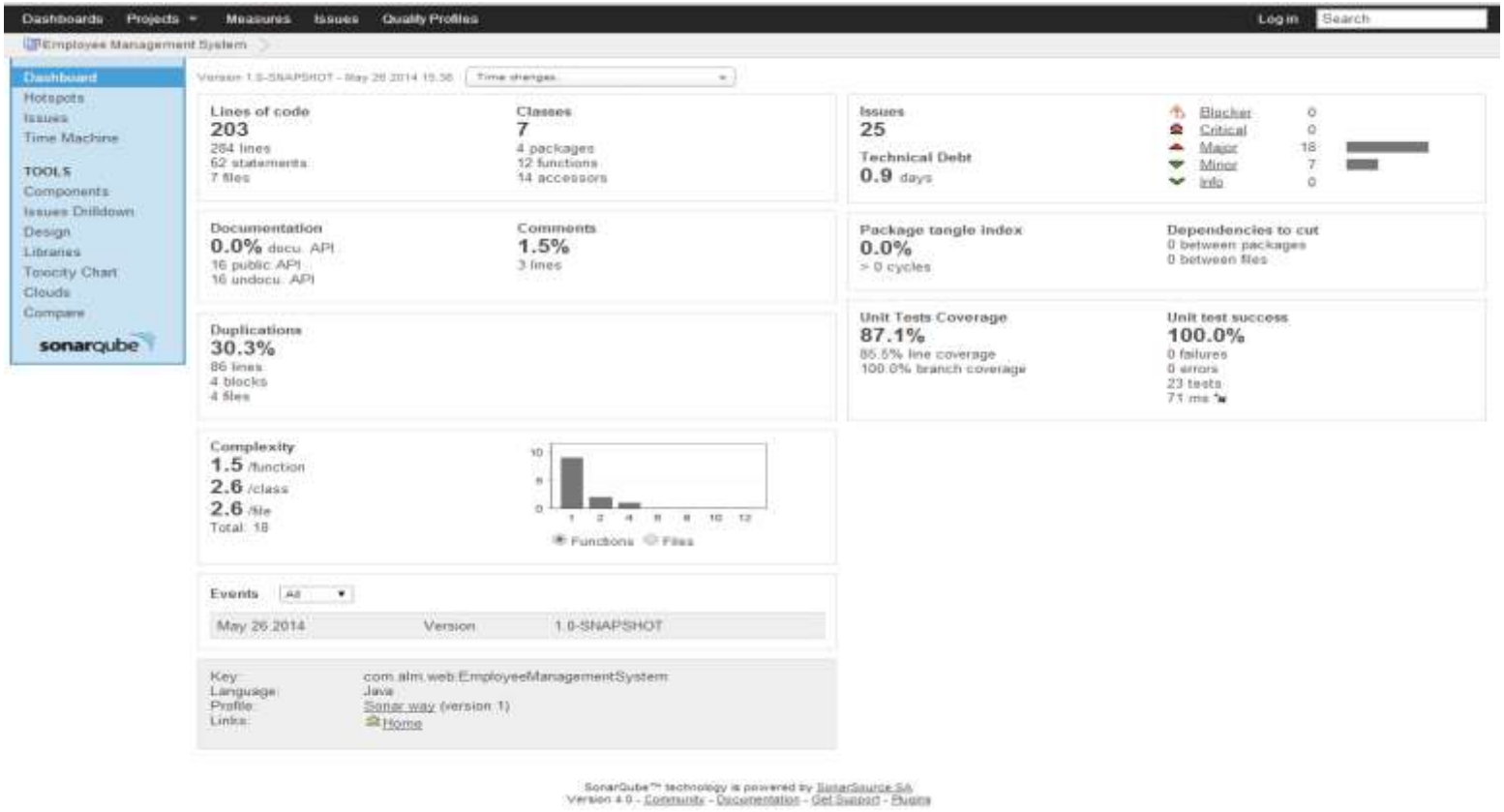
Static Code Analysis : Sonar



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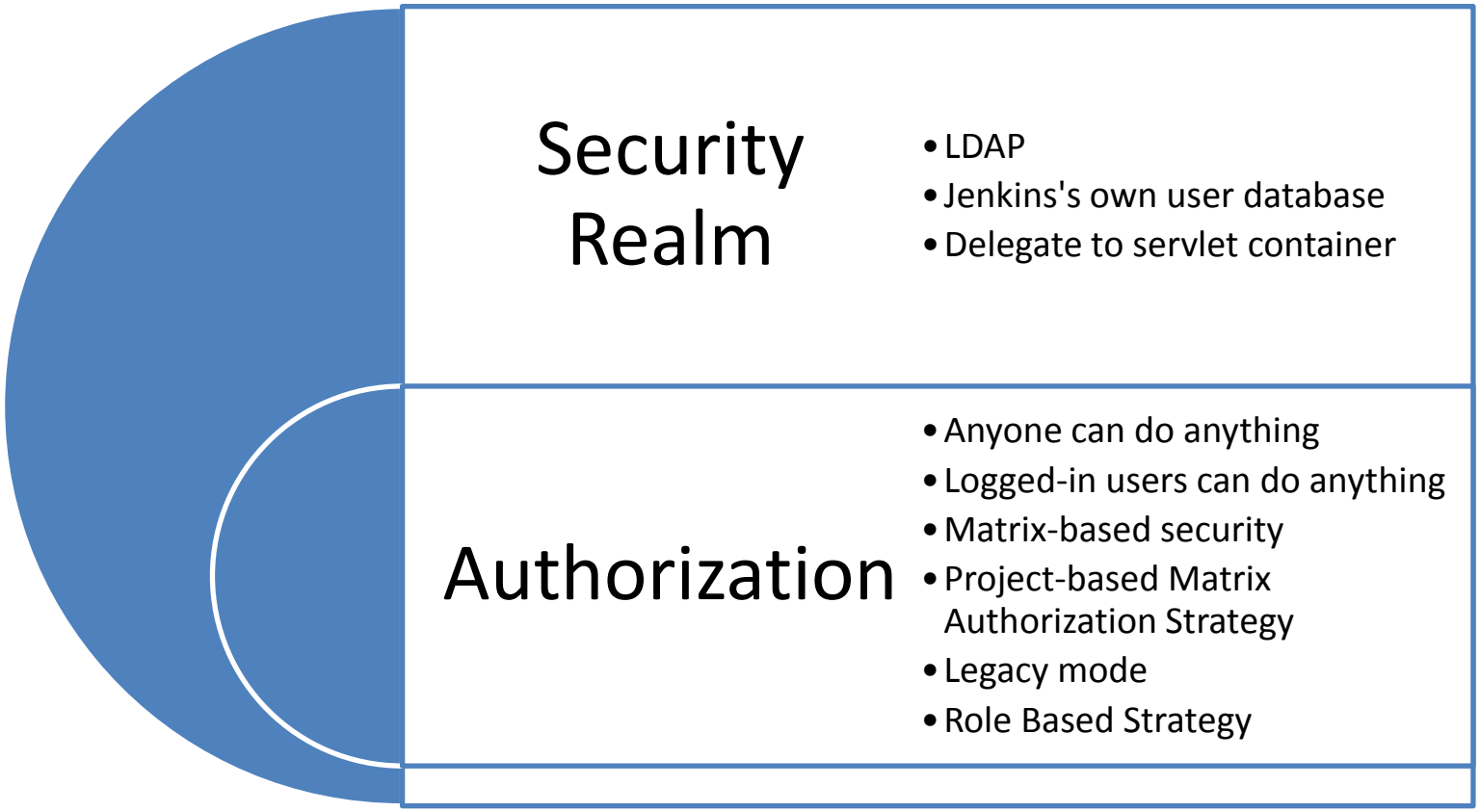
Security Management



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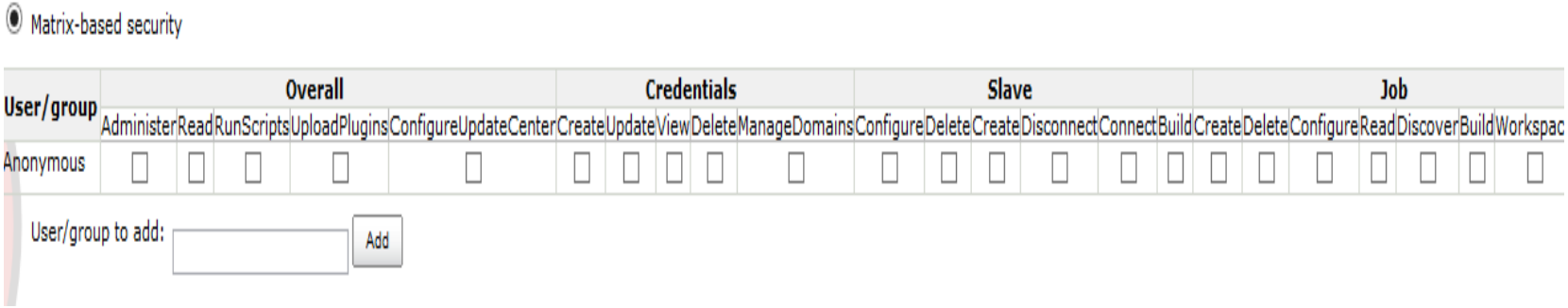
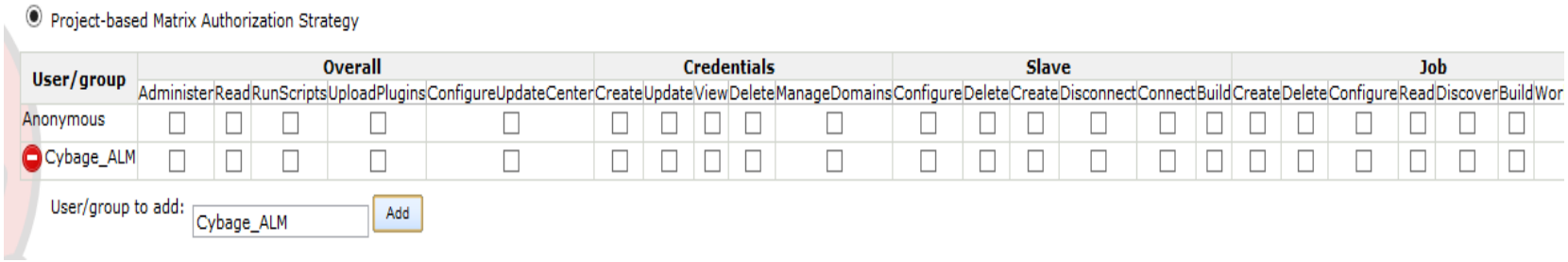
Security Management…

- Matrix-based security



- Project-based Matrix Authorization



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Security Management Plugins

Role based privilege control

Global roles

Role	Overall	Slave		Job						Run			View			SCM
	Administer	Read	Configure	Delete	Create	Delete	Configure	Read	Build	Workspace	Delete	Update	Artifacts	Create	Delete	Configure	Tag
admin	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
anonymous	☐	☑	☐	☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐
job-creator	☐	☑	☐	☐	☑	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐

Role to add

Add

Project roles

Role	Pattern	Job					Run		
		Delete	Configure	Read	Build	Workspace	Delete	Update	Artifacts
[redacted]	[redacted]	☐	☑	☑	☑	☑	☐	☑	☑
[redacted]	[redacted]	☑	☑	☑	☑	☑	☑	☑	☑
[redacted]	[redacted]	☐	☑	☑	☑	☑	☐	☑	☑
Sample	Sample.*	☐	☑	☑	☑	☑	☐	☑	☑
[redacted]	[redacted]	☐	☑	☑	☑	☑	☐	☑	☑

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Build Pipeline

- Forms chain of jobs based on their upstream/downstream dependencies.

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Jenkins Distributed Build Architecture

- Master/slave architecture to manage distributed builds.

Master

- handle scheduling build jobs
- dispatching builds to the slaves for the actual execution
- monitor the slaves and recording and presenting the build

Slave

- small Java executable that runs on a remote machine and listens for requests from master

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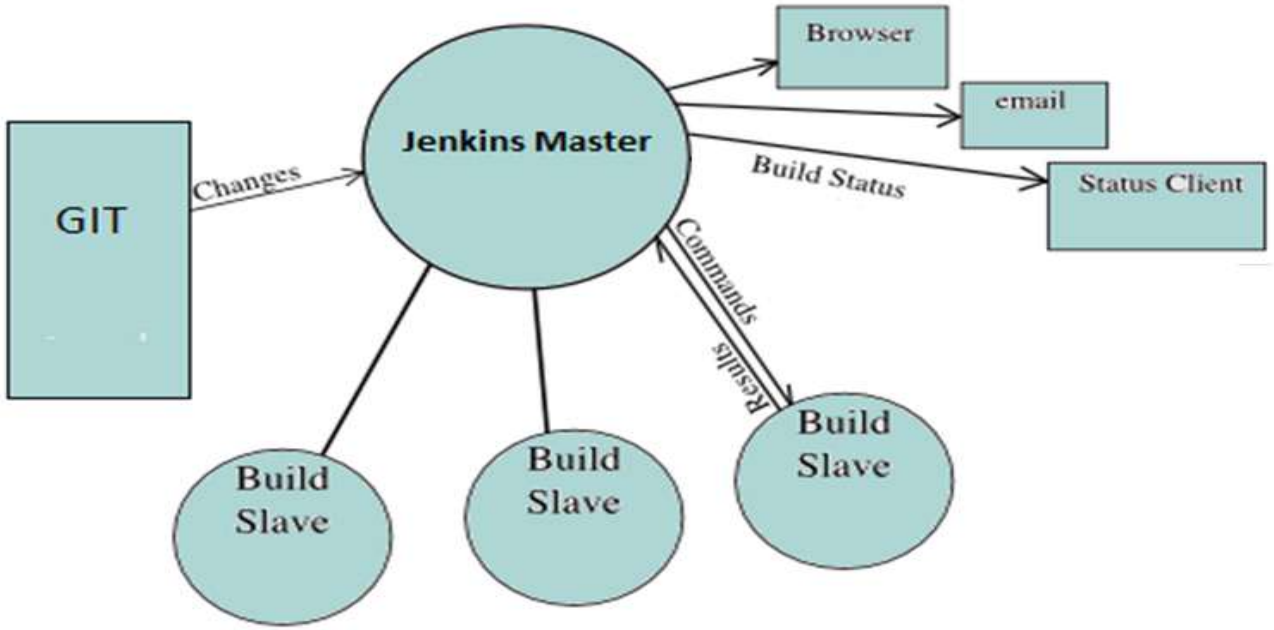
Jenkins Master Slave



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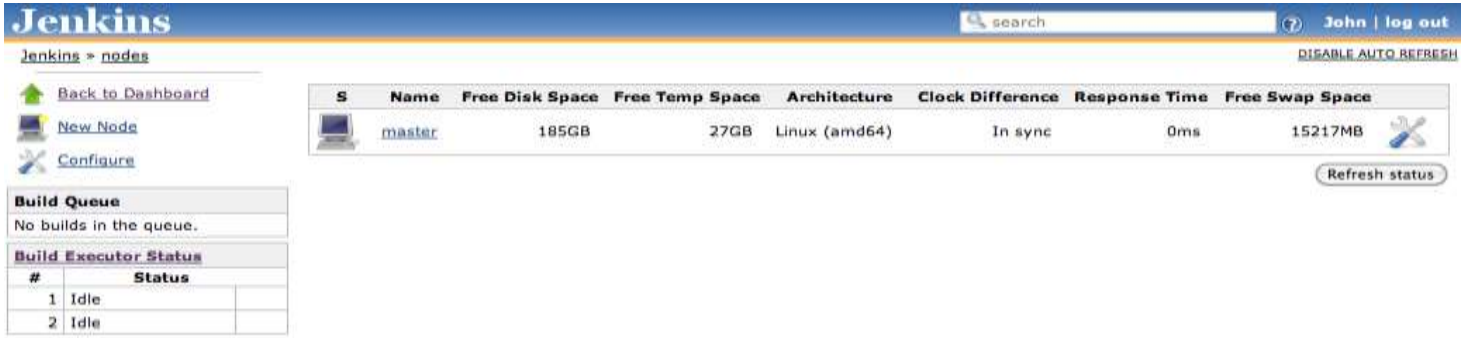
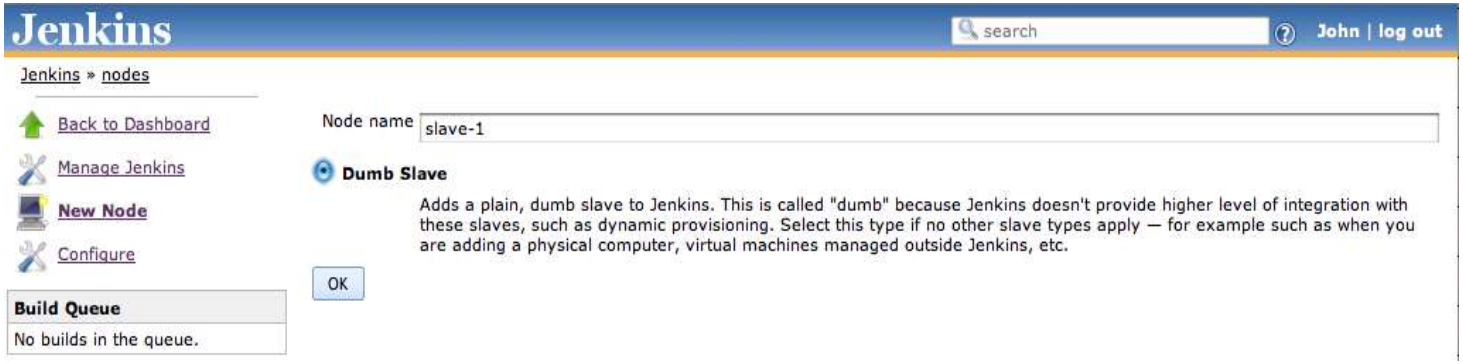
Master Slave

- Master



- Creating Slave



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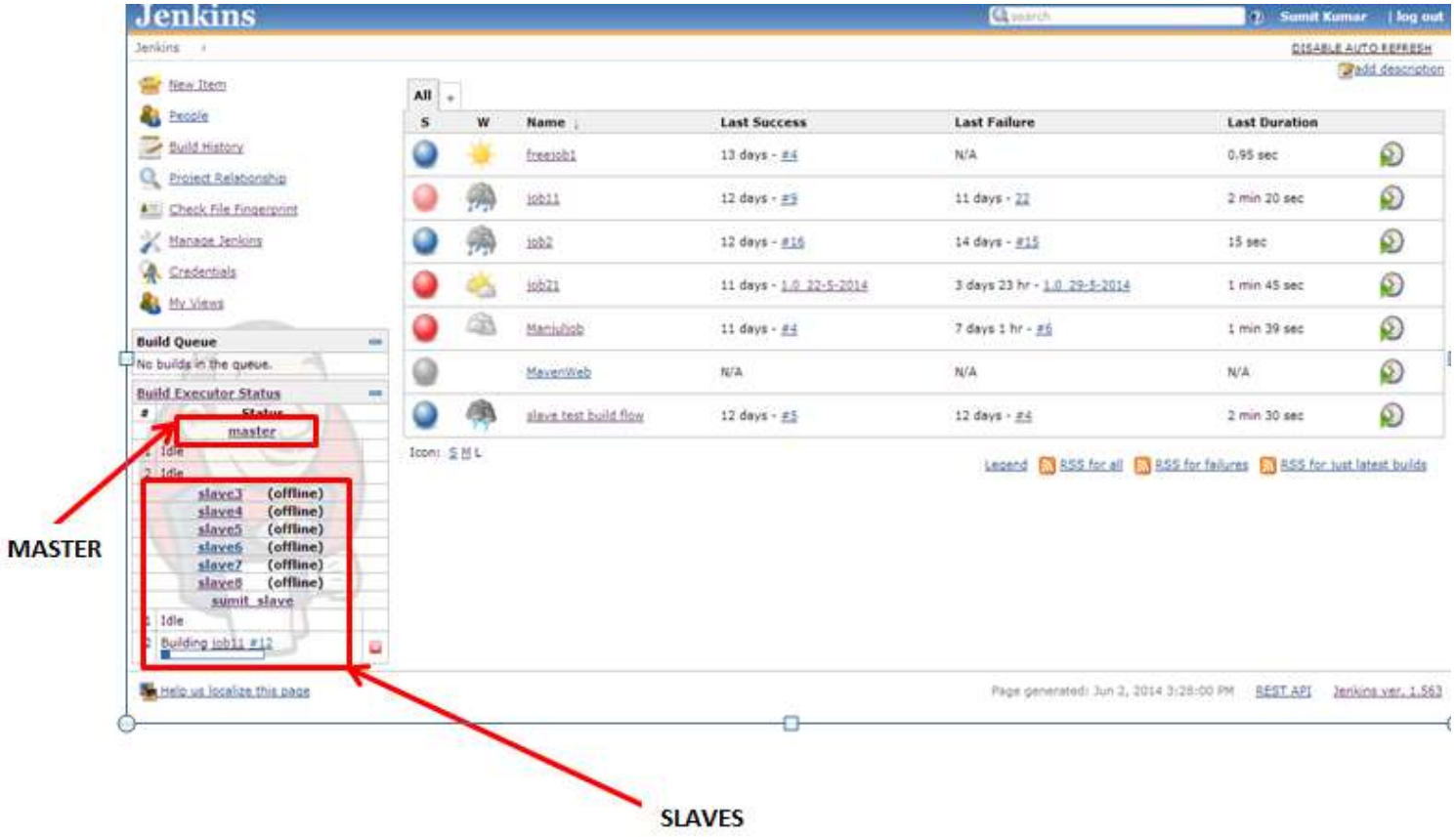
Master Slave together



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Jenkins with Artifactory

Artifactory

- Central storage server for internal artifacts
- Open Source from JFrog makes configuring and maintaining maven repositories easy
- Refer back to the build that generated a given artifact
- keeps track of the dependencies that were used in the Jenkins build
- Jenkins Artifactory Plugin - Provides tighter two-way integration with the Artifactory

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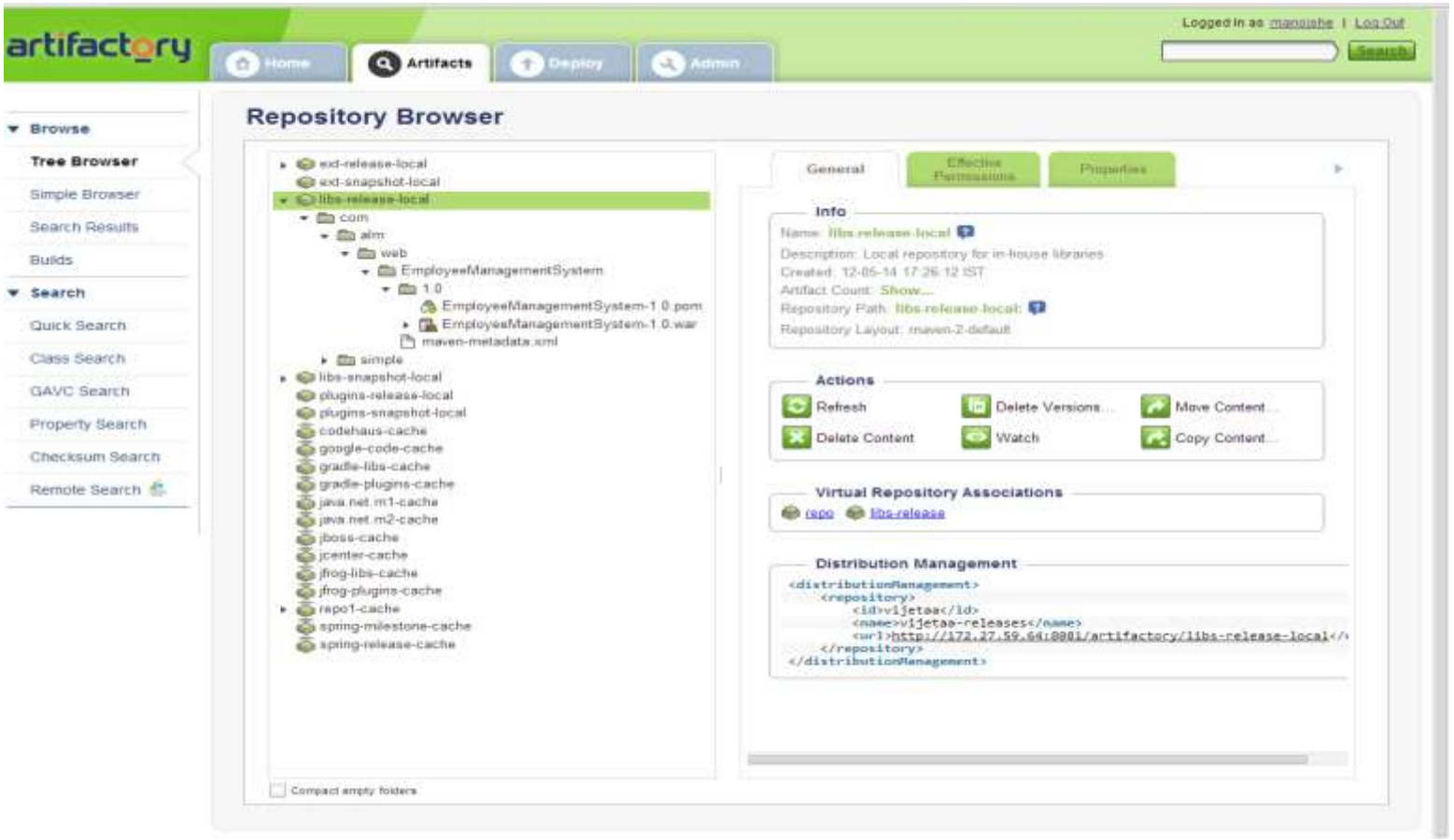
Jenkins with Artifactory…



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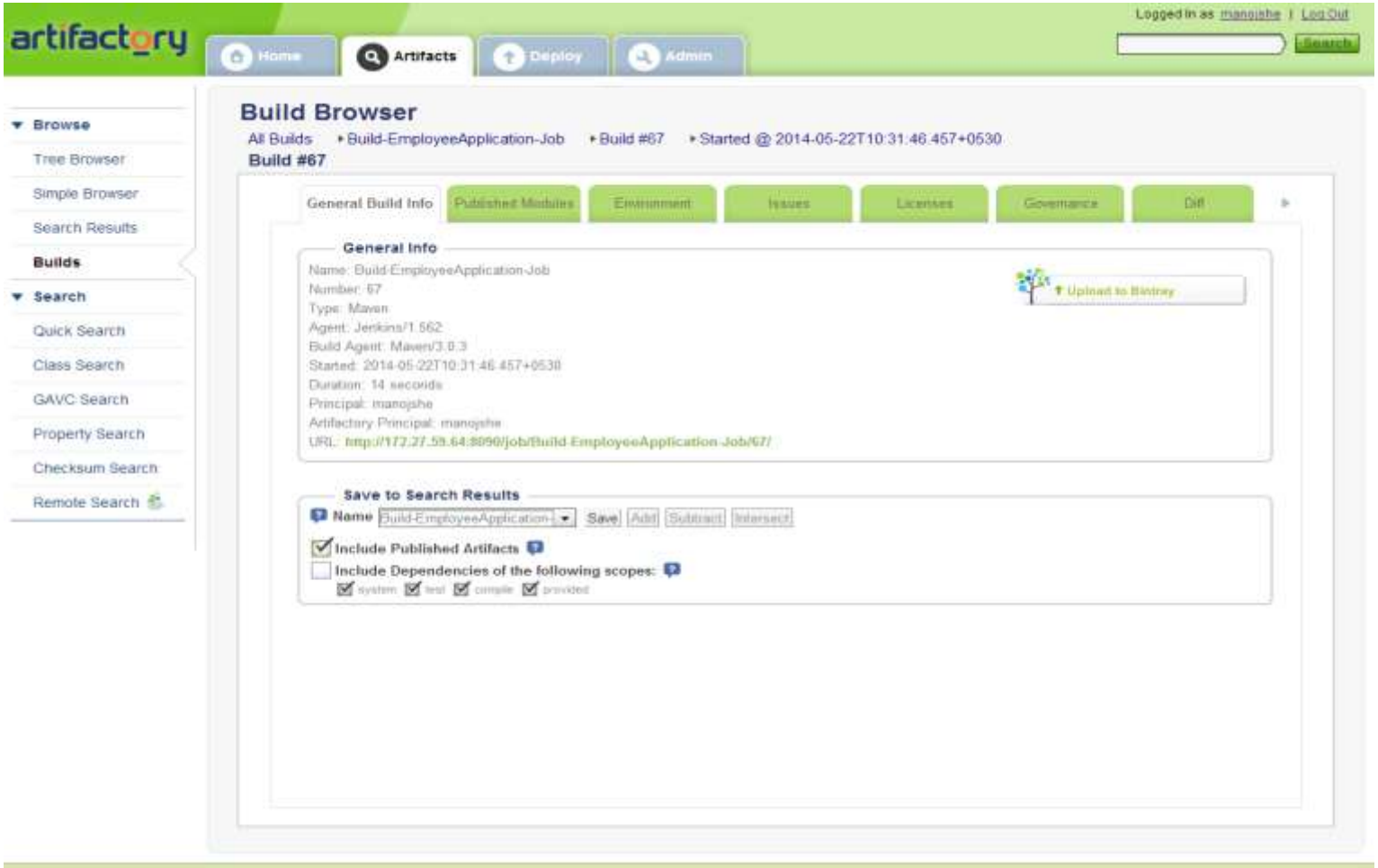
Jenkins with Artifactory…



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Jenkins with Jira

- Jira plugin integrates Atlassian JIRA to Jenkins
- Configure Jira Url
- Back pointer to Jenkins build pages
- JIRA keys in changelogs are linked to the corresponding JIRA pages.

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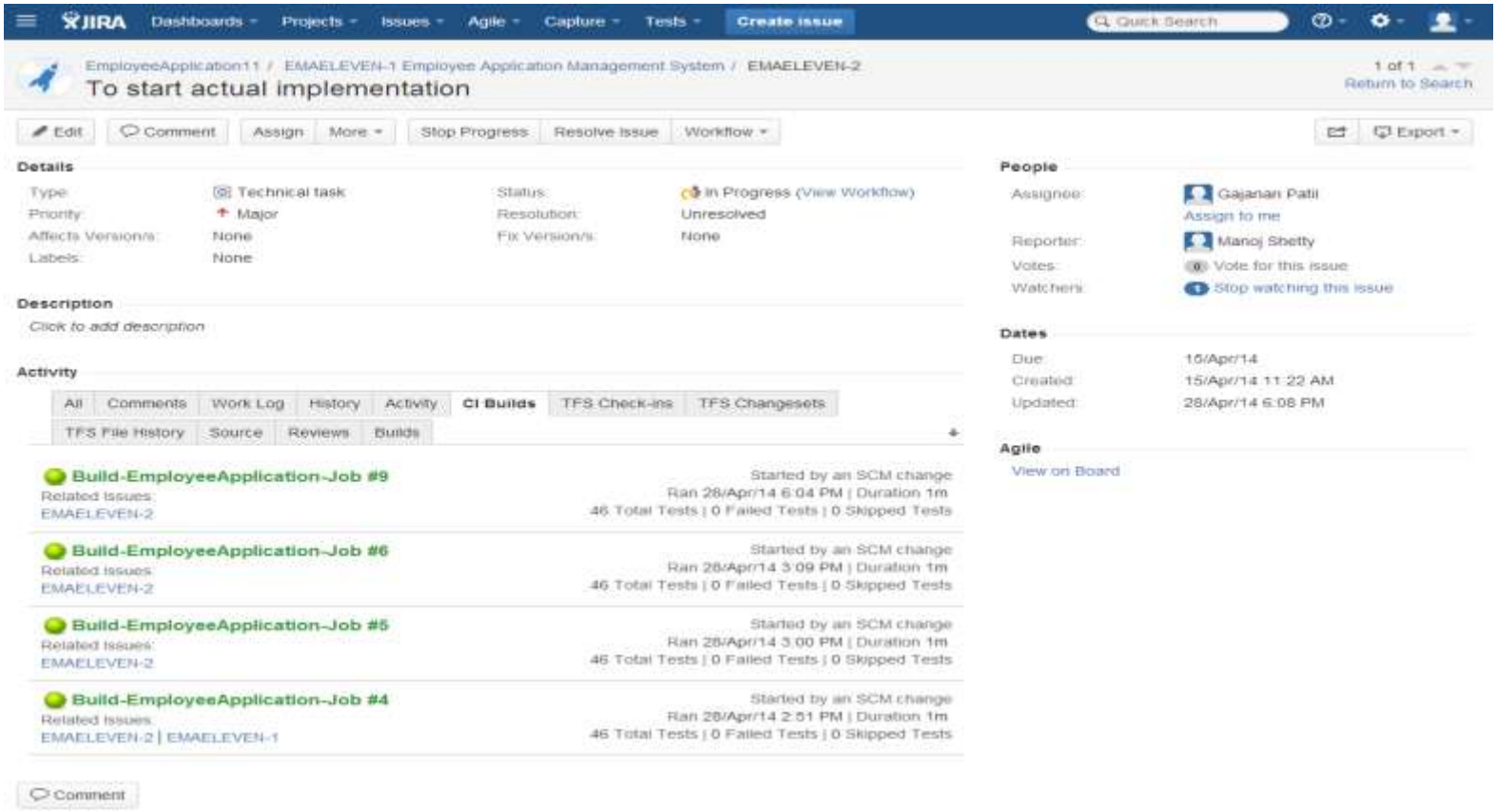
Jenkins with Jira…



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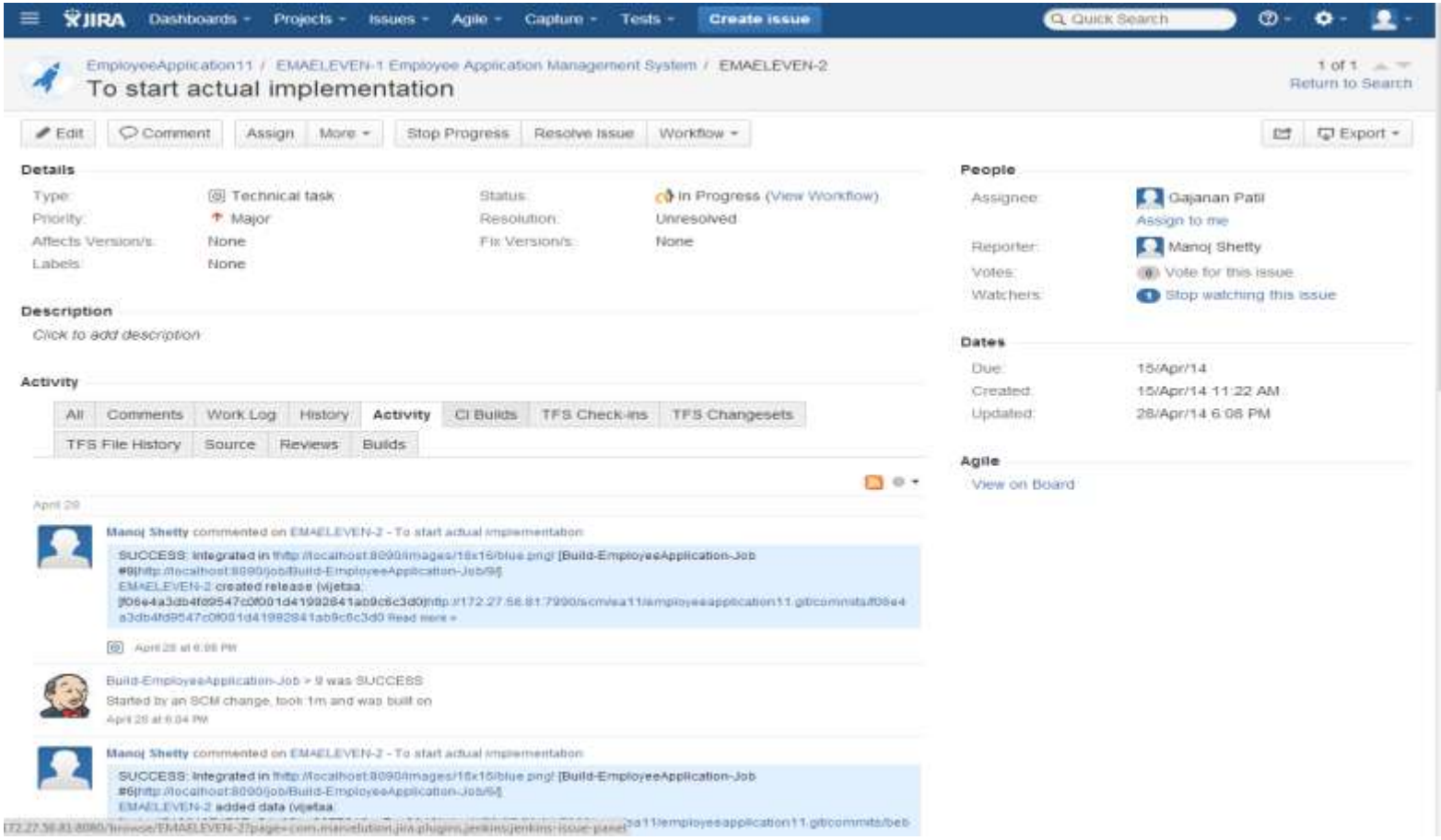
Jenkins with Jira



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Jenkins with Stash

- Stash notifier plugin integrats Atlassian Stash with Jenkins
- builds in progress and their results.
- The build results will show up in the commit list in Stash or in a Stash pull request and provide immediate and easy to scan feedback about a commit.
- It is possible to navigate from build result information in Stash directly to the build in question.
- The plugin can be configured on a per-job basis, globally for all Jobs or both to minimize the configuration overhead.

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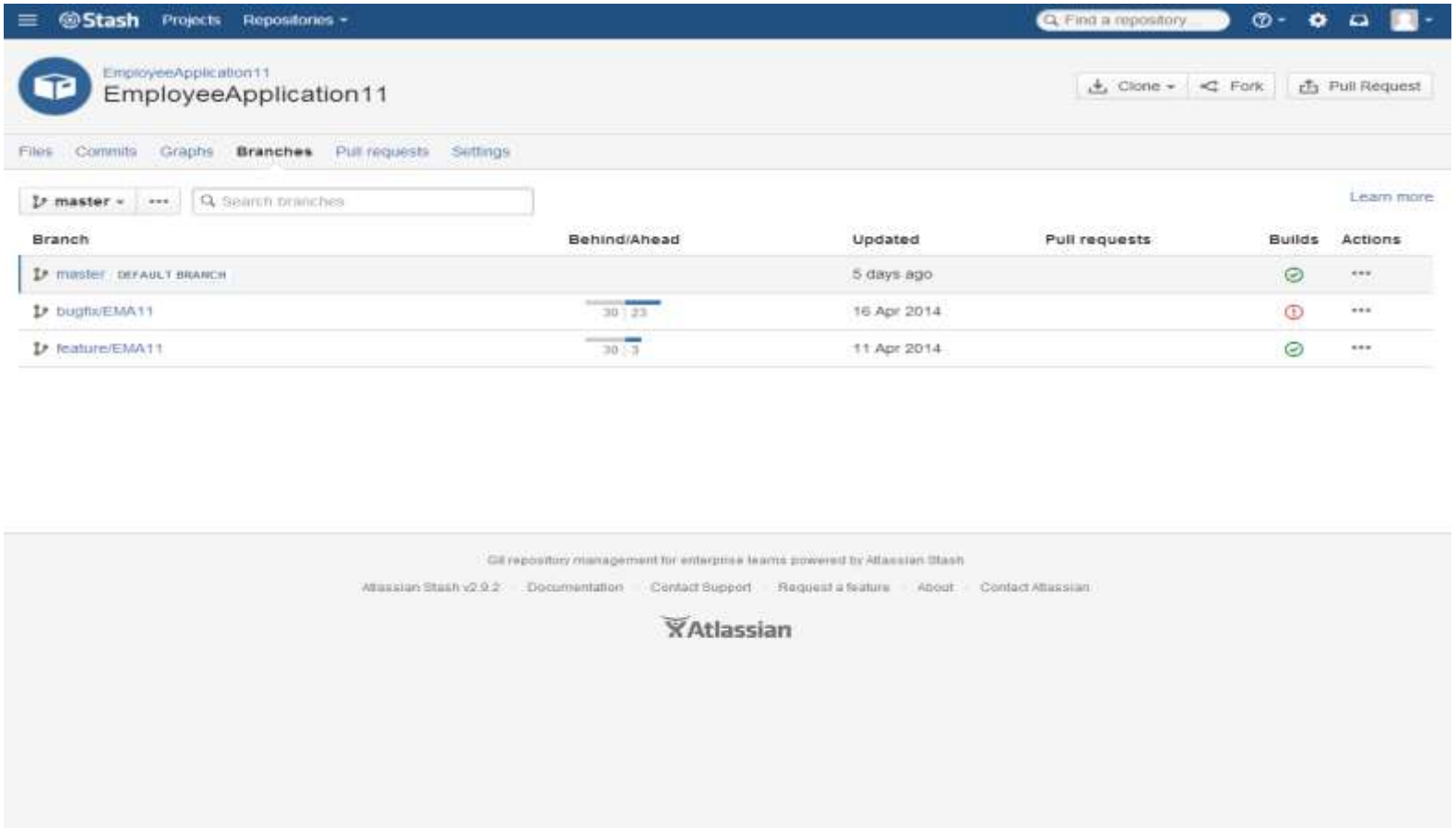
Jenkins with Stash



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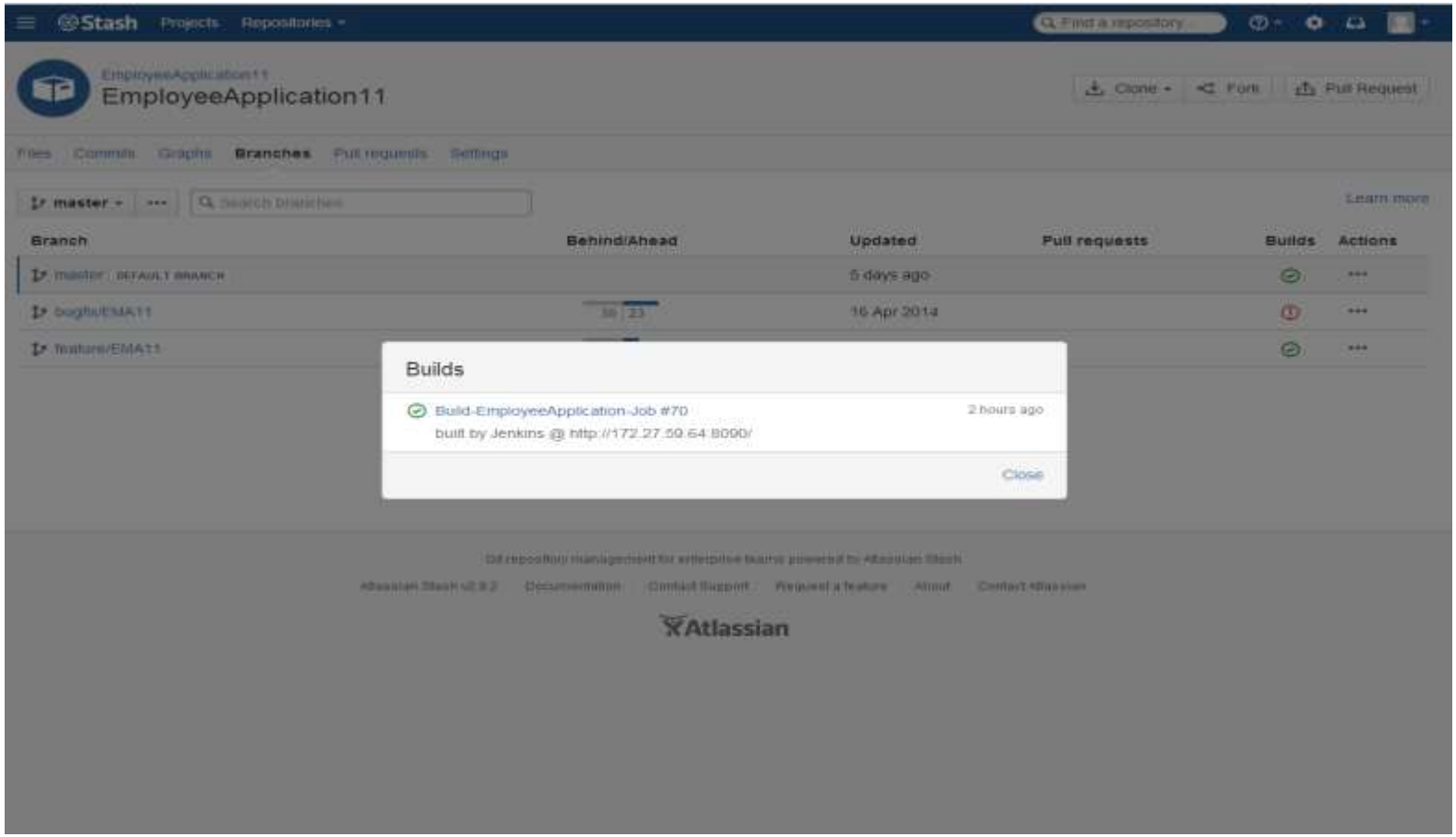
Jenkins with Stash



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Jenkins Best Practices

- Always secure Jenkins
- Jenkins Home should be backed up regularly
- Issues must be tightly integrated with tracking system.
- Job should always be configured to generate trend reports and automated testing
- Jenkins on the partition that has the most free disk-space
- Master Slave distribution should be used
- Take steps to ensure failures are reported as soon as possible

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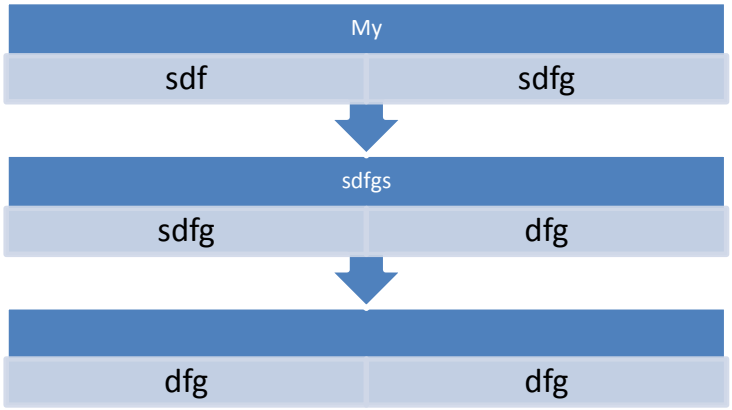
TESTING SMART ART



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List of Plugins required for a Jenkins CI

- Deploy Plugin
- Clover Plugin
- Sonar Plugin
- Cobertura Plugin
- Jacoco Plugin
- Jira Plugin
- Git Plugin
- Stash notifier plugin
- Thucydidies Plugin
- Build pipeline Plugin
- Copy artifact Plugin
- Join Plugin
- Artifactory Plugin
- Role Strategy Plugin

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Who uses Jenkins?

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Thank You!

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