Jenkins

MOUNT EVEREST
CONSULTING

Executive summary

- Continuous integration systems are a vital part of any Agile team because they help enforce the ideals of Agile development
- Jenkins, a continuous build tool, enables teams to focus on their work by automating the build, artifact management, and deployment processes
- Jenkins' core functionality and flexibility allow it to fit in a variety of environments and can help streamline the development process for all stakeholders involved

Agenda

- Continuous Integration (CI)
  - What is it?
  - What are the benefits?
  - Continuous Build Systems
- Jenkins
  - What is it?
  - Where does it fit in?
  - Why should I use it?
  - What can it do?
  - How does it work?
  - Where is it used?
  - How can I get started?
- Putting it all together
- Conclusion
- References

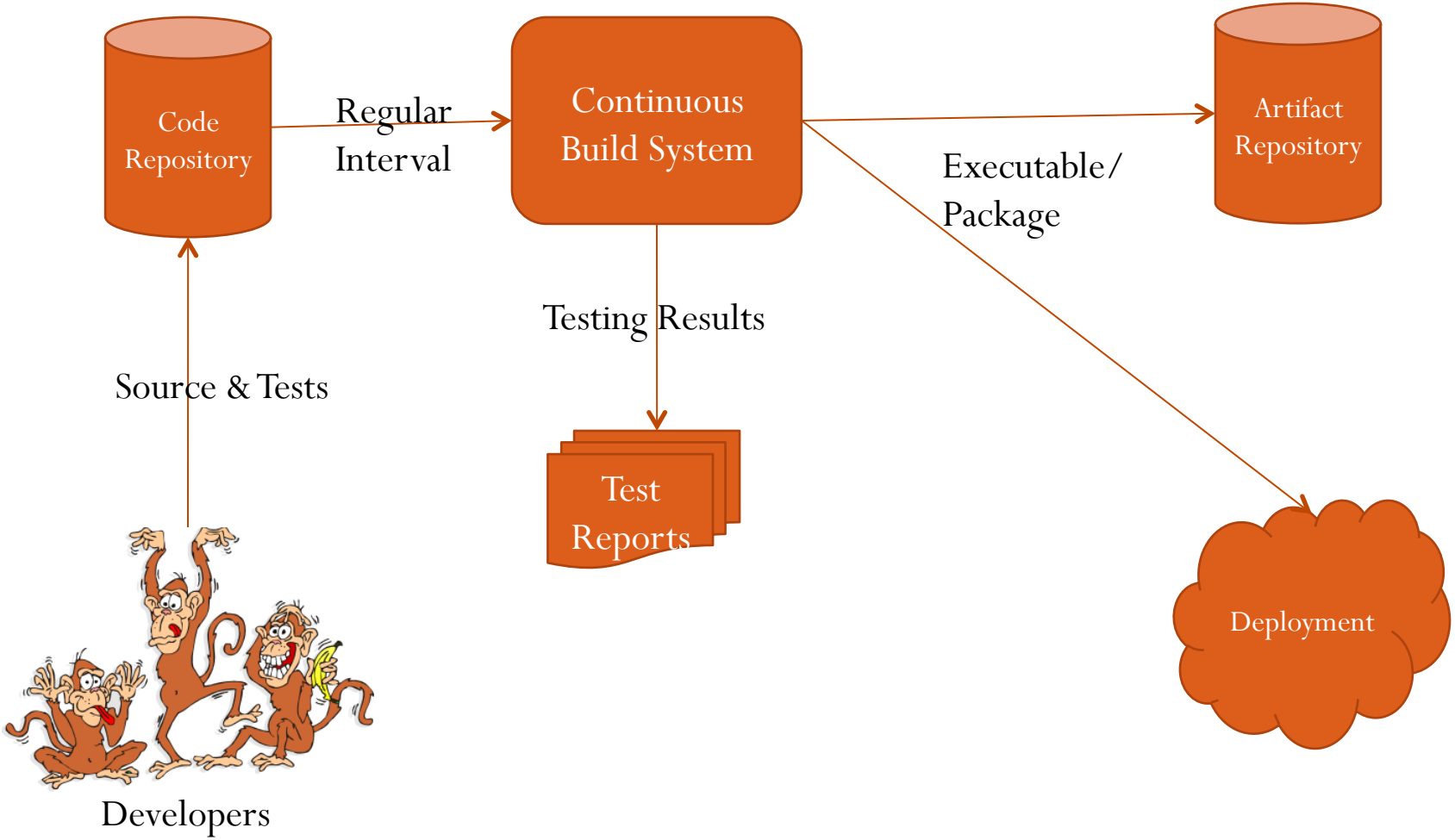
CI - Defined

- "Continuous Integration is a software development practice where members of a team integrate their work frequently, usually each person integrates at least daily - leading to multiple integrations per day. Each integration is verified by an automated build (including test) to detect integration errors as quickly as possible" – Martin Fowler

CI – What does it really mean?

- At a regular frequency (ideally at every commit), the system is:
  - Integrated
    - All changes up until that point are combined into the project
  - Built
    - The code is compiled into an executable or package
  - Tested
    - Automated test suites are run
  - Archived
    - Versioned and stored so it can be distributed as is, if desired
  - Deployed
    - Loaded onto a system where the developers can interact with it

CI - Workflow


Code Repository
Regular Interval
Continuous Build System
Artifact Repository
Executable/ Package
Testing Results
Source & Tests
Test Reports
Deployment
Developers

CI – Benefits

- Immediate bug detection
- No integration step in the lifecycle
- A deployable system at any given point
- Record of evolution of the project

CI – The tools

- Code Repositories
  - SVN, Mercurial, Git
- Continuous Build Systems
  - **Jenkins**, Bamboo, Cruise Control
- Test Frameworks
  - JUnit,Cucumber, CppUnit
- Artifact Repositories
  - Nexus, Artifactory, Archiva

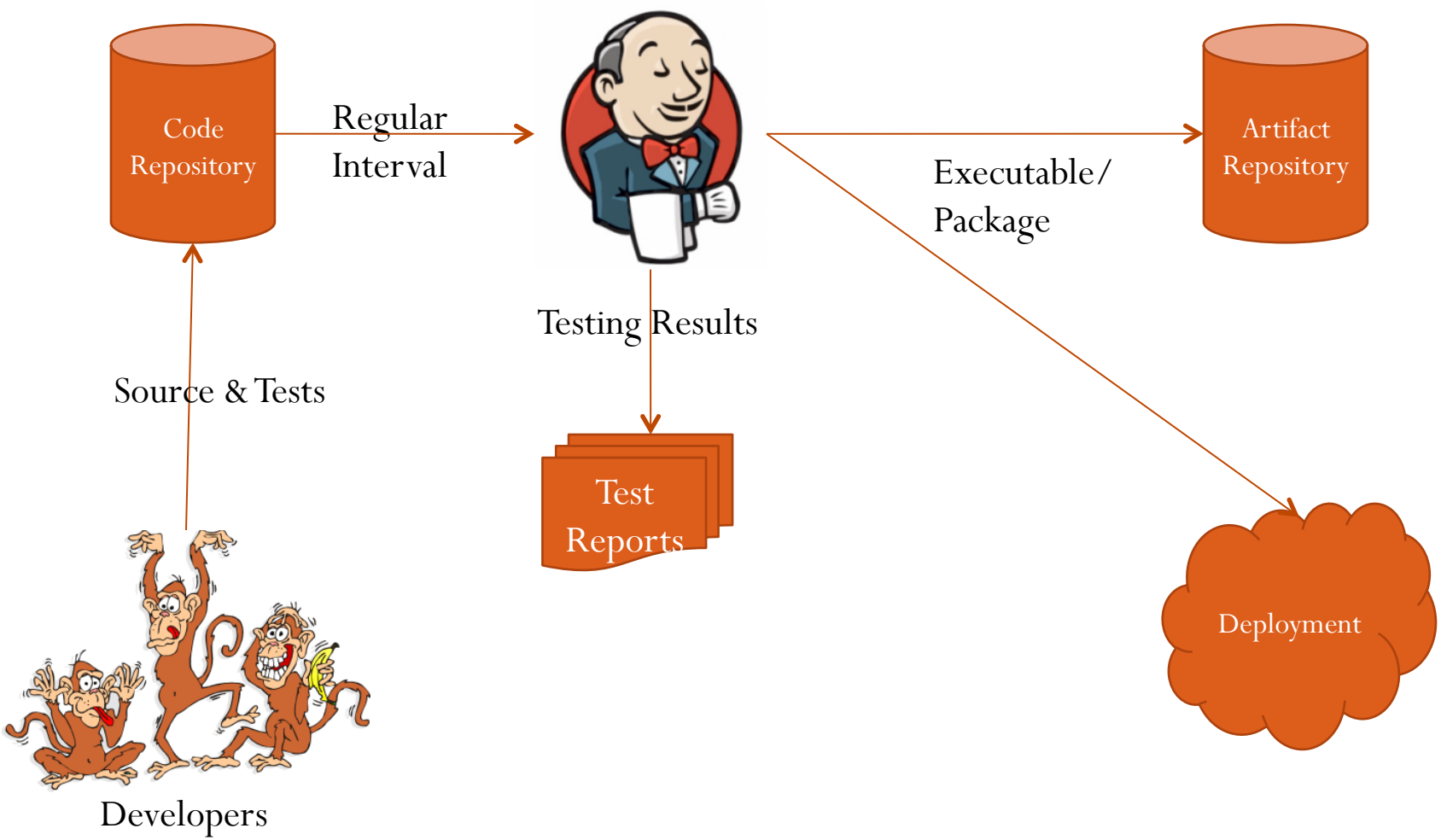
Jenkins

- Branched from Hudson
- Java based Continuous Build System
- Runs in servlet container
  - Glassfish, Tomcat
- Supported by over 400 plugins
  - SCM, Testing, Notifications, Reporting, Artifact Saving, Triggers, External Integration
- Under development since 2005
- http://jenkins-ci.org/

Jenkins - History

- 2005 - Hudson was first release by Kohsuke Kawaguchi of Sun Microsystems
- 2010 – Oracle bought Sun Microsystems
  - Due to a naming dispute, Hudson was renamed to Jenkins
  - Oracle continued development of Hudson (as a branch of the original)

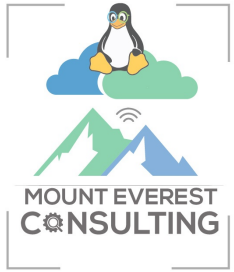
Jenkins – Fitting in



Why Jenkins? Flexibility!

- Jenkins is a highly configurable system by itself
- The additional community developed plugins provide even more flexibility
- By combining Jenkins with Ant, Gradle, or other Build Automation tools, the possibilities are limitless

Why Jenkins? Award winning!



- InfoWorld Bossies Award, 2011

- O'Reilly Open-Source Award, 2011

- ALM&SCM, SDTimes 100, 2010, 2011

- GlassFish Community Innovation Award 2008

- Duke's Choice Award 2008

Why Jenkins? Free/OSS

- Jenkins is released under the MIT License
- There is a large support community and thorough documentation
- It's easy to write plugins
- Think something is wrong with it? You can fix it!

What can Jenkins do?

- Generate test reports
- Integrate with many different Version Control Systems
- Push to various artifact repositories
- Deploys directly to production or test environments
- Notify stakeholders of build status
- …and much more

How Jenkins works - Setup

- When setting up a project in Jenkins, out of the box you have the following general options:
  - Associating with a version control server
  - Triggering builds
    - Polling, Periodic, Building based on other projects
  - Execution of shell scripts, bash scripts, Ant targets, and Maven targets
  - Artifact archival
  - Publish JUnit test results and Javadocs
  - Email notifications
- As stated earlier, plugins expand the functionality even further

How Jenkins works - Building

- Once a project is successfully created in Jenkins, all future builds are automatic
- Building
  - Jenkins executes the build in an executer
    - By default, Jenkins gives one executer per core on the build server
  - Jenkins also has the concept of slave build servers
    - Useful for building on different architectures
    - Distribution of load

How Jenkins works - Reporting

- Jenkins comes with basic reporting features
  - Keeping track of build status
    - Last success and failure
    - "Weather" – Build trend
- These can be greatly enhanced with the use of pre-build plugins
  - Unit test coverage
  - Test result trending
  - Findbugs, Checkstyle, PMD

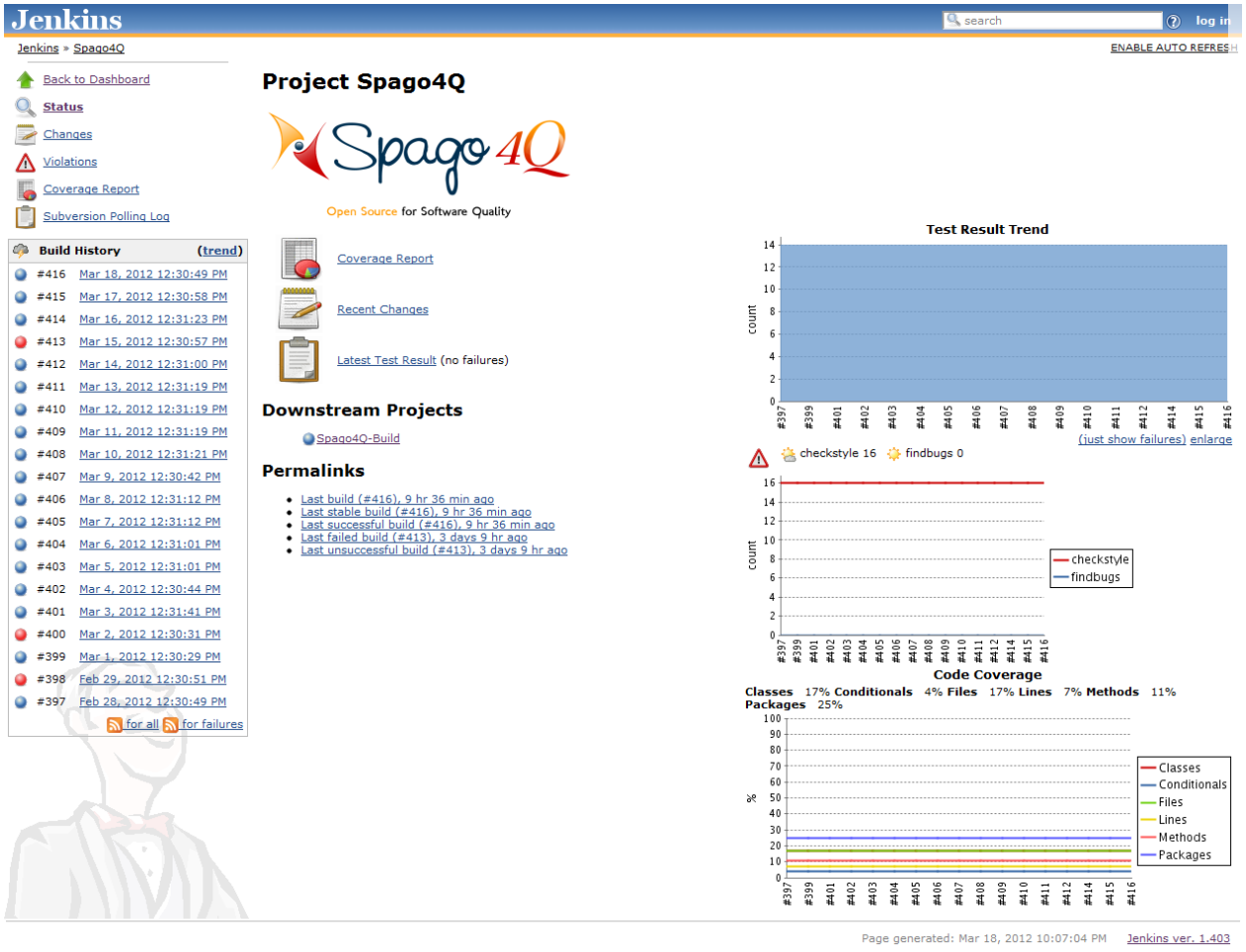
Jenkins by example – Main Page

- The main page provides a summary of the projects
- Quick view of
  - What's building ("No builds in the queue")
  - Build Executor Status (both "Idle")
  - Status of the projects

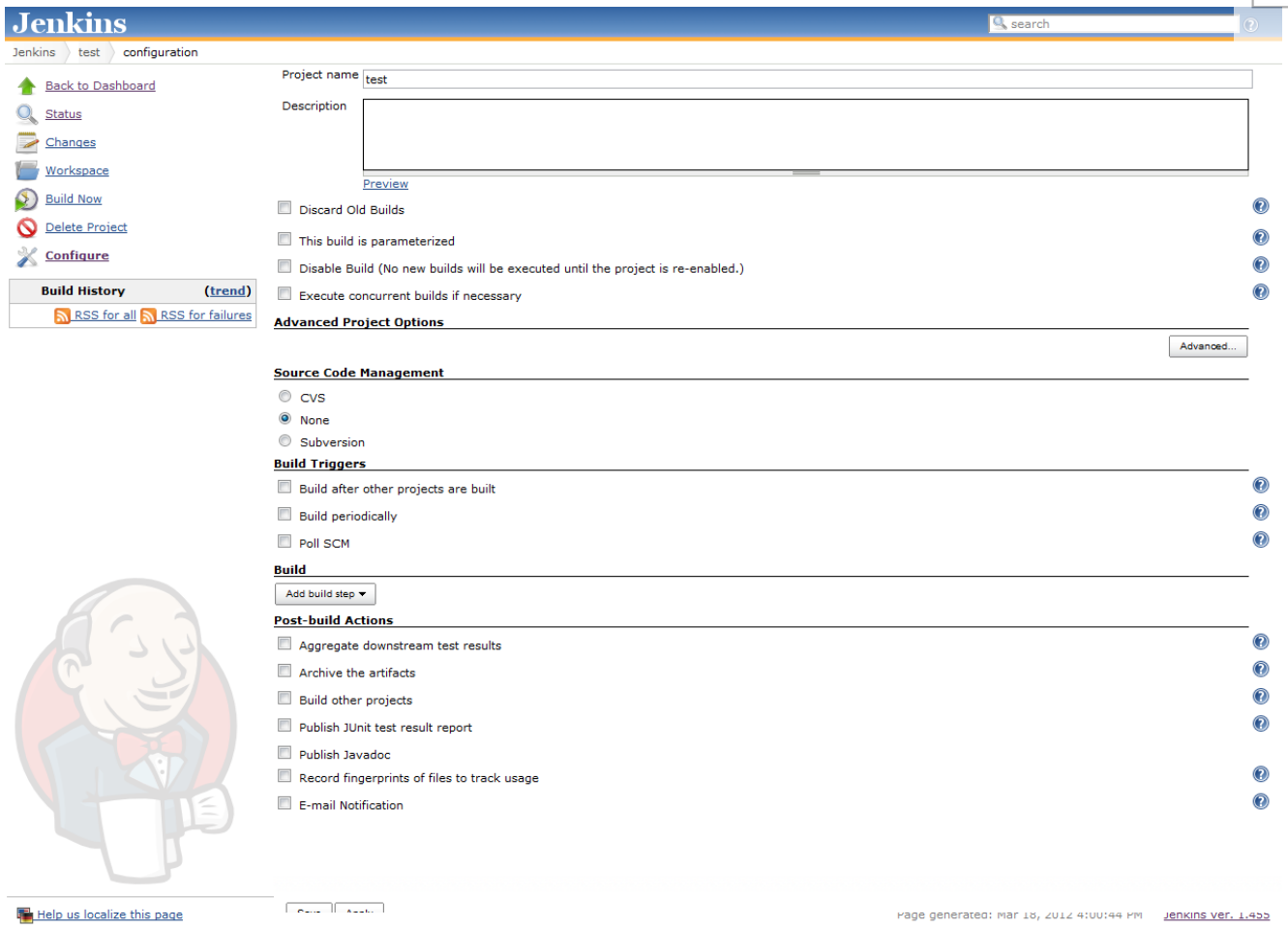
Jenkins by example – Project Status

- Project status pages provide more details about a given project
  - The status of the last several builds
  - Charting (depending on plugins)
  - Dependencies

Jenkins by example – Project Status



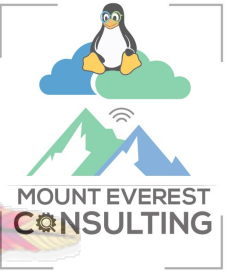
Jenkins by example – New Project



Enhancing Jenkins

- Jenkins plugin system can enable a wide range of features including (but certainly not limited to)
  - SCM
    - Mercurial, Git, Subversion
  - Testing
    - Selenium, Windmill, TestLink
  - Notifications
    - IRC, Twitter, Jabber
  - Reporting
    - Doxygen, PMD, Findbugs
  - Artifact Saving
    - Artifactory, Amazon S3, SCP
  - Triggers
    - Jabber, Directory Watchers
  - External Integration
    - GitHub, Bugzilla, JIRA
  - And most importantly – The CI Game
    - A points based game where developers compete against each other to develop the most stable, well-tested code

Who uses Jenkins?



LinkedIn

ebay

CARFAX
VEHICLE HISTORY REPORTS

NETFLIX

NASA

BOEING

mozilla
FOUNDATION

Running Jenkins yourself

- Jenkins is packaged as a WAR, so you can drop it into whichever servlet container you prefer to use
- Jenkins comes pre-packaged with a servlet if you just want a light-weight implementation
- Native/Supported packages exist for
  - Windows
  - Ubuntu/Debian
  - Redhat/Fedora/CentOS
  - Mac OSX
  - openSUSE
  - FreeBSD
  - OpenBSD
  - Solaris/OpenIndiana
  - Gentoo

Running Jenkins yourself – Updates

- Jenkins has two release lines
  - Standard releases
    - Weekly bug fixes and features
  - Long-Term Support releases
    - Updates about every 3 months
    - Uses a "Stable but older" version from the standard release line
    - Changes are limited to backported, well-tested modifications

Letting someone else run Jenkins

- There are also cloud-based solutions that can provide a Jenkins instance
  - Cloudbees - http://www.cloudbees.com/
  - ShiningPanda - https://www.shiningpanda.com/

Tying it into Agile

- For an Agile team, Jenkins provides everything needed for a robust continuous build system
- Jenkins supports Agile principles by constantly providing access to working copies of software
- Jenkins' extensibility allows the system to adapt to many different pre-existing environments

Putting it all together

- While an integral part of a CI system, Jenkins is by no means the only component
- In order for a CI system to function, a common repository for the codebase needs to exist
- A database of artifacts needs to exist, so deliveries can be made at past iterations
- The last step in a CI process is the deployment of the components built
- …and none of this matters if the developers don't use the system; procedures need to ensure the system is used as intended

Conclusion

- Continuous integration is a necessity on complex projects due to the benefits it provides regarding early detection of problems
- A good continuous build system should be flexible enough to fit into pre-existing development environments and provide all the features a team expects from such a system
- Jenkins, a continuous build system, can be an integral part of any continuous integration system due to it's core feature set and extensibility through a plugin system

References

- Continuous Integration – Martin Fowler
  - http://www.martinfowler.com/articles/continuousIntegration.html
- Hudson
  - http://hudson-ci.org/
- Hudson Continuous Integration Server
  - http://www.code-magazine.com/articleprint.aspx?quickid=0906071&printmode=true
- The Hudson Book
  - http://www.eclipse.org/hudson/the-hudson-book/book-hudson.pdf
- Jenkins
  - https://wiki.jenkins-ci.org
- Monkey Image
  - http://corrines-corner2006.blogspot.com/2011/09/freebie-monday_26.html
- What is Continuous Integration
  - http://confluence.public.thoughtworks.org/display/CCNET/What+is+Continuous+Integration