Software Testing

Continuous Integration

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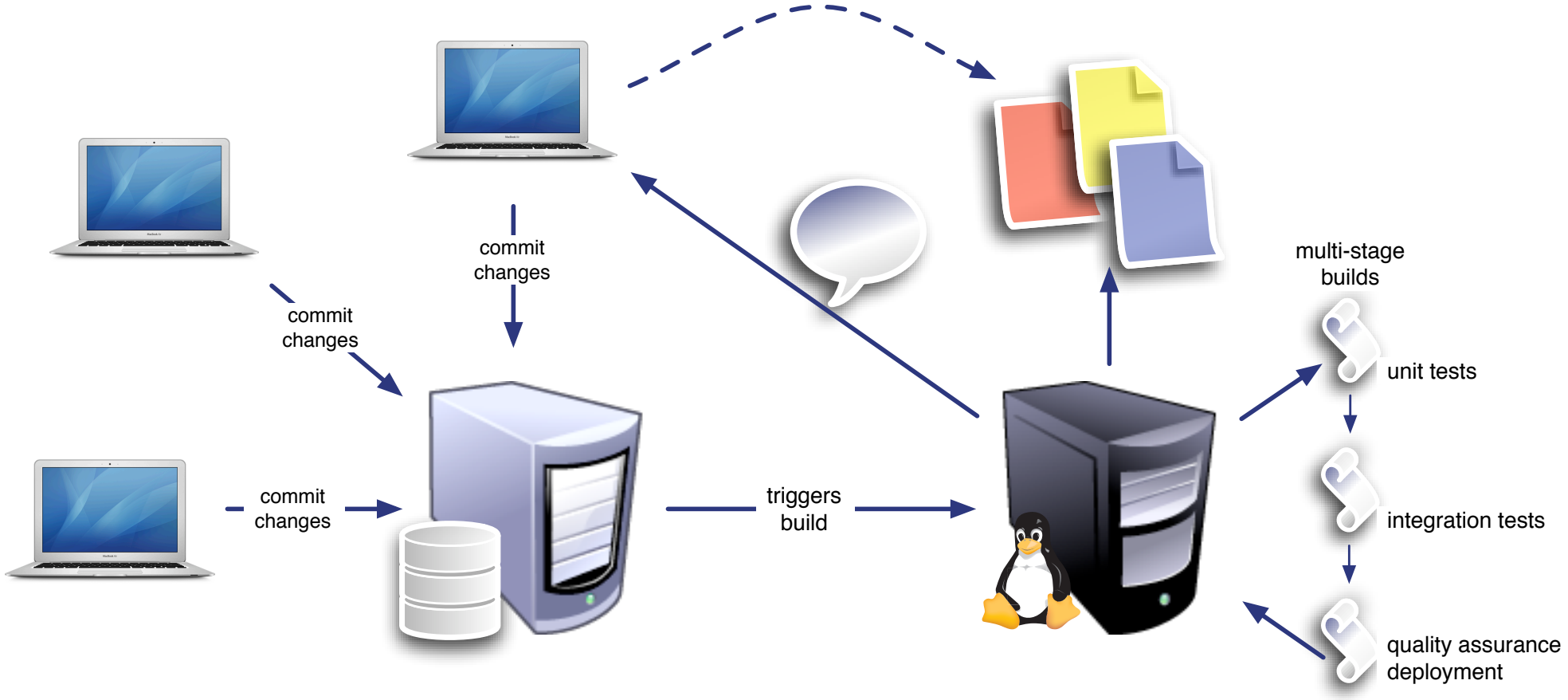
Continuous Integration - What

... 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. Many teams find that this approach leads to significantly reduced integration problems and allows a team to develop cohesive software more rapidly.

Martin Fowler, Article

Source: http://martinfowler.com/articles/continuousIntegration.html

Continuous Integration - How



Continuous Integration - How

Version control repository: CVS, Subversion, Git, Mercurial, etc.

Build tools: Ant, Maven, Make, Gant, Grails, Rake, etc.

Continuous integration environment (server): CruiseControl, Continuum, Hudson/Jenkins

Our experience

- Subversion (http://subversion.tigris.org/)
- Apache Maven (http://maven.apache.org/), Apache Ant (http://ant.apache.org/)
- Hudson/Jenkins (https://http://jenkins-ci.org/)

Continuous Integration - Why

Reduce risks

- Defects are detected when they are introduced
- Measure the health of a software
- Environment always the same and build starts clean => no assumptions

Reduce repetitive manual processes (safe time and costs)

- Process runs the same every time
- Ordered process: compile, unit tests, integration tests, qa, etc.

Generate deployable software at any time and at any place

- Going back in the build history to deploy older, maybe stable, builds

Source: Paul M. Duval. Continuous Integration. Pearson Education, Inc., 2007

Continuous Integration - Why

Enable better project visibility

- Decisions on quality improvements and tests are shown immediately
- Ability to notice trends in various quality metrics (# bugs; # checkstyle, findbugs, pmd violations; code coverage of test cases)

Establish greater confidence in the software product from the development team

- Making progress is visible and encourages developers
- Confidence increases if the increase of overall product quality is visible

Same code basis for every developer: reduces communication overhead

- Go to build #x, do you see...

Source: Paul M. Duval. Continuous Integration. Pearson Education, Inc., 2007

Build Automation - Maven

Maven is a build tool (*Maven: The Definitive Guide*)

Maven is a software project management and comprehension tool (*http://maven.apache.org*)

- Comprehension is probably a bit enthusiastic

Maven works with Project Object Models (POM files) to specify project settings (see uDoo)

Plugin architecture to include tools into the build cycle

Build Automation - Maven

Works with the principle: Convention over configuration

- `./src/main/java`
- `./src/main/resources`
- `./src/test/java`
- `./src/test/resources`
- `./target/classes`
- `./target/*` (`.jar`, reports, etc.)

Maven - Build Lifecycle

Default (only main phases)

- `compile`
- `test`
- `package`
- `integration-test`
- `verify`
- `install`
- `deploy`

`Site` (Generates web page with project infos and reports)

`Clean`

Execute: `mvn <phase>`

Maven - Build Lifecycle

Maven plugin can be hooked into a certain lifecycle phase

- Coverage measure into `verify`

```
<plugin>
    <groupId>org.codehaus.mojo</groupId>
    <artifactId>cobertura-maven-plugin</artifactId>
    <executions>
        <execution>
            <phase>verify</phase>
            <goals>
                <goal>cobertura</goal>
            </goals>
        </execution>
    </executions>
</plugin>
```

Maven - Dependency Management

Maven works with repositories where a huge number of jars are stored

Specify a dependency in the POM file

maven downloads the necessary jar file

```
<dependencies>
    <dependency>
        <groupId>junit</groupId>
        <artifactId>junit</artifactId>
        <version>4.8</version>
        <scope>test</scope>
    </dependency>
</dependencies>
```

Continuous Integration with uDoo