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Topic 6

Continuous Integration

Computer Science 2212b
Introduction to Software Engineering
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(Common) Scenario

- **Joe and Jane are working on a project**
  - They each implement a few classes
    - Code them
    - Ensure they are well tested
  - When they're done, they *integrate* them
    - *Everything breaks*

Integration Hell

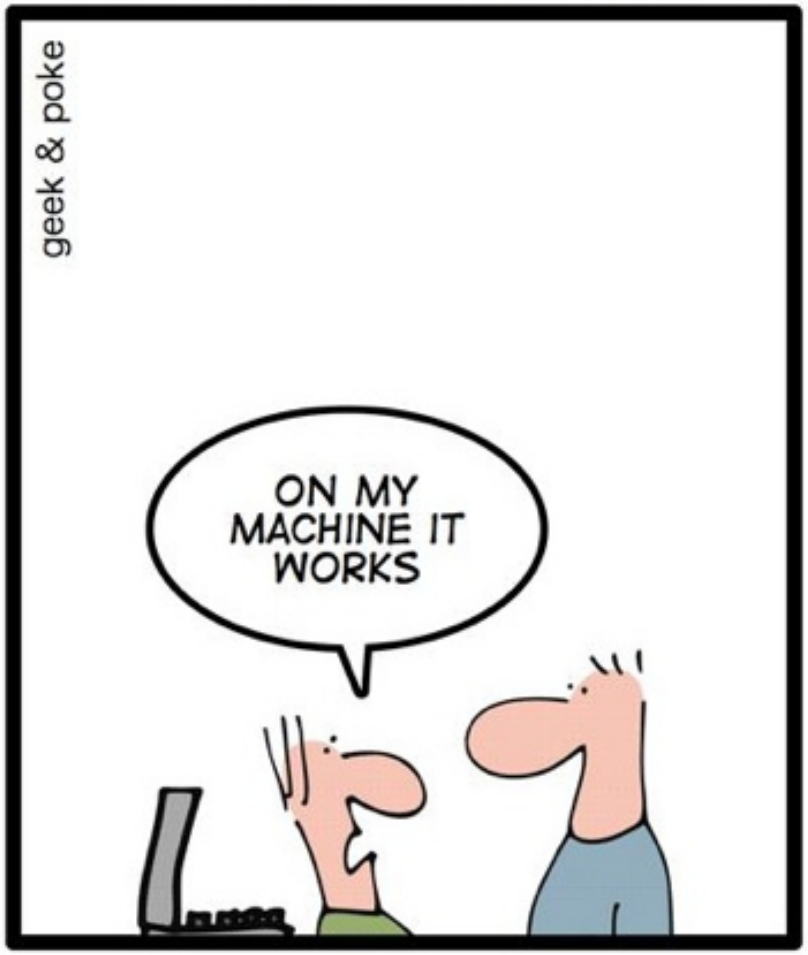
That awkward moment near the end of a project when everyone realizes that none of their classes interoperate correctly

WHEN YOU HEAR THIS:

YOU KNOW YOU'RE IN A SOFTWARE PROJECT

JUST IN CASE YOU'RE STILL NOT SURE WHETHER YOU'RE IN A SOFTWARE PROJECT

WAIT UNTIL YOU HEAR THIS:



Integration Hell

Integration Hell is extremely risky for a project

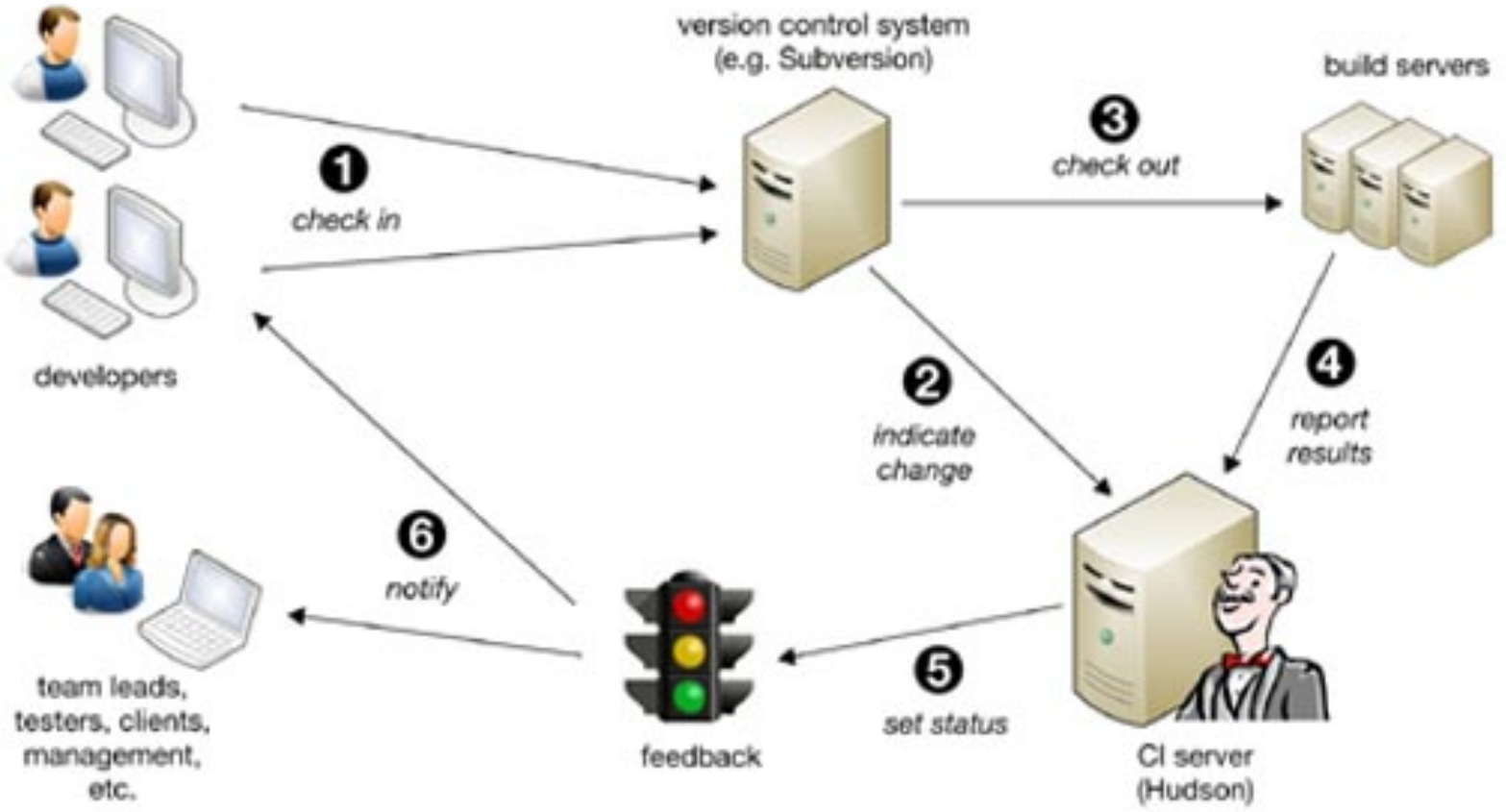
- Difficult to determine how long it will take to resolve the integration problems
  - May (vastly) exceed our budget
  - May (vastly) exceed our schedule

Continuous Integration (CI)

- Originated from eXtreme Programming (XP)
- Mitigates risks associated with integrating software
- Avoids integration hell
- Integrate ***early*** and integrate ***often***
  - i.e. on ***every change***

Continuous Integration Server

Automates the process of building, testing, reporting



Benefits of a CI Server

- **Developers might forget to run the tests**
  - Don’t break the build!
- **It might take too long to run the tests**
- **We might need to test the code in various environments**
  - Different architectures (32-bit / 64-bit Intel, ARM, PowerPC)
  - Different platforms (Windows, Linux, Mac, Solaris, HP-UX, AIX)

Benefits of a CI Server

- **Reports provide useful insights to the team**
  - Can track metrics like *line coverage*
    - Percentage of lines executed by a program's tests
  - Can run all sorts of utilities on our code
    - `checkstyle`
    - `findbugs`
    - ...
- **Can deploy automatically**
  - Deploy a web project to a *staging server*

Lab 5: Jenkins on Amazon EC2

Amazon EC2

- Amazon (yes, *that* Amazon) operates the largest public cloud in the world
- Amazon Elastic Compute Cloud (EC2)
- We can quickly create *virtual machines* (*instances*)

***Many* CI server implementations available:**

- Hudson, CruiseControl, TeamCity, Jenkins, etc.
- Jenkins is a popular, active project with many plugins
- Originally forked from Hudson after Oracle took control

Lab 5: Jenkins on Amazon EC2

Tasks

- Setup an Amazon EC2 *instance*
- Install Jenkins
- Configure Jenkins to poll a GitHub repository
  - Clone repository when changes are made
  - Build the project
  - Run the project's tests
  - Generate line coverage reports

Lab 5: Jenkins on Amazon EC2

Prerequisites

- Need an AWS account
  - I will provide you with a username/password and a special link to the AWS console.
- Need an SMTP server
  - I will provide you with an SMTP hostname, username, and password

If you are doing lab 5, please email me to request this information and I will send it to you shortly after I post the lab.

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