Using and contributing to Open Source

by Geoffrey De Smet

OptaPlanner lead

Who am I?

- Java developer (graduated in 2003)
- Founder/lead of Open Source project **OptaPlanner**
  - Customers and users around the world
  - 1k+ zip downloads per month
  - 255k lines of code
- Contributor to 23+ Open Source projects

Reusing code is better than writing it

(99% of the time)

Logo
×

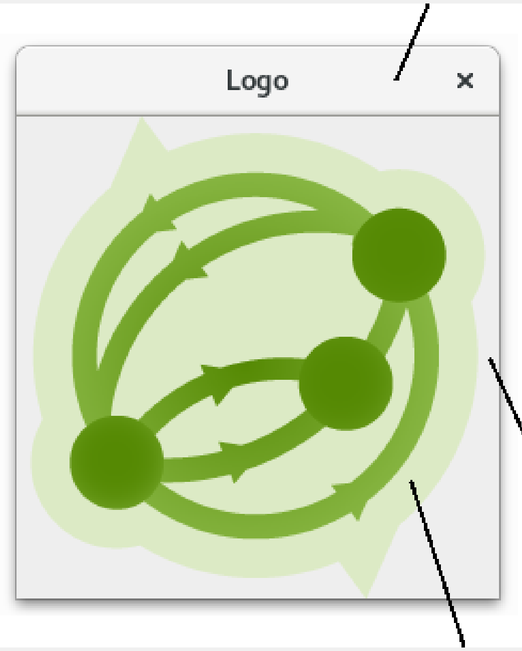
```java
import javax.swing.ImageIcon;
import javax.swing.JFrame;
import javax.swing.JLabel;

public class LogoApp extends JFrame {
    ...

    public LogoApp() {
        super("Logo");
        ImageIcon image = new ImageIcon(
                getClass().getResource("logo.png"));
        getContentPane().add(new JLabel(image));
    }

}
```

```java
import javax.swing.JFrame;
```



```java
import javax.swing.ImageIcon;
```

```java
import javax.swing.JLabel;
```

Use other people’s code

```java
import javax.swing.ImageIcon;
import javax.swing.JFrame;
import javax.swing.JLabel;
```

⇒ my dependencies

To reuse **Not to reuse (NIH)**

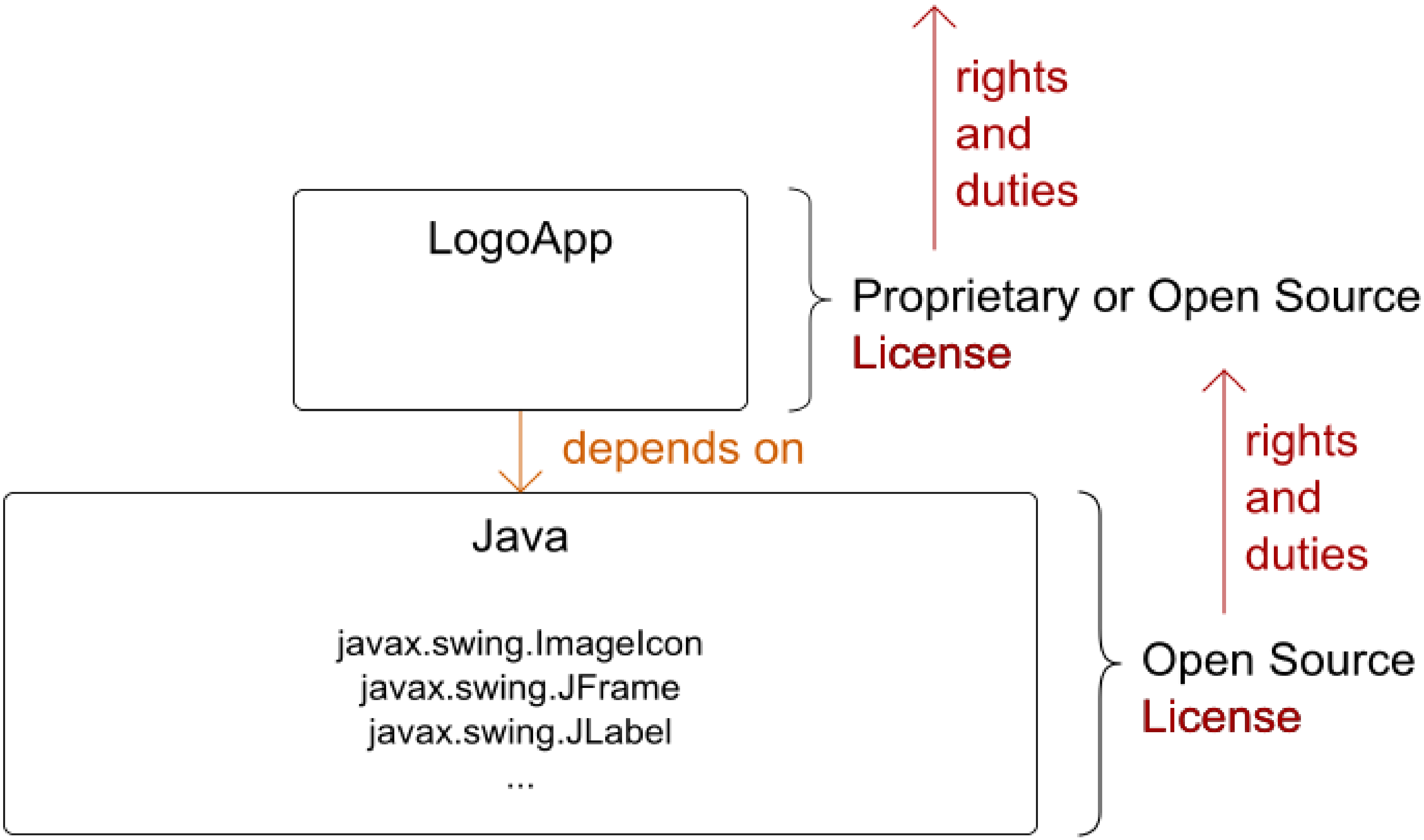
Show an image on the screen

```
import javax.swing.ImageIcon;
```

	To reuse	**Not to reuse (NIH)**
Development time	1 minute	2 years
Quality	High Written by specialists Tested by millions	Low Only PNG (no JPG) Exploits, slow, ...
Maintenance time	low (upgrades)	high (rewrites)
Dependencies?	Yes	No

An extra dependency is the lesser evil.

LogoApp depends on Java



LogoApp

depends on

Java

javax.swing.ImageIcon
javax.swing.JFrame
javax.swing.JLabel
...

rights and duties

Proprietary or Open Source **License**

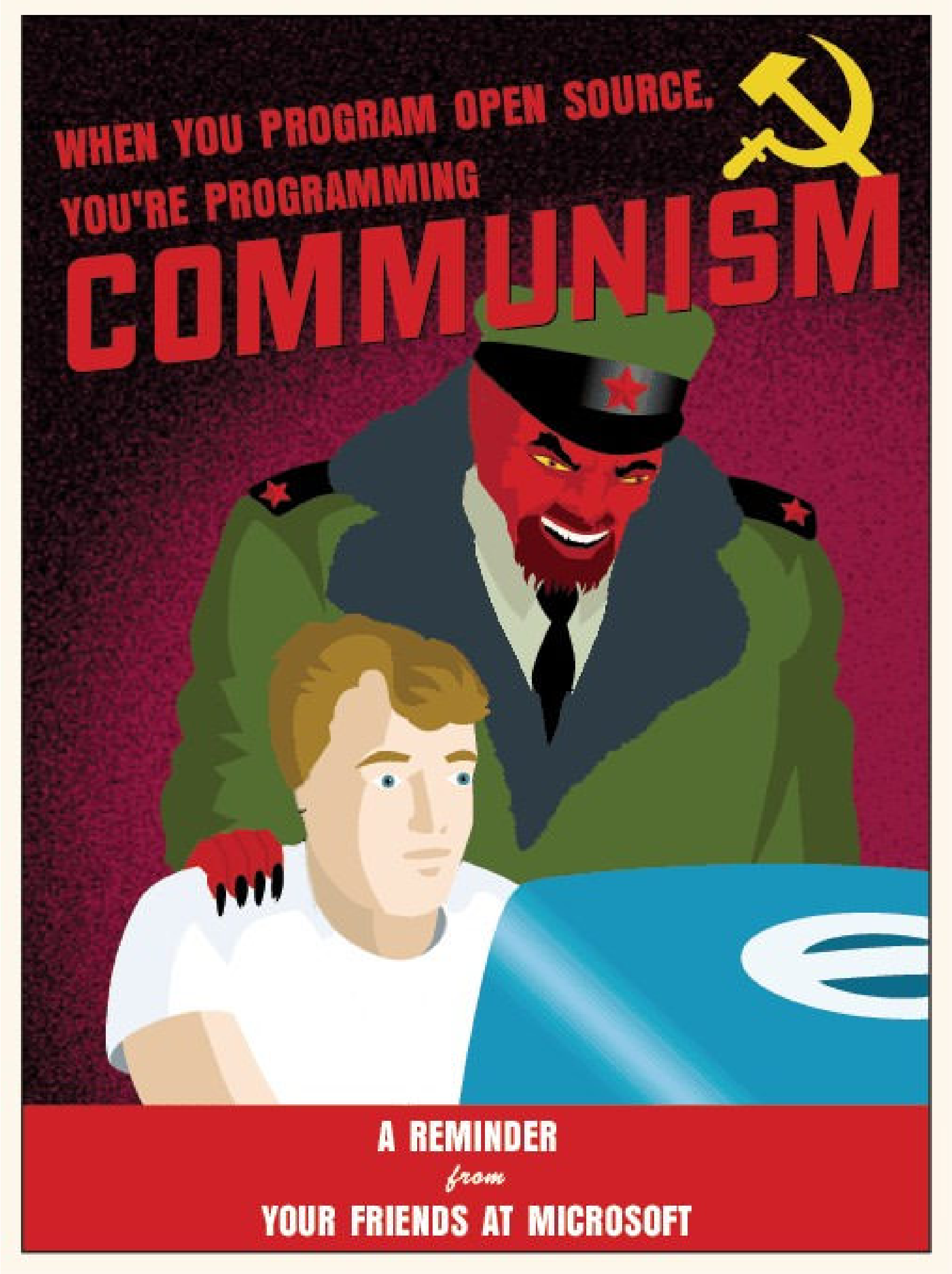
rights and duties

Open Source **License**

What is Open Source?

- Source code included
- Right to modify
- **Free redistribution**
- No fields of use restrictions
- ... (see opensource.org)

⇒ Formalized by a License


WHEN YOU PROGRAM OPEN SOURCE,
YOU'RE PROGRAMMING
COMMUNISM
A REMINDER
from
YOUR FRIENDS AT MICROSOFT

No longer the 90s

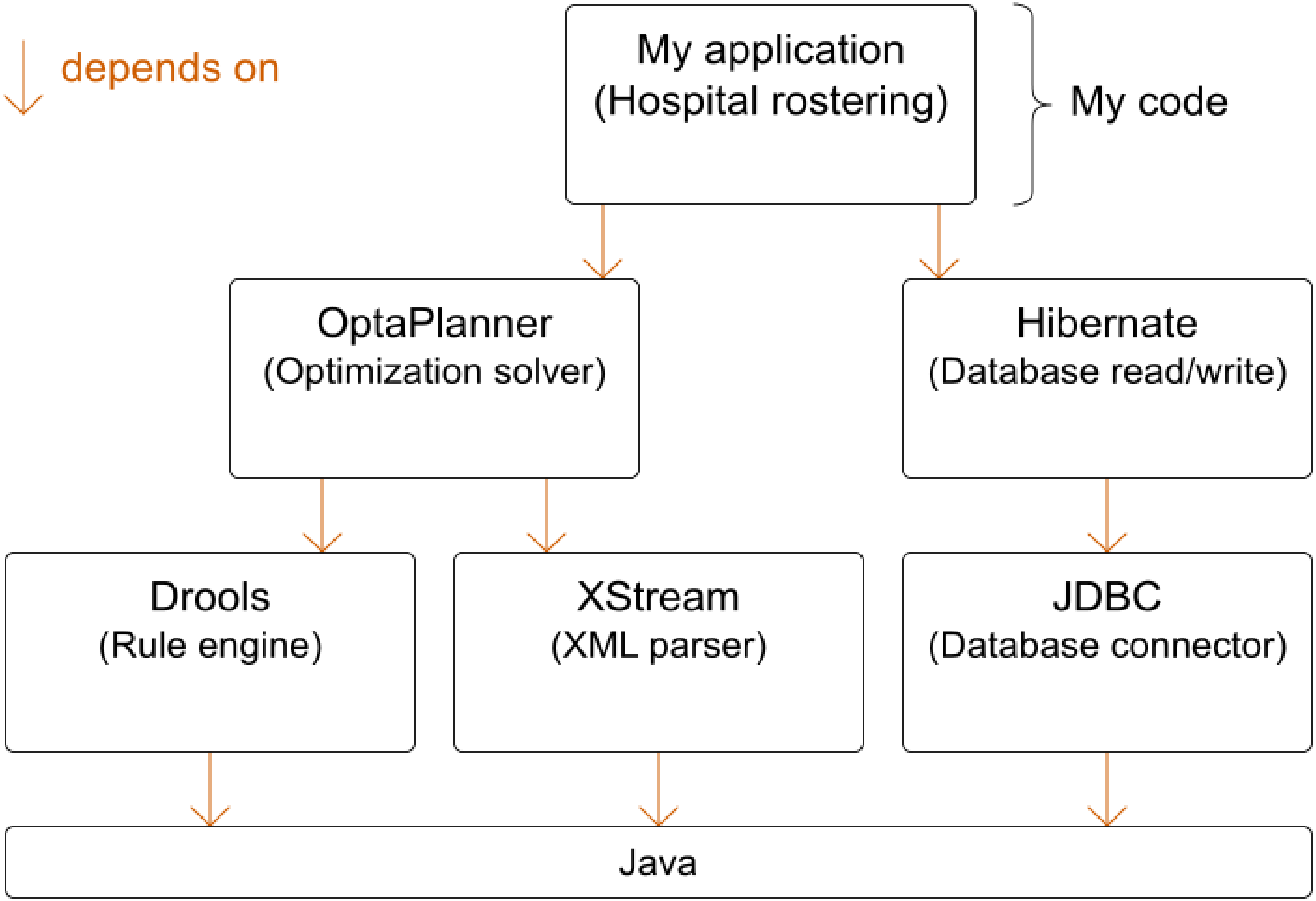
- Java is Open Source
  - http://openjdk.java.net/
- C++: GNU's GCC is Open Source
  - https://gcc.gnu.org/
- .NET Core is Open Source
  - https://github.com/Microsoft/dotnet

You're already using Open Source.

Typical web application has 100+ dependencies

and millions of imports

Dependency Tree



depends on

My application (Hospital rostering)

My code

OptaPlanner (Optimization solver)

Hibernate (Database read/write)

Drools (Rule engine)

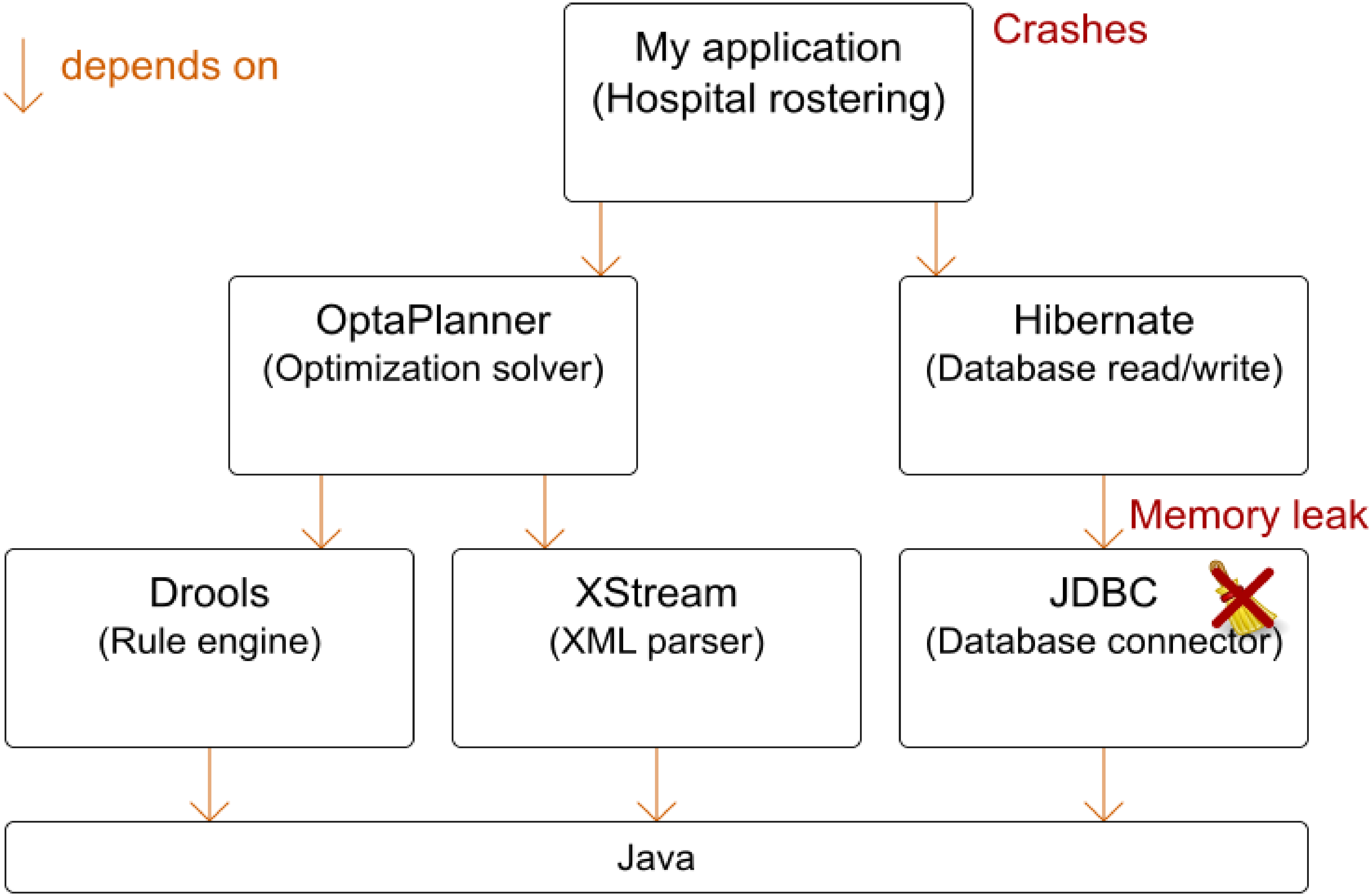
XStream (XML parser)

JDBC (Database connector)

Java

Every dependency can harm you.

Dependency Tree



depends on

My application (Hospital rostering)

Crashes

OptaPlanner (Optimization solver)

Hibernate (Database read/write)

Memory leak

Drools (Rule engine)

XStream (XML parser)

JDBC (Database connector)

Java

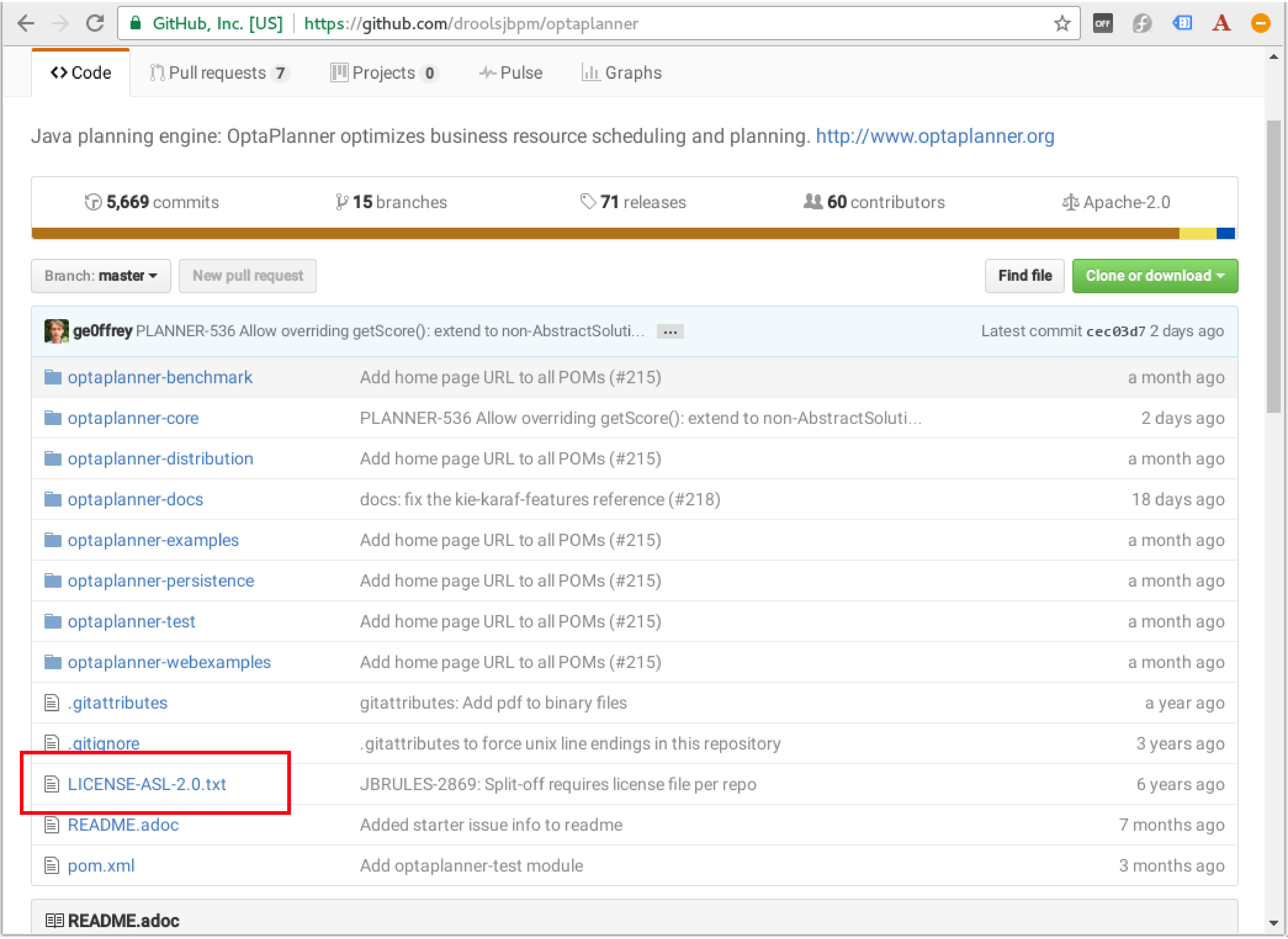
Depend only
on **mature** projects

What makes (Open Source) projects mature?

What makes (Open Source) projects mature?

1. License

IANAL



GitHub, Inc. [US] | https://github.com/droolsjbpm/optaplanner

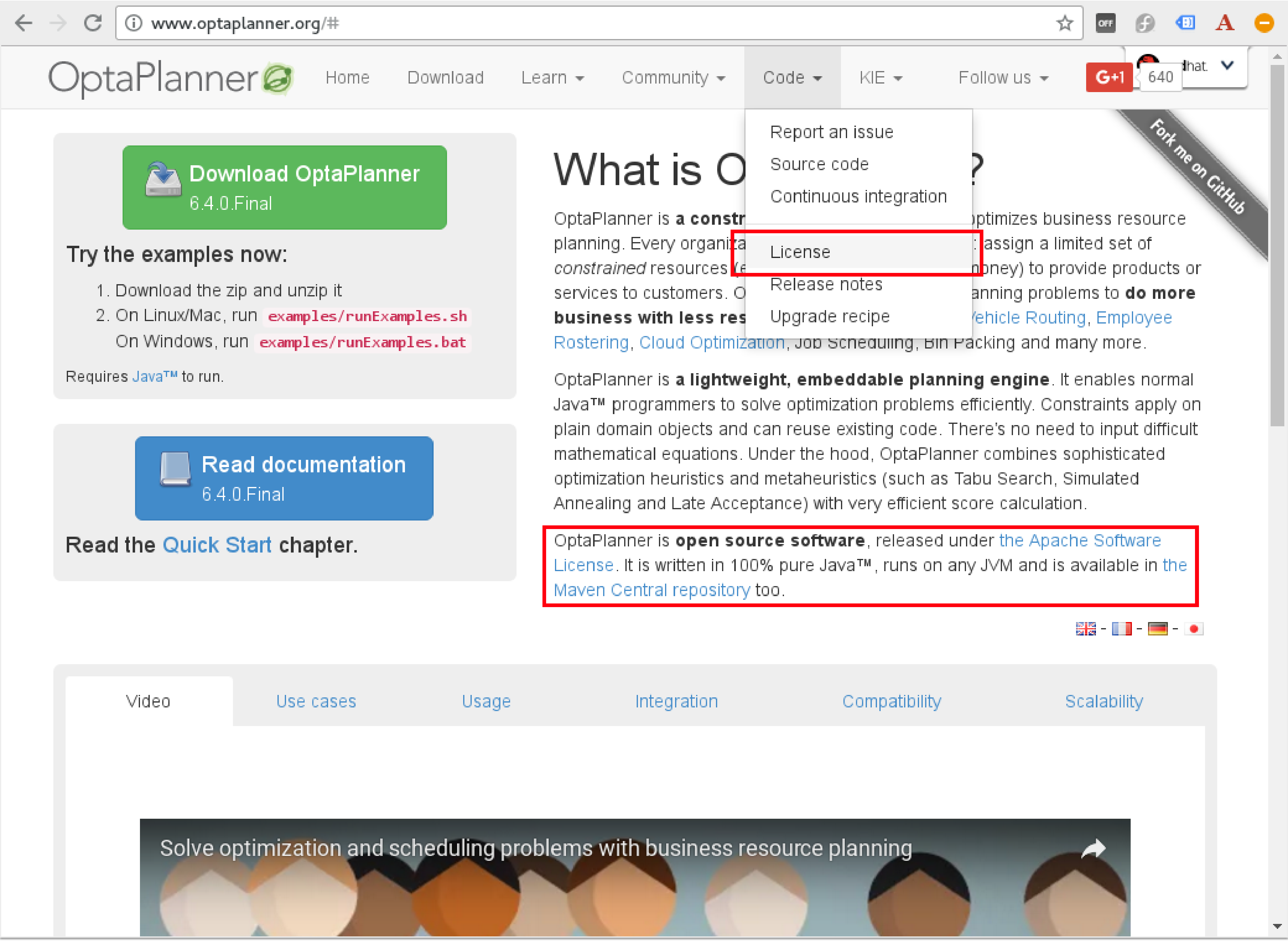
Java planning engine: OptaPlanner optimizes business resource scheduling and planning. http://www.optaplanner.org

5,669 commits | 15 branches | 71 releases | 60 contributors | Apache-2.0

ge0ffrey PLANNER-536 Allow overriding getScore(): extend to non-AbstractSoluti... … Latest commit cec03d7 2 days ago

optaplanner-benchmark	Add home page URL to all POMs (#215)	a month ago
optaplanner-core	PLANNER-536 Allow overriding getScore(): extend to non-AbstractSoluti...	2 days ago
optaplanner-distribution	Add home page URL to all POMs (#215)	a month ago
optaplanner-docs	docs: fix the kie-karaf-features reference (#218)	18 days ago
optaplanner-examples	Add home page URL to all POMs (#215)	a month ago
optaplanner-persistence	Add home page URL to all POMs (#215)	a month ago
optaplanner-test	Add home page URL to all POMs (#215)	a month ago
optaplanner-webexamples	Add home page URL to all POMs (#215)	a month ago
.gitattributes	gitattributes: Add pdf to binary files	a year ago
.gitignore	.gitattributes to force unix line endings in this repository	3 years ago
LICENSE-ASL-2.0.txt	JBRULES-2869: Split-off requires license file per repo	6 years ago
README.adoc	Added starter issue info to readme	7 months ago
pom.xml	Add optaplanner-test module	3 months ago

README.adoc



Download OptaPlanner
6.4.0.Final

Try the examples now:

1. Download the zip and unzip it
2. On Linux/Mac, run `examples/runExamples.sh`
   On Windows, run `examples/runExamples.bat`

Requires Java™ to run.

Read documentation
6.4.0.Final

Read the Quick Start chapter.

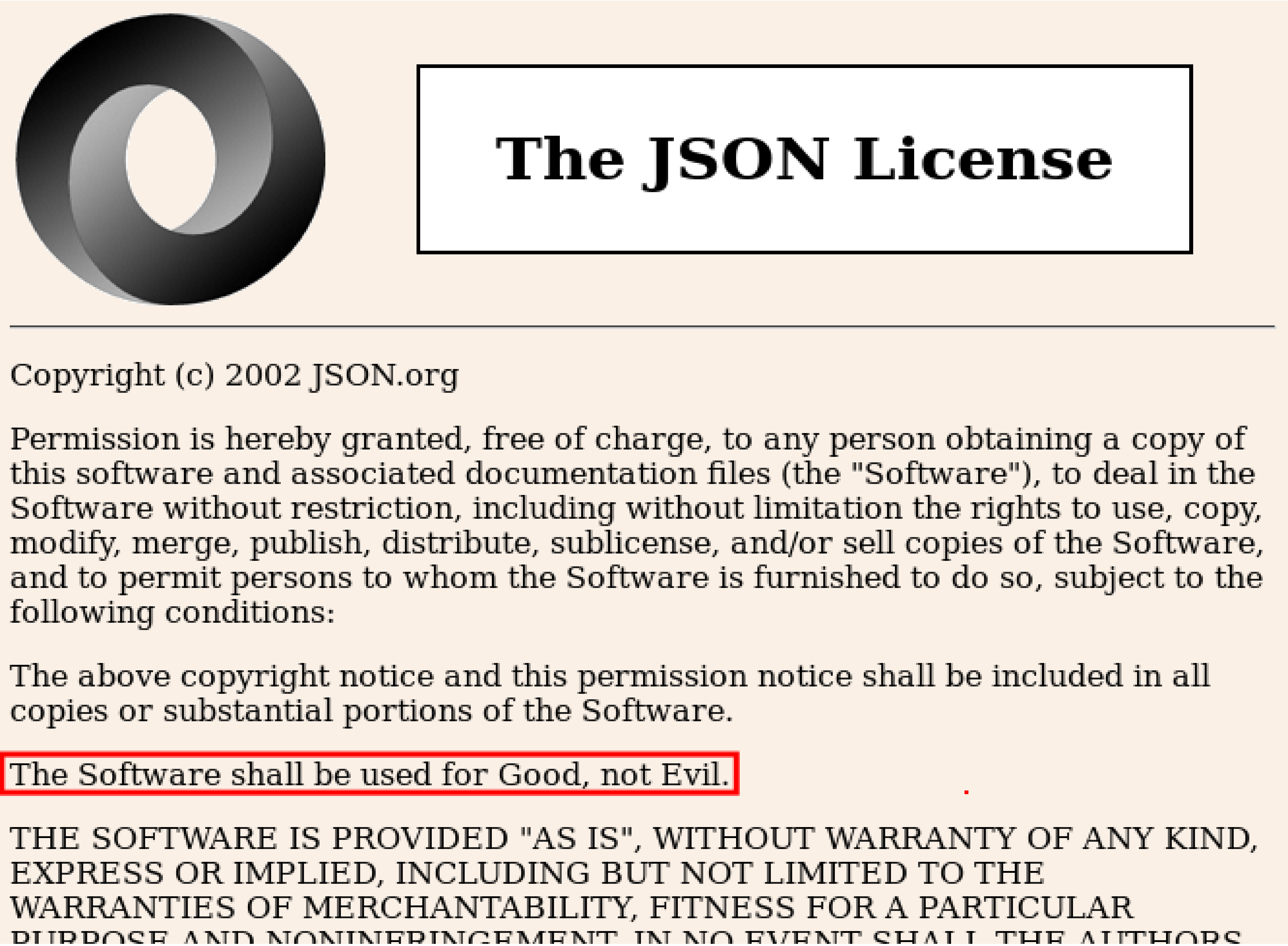
What is O ?

OptaPlanner is **a constr** ptimizes business resource planning. Every organiza assign a limited set of *constrained* resources (e oney) to provide products or services to customers. O anning problems to **do more business with less res** ehicle Routing, Employee Rostering, Cloud Optimization, Job Scheduling, Bin Packing and many more.

OptaPlanner is **a lightweight, embeddable planning engine**. It enables normal Java™ programmers to solve optimization problems efficiently. Constraints apply on plain domain objects and can reuse existing code. There's no need to input difficult mathematical equations. Under the hood, OptaPlanner combines sophisticated optimization heuristics and metaheuristics (such as Tabu Search, Simulated Annealing and Late Acceptance) with very efficient score calculation.

OptaPlanner is **open source software**, released under the Apache Software License. It is written in 100% pure Java™, runs on any JVM and is available in the Maven Central repository too.

Video
Use cases
Usage
Integration
Compatibility
Scalability
Solve optimization and scheduling problems with business resource planning



The JSON License

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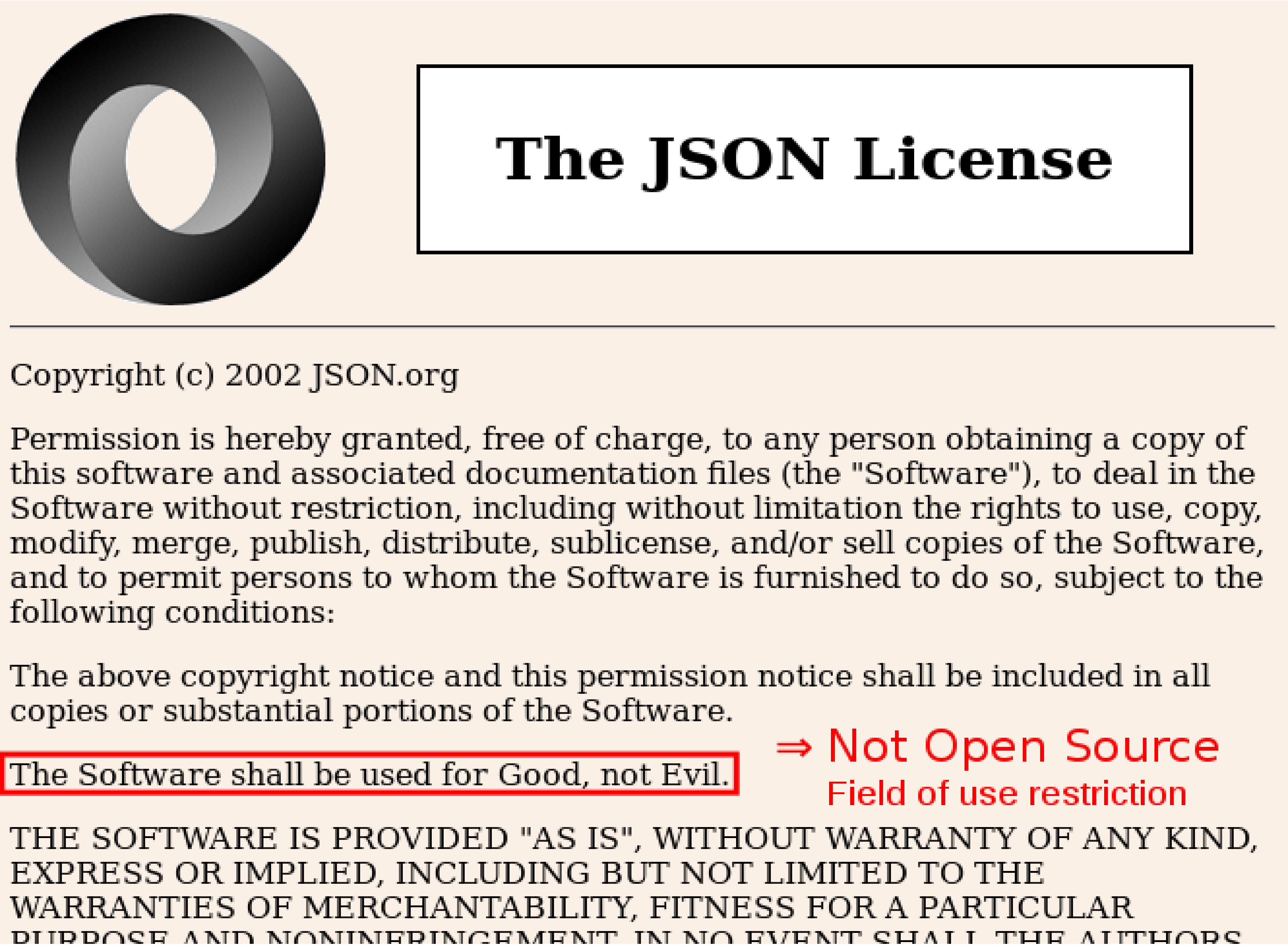

The JSON License

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The Software shall be used for Good, not Evil.

⇒ Not Open Source

Field of use restriction

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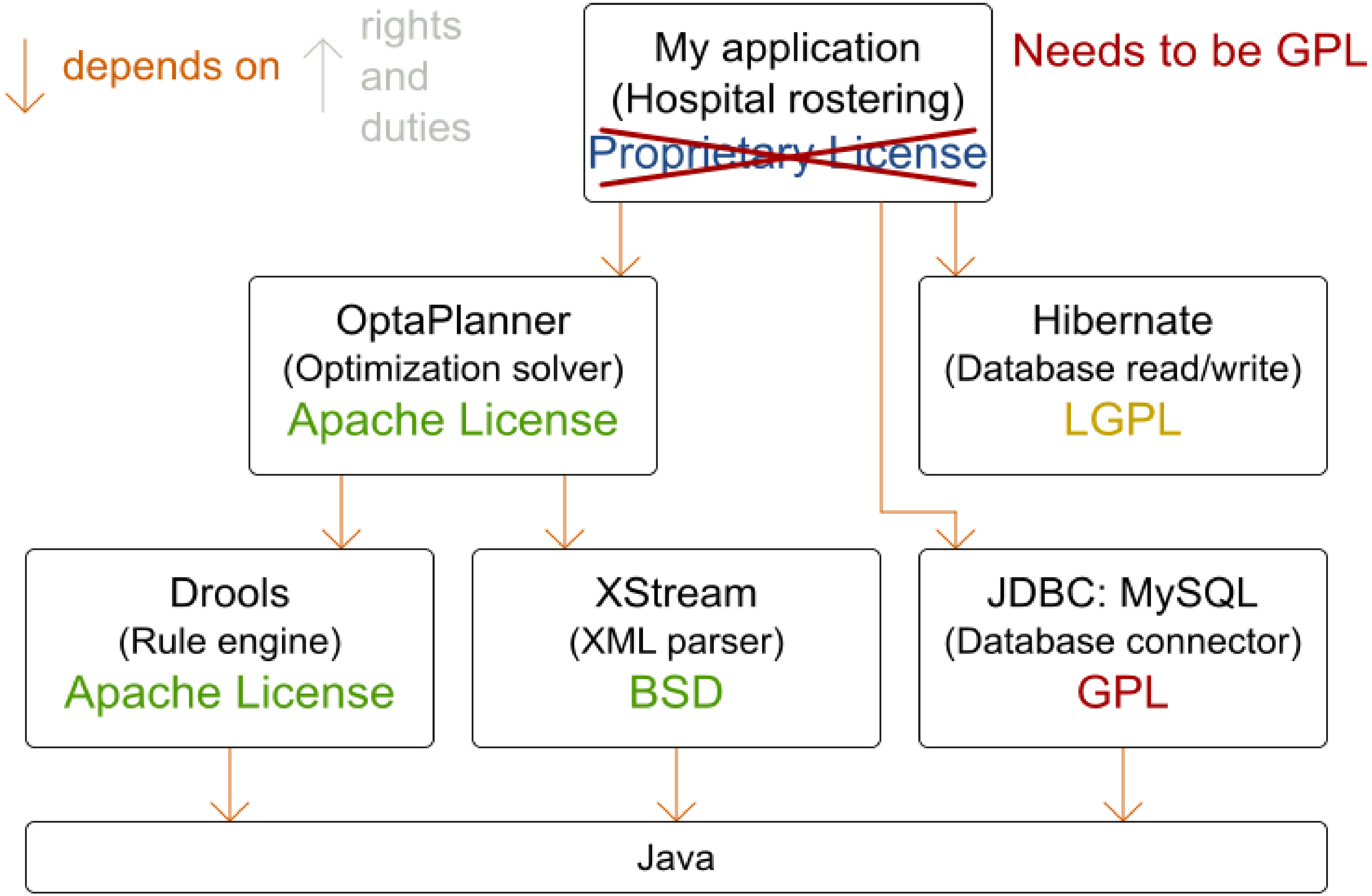
Avoid exotic licenses

Normal Open Source licenses

- MIT
- BSD
- ASL: Apache License
- MPL: Mozilla Public License
- EPL: Eclipse Public License
- LGPL: Lesser General Public License
- GPL: General Public License
- AGPL

License impact



depends on

rights and duties

My application (Hospital rostering) ~~Proprietary License~~

Needs to be GPL

OptaPlanner (Optimization solver) Apache License

Hibernate (Database read/write) LGPL

Drools (Rule engine) Apache License

XStream (XML parser) BSD

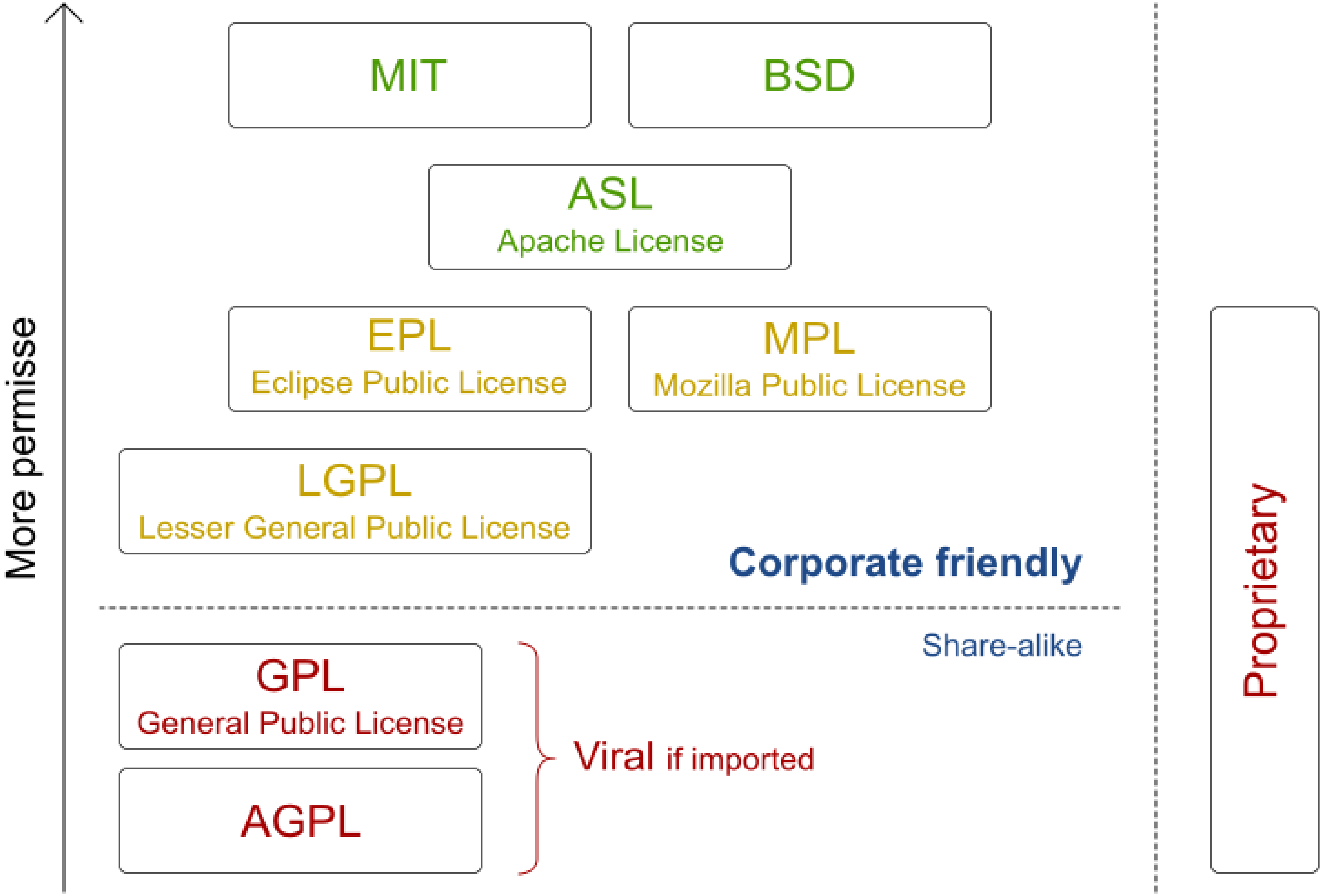
JDBC: MySQL (Database connector) GPL

Java

Make 2 lists of licenses

- Whitelist: approved by legal
- Blacklist: rejected by legal
- Other: ask legal before importing

Commercial friendliness for consumers



More permisse

MIT

BSD

ASL

Apache License

EPL

Eclipse Public License

MPL

Mozilla Public License

LGPL

Lesser General Public License

Corporate friendly

Share-alike

GPL

General Public License

AGPL

Viral if imported

Proprietary

FAQ

- Isn't OpenJDK (Java) GPL?
  - **GPL with classpath exception**
  - Does not affect normal Java code
- Isn't GCC (the C++ compiler) GPL?
  - Does not affect your compiled code

IANAL

I am not a lawyer

TINLA

This is not legal advice

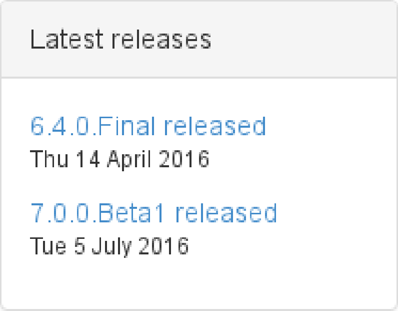
All licenses (open source or proprietary)
include legal uncertainty
until tried in court.

Red Hat includes indemnification for its customers.

What makes (Open Source) projects mature?

2. Distribution and download

Recent stable release



Latest releases

6.4.0.Final released
Thu 14 April 2016

7.0.0.Beta1 released
Tue 5 July 2016

- There is a stable release
  - Stable releases: Final, GA
  - Unstable releases: Alpha, Beta, CR, RC, Milestone
- Released in the last year
  - 8% out of 500 000 tracked open source projects (according to openhub.net in 2012)

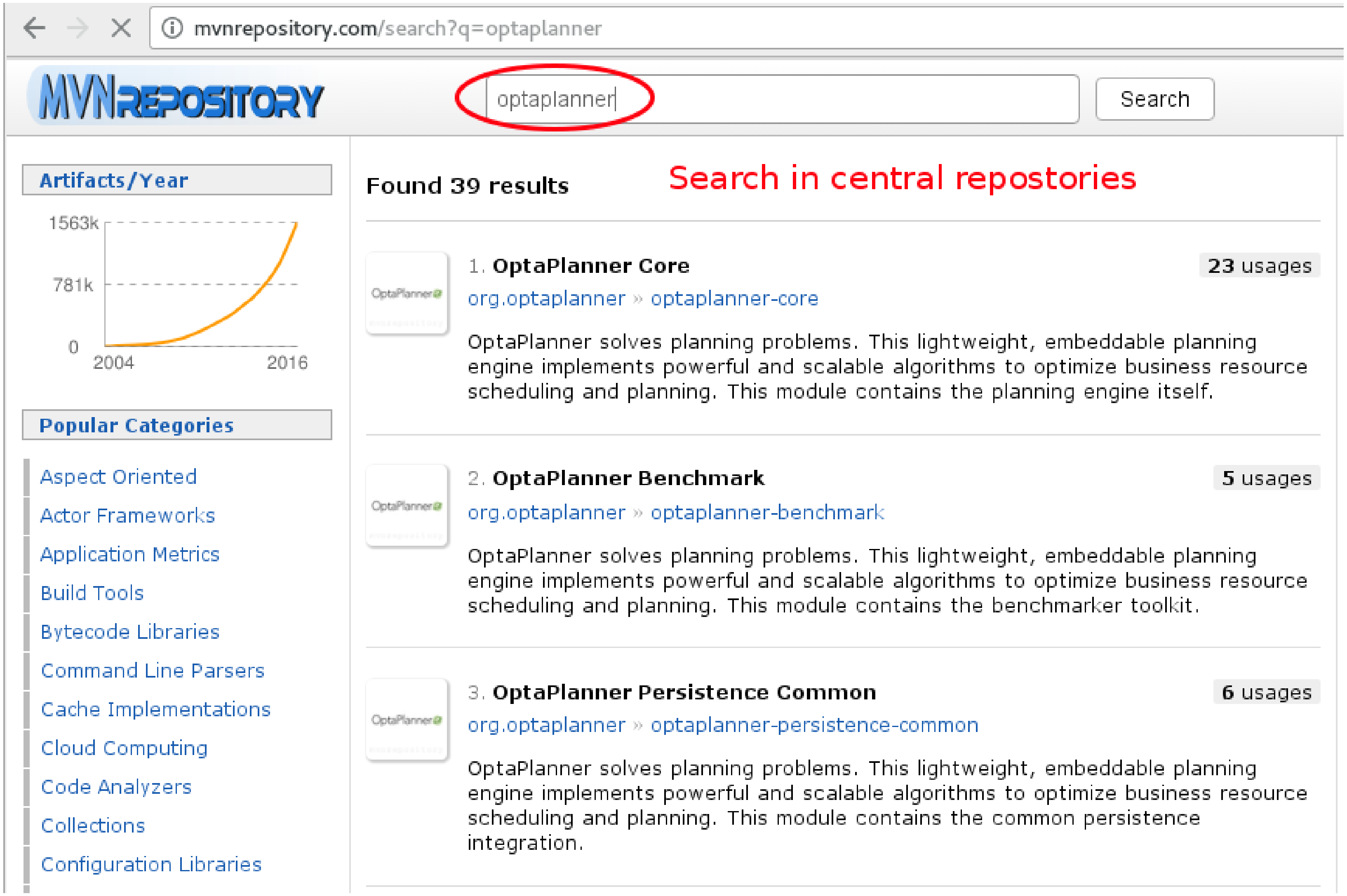
Available on central repository

- Java: in **Maven Central** repository
  - Bad name: Gradle, Ivy and Buildr use it too
- .NET: in NuGet Gallery
- Ruby: in rubygems.org

Similar to Android's Play store, IPhone's App store,
Fedora's rpm repository, Ubuntu's deb repository, ..

Easy to consume updates (bugfixes, ...)

search.maven.org / mvnrepository.com



Found 39 results

Search in central repostories

1. **OptaPlanner Core** — 23 usages
org.optaplanner » optaplanner-core
OptaPlanner solves planning problems. This lightweight, embeddable planning engine implements powerful and scalable algorithms to optimize business resource scheduling and planning. This module contains the planning engine itself.

2. **OptaPlanner Benchmark** — 5 usages
org.optaplanner » optaplanner-benchmark
OptaPlanner solves planning problems. This lightweight, embeddable planning engine implements powerful and scalable algorithms to optimize business resource scheduling and planning. This module contains the benchmarker toolkit.

3. **OptaPlanner Persistence Common** — 6 usages
org.optaplanner » optaplanner-persistence-common
OptaPlanner solves planning problems. This lightweight, embeddable planning engine implements powerful and scalable algorithms to optimize business resource scheduling and planning. This module contains the common persistence integration.

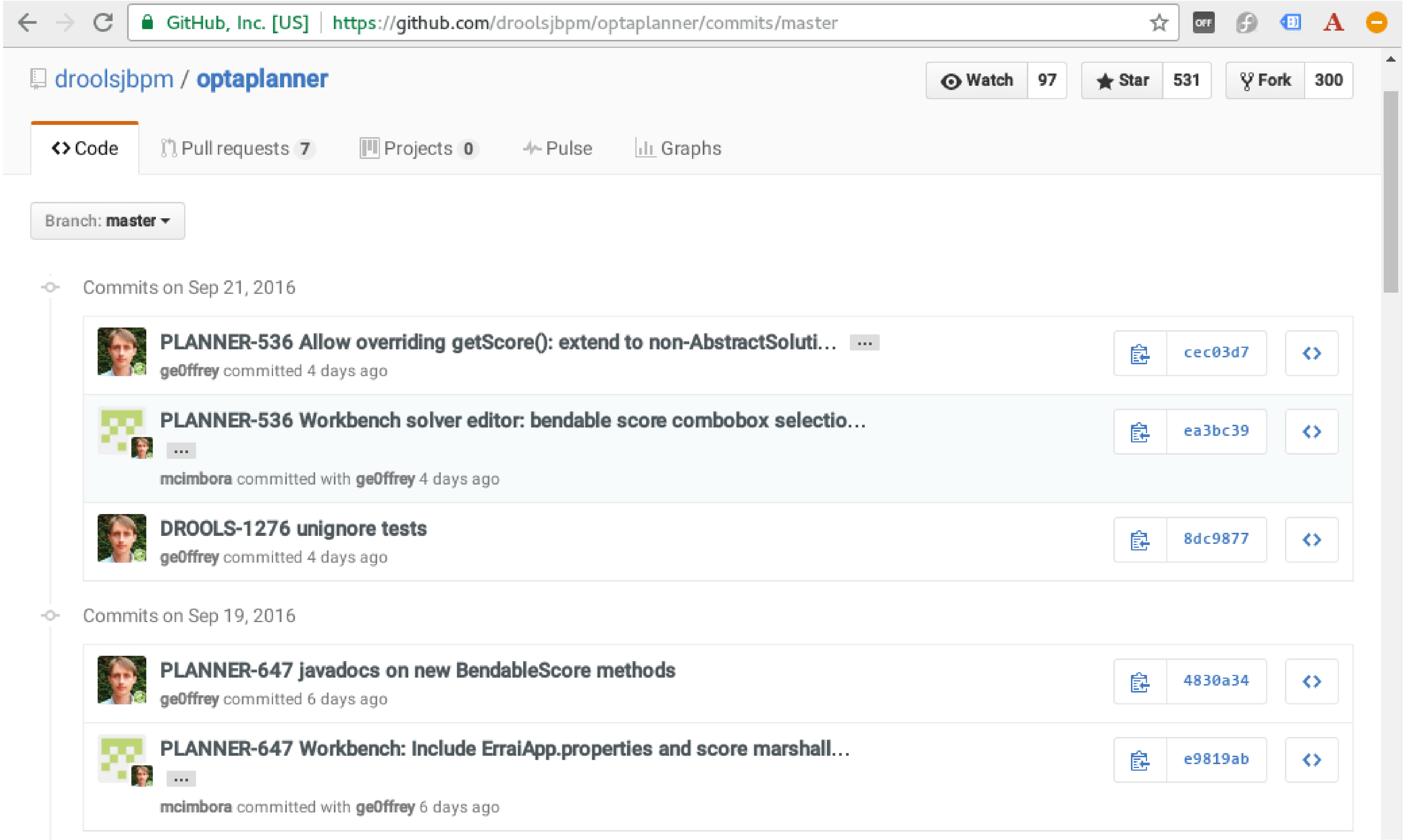
What makes (Open Source) projects mature?

3. Source control

Source Control

- Stored in
  - Git
  - Mercurial
  - Subversion
    - Fork unfriendly ⇒ collaboration unfriendly
- Hosted on
  - **GitHub.com** (10m+ repositories)
  - Bitbucket.org
  - GitLab.com
  - SourceForge.net

GitHub commit history



Commits on Sep 21, 2016

PLANNER-536 Allow overriding getScore(): extend to non-AbstractSoluti… …
ge0ffrey committed 4 days ago
cec03d7

PLANNER-536 Workbench solver editor: bendable score combobox selectio… …
mcimbora committed with ge0ffrey 4 days ago
ea3bc39

DROOLS-1276 unignore tests
ge0ffrey committed 4 days ago
8dc9877

Commits on Sep 19, 2016

PLANNER-647 javadocs on new BendableScore methods
ge0ffrey committed 6 days ago
4830a34

PLANNER-647 Workbench: Include ErraiApp.properties and score marshall… …
mcimbora committed with ge0ffrey 6 days ago
e9819ab

Easy to build from source

```
$ git clone https://github.com/droolsjbpm/optaplanner.git
...
$ cd optaplanner
$ mvn clean install -DskipTests
...
```

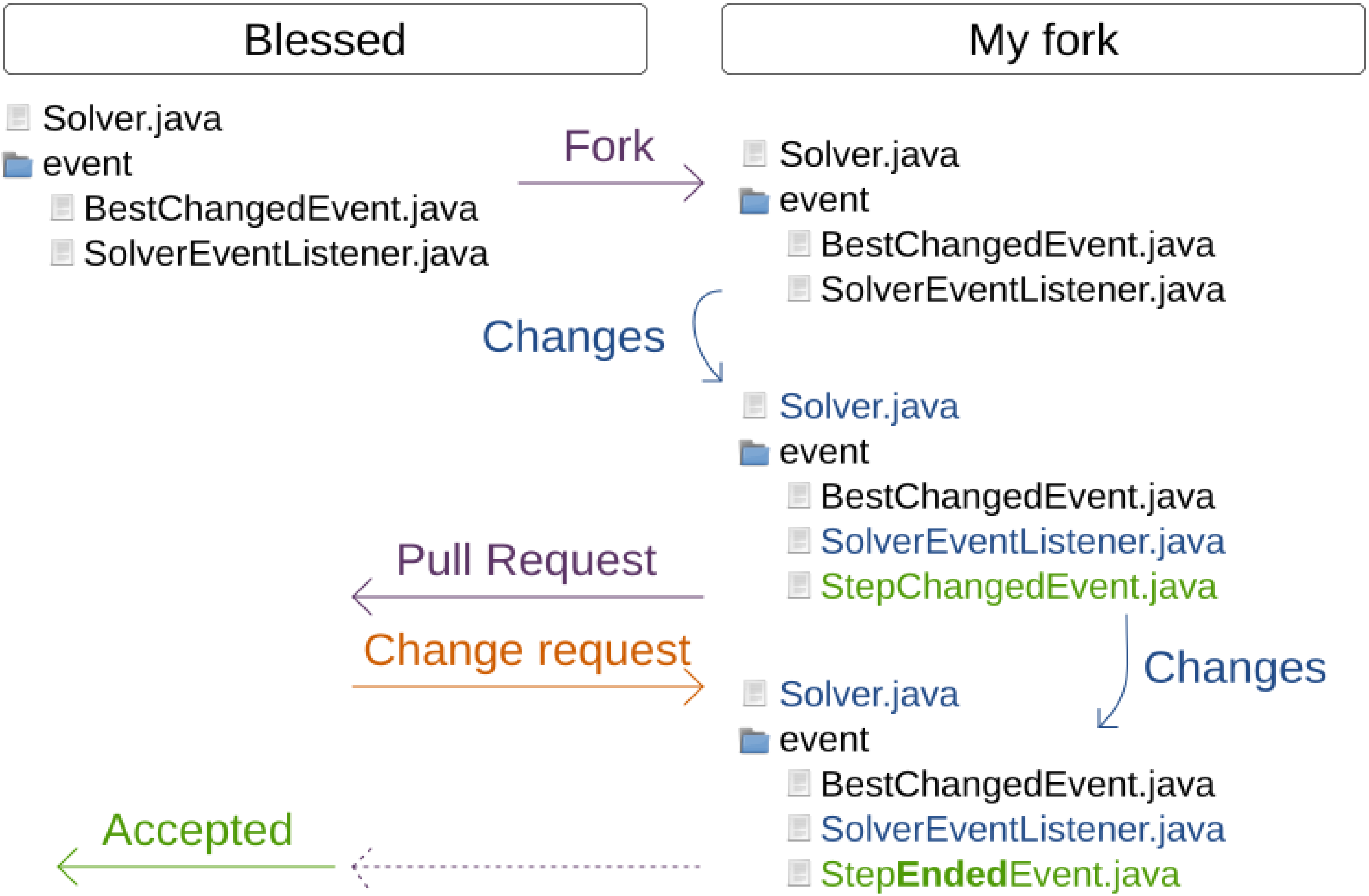
Why share your modifications?

- Feedback/review from project committers
- Reduce maintenance if accepted
    - Fixed in all future releases
    - No need to pull upstream changes (no merge conflicts)

How do you share your modifications?

- Patch file (diff)
  - Goes stale
  - No review support
- **Pull Request**
  - Send Pull Request
  - Committers review it
    - Fix any review comments
  - Committers merge it in *blessed*

Contribution workflow



Blessed

My fork

Solver.java
event
BestChangedEvent.java
SolverEventListener.java

Fork

Solver.java
event
BestChangedEvent.java
SolverEventListener.java

Changes

Solver.java
event
BestChangedEvent.java
SolverEventListener.java
StepChangedEvent.java

Pull Request

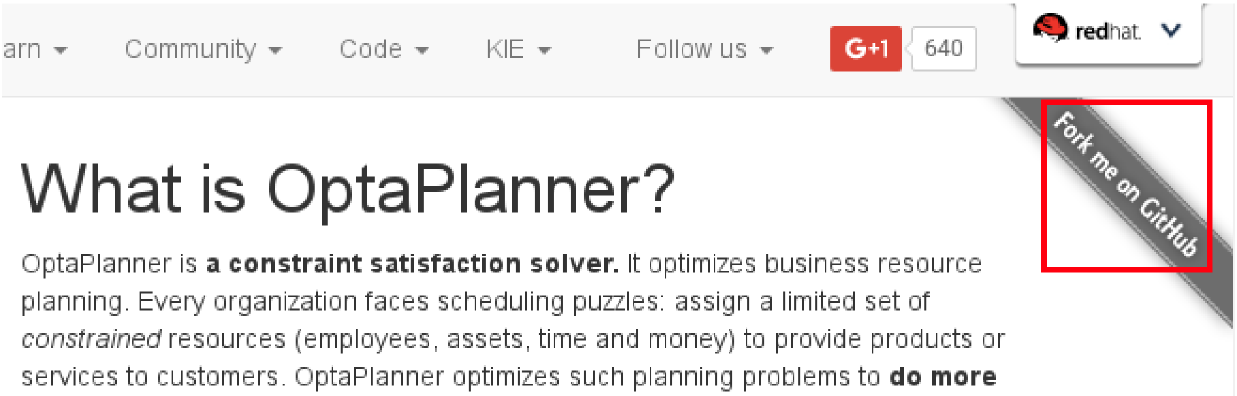
Change request

Changes

Solver.java
event
BestChangedEvent.java
SolverEventListener.java
Step**Ended**Event.java

Accepted

Fork it!



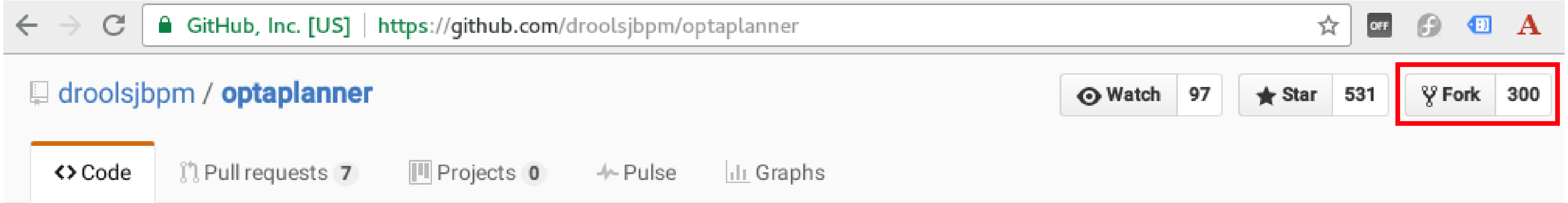
What is OptaPlanner?

OptaPlanner is **a constraint satisfaction solver.** It optimizes business resource planning. Every organization faces scheduling puzzles: assign a limited set of *constrained* resources (employees, assets, time and money) to provide products or services to customers. OptaPlanner optimizes such planning problems to **do more**

My fork = my personal sandbox

Easy to fork

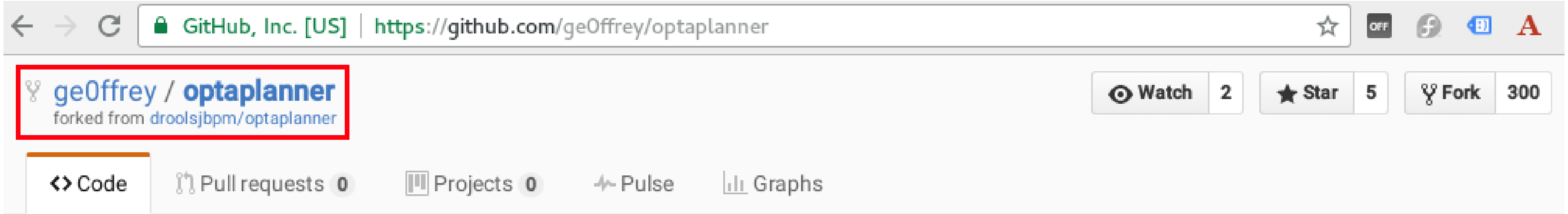
Blessed (official releases):



GitHub, Inc. [US] | https://github.com/droolsjbpm/optaplanner

droolsjbpm / optaplanner

My fork:



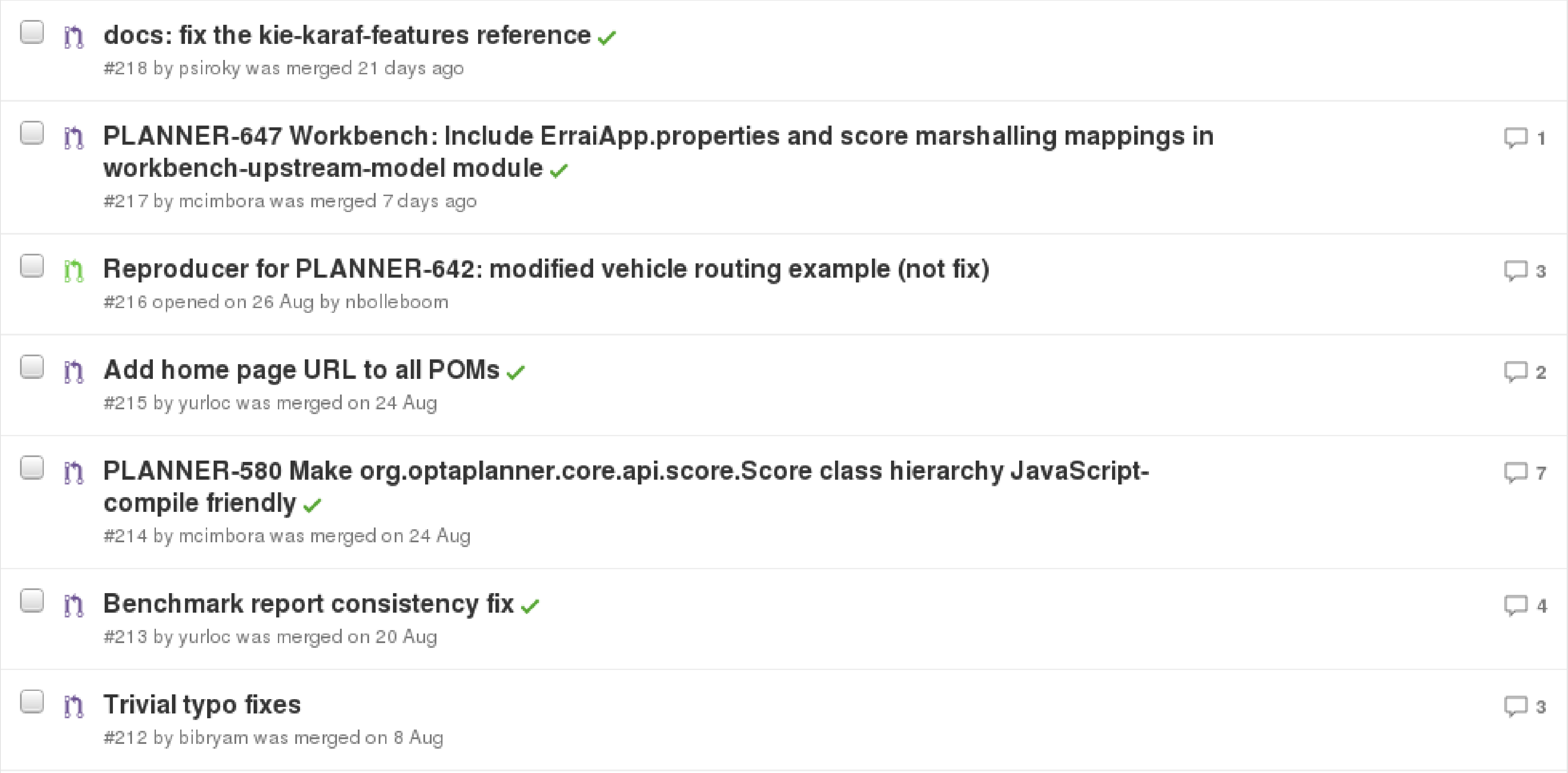
GitHub, Inc. [US] | https://github.com/ge0ffrey/optaplanner

ge0ffrey / optaplanner
forked from droolsjbpm/optaplanner

My changes do *not* affect *blessed*.

Easy to pull upstream changes from *blessed*.

List of Pull Requests



□ **docs: fix the kie-karaf-features reference** ✓
#218 by psiroky was merged 21 days ago

□ **PLANNER-647 Workbench: Include ErraiApp.properties and score marshalling mappings in workbench-upstream-model module** ✓ — 💬 1
#217 by mcimbora was merged 7 days ago

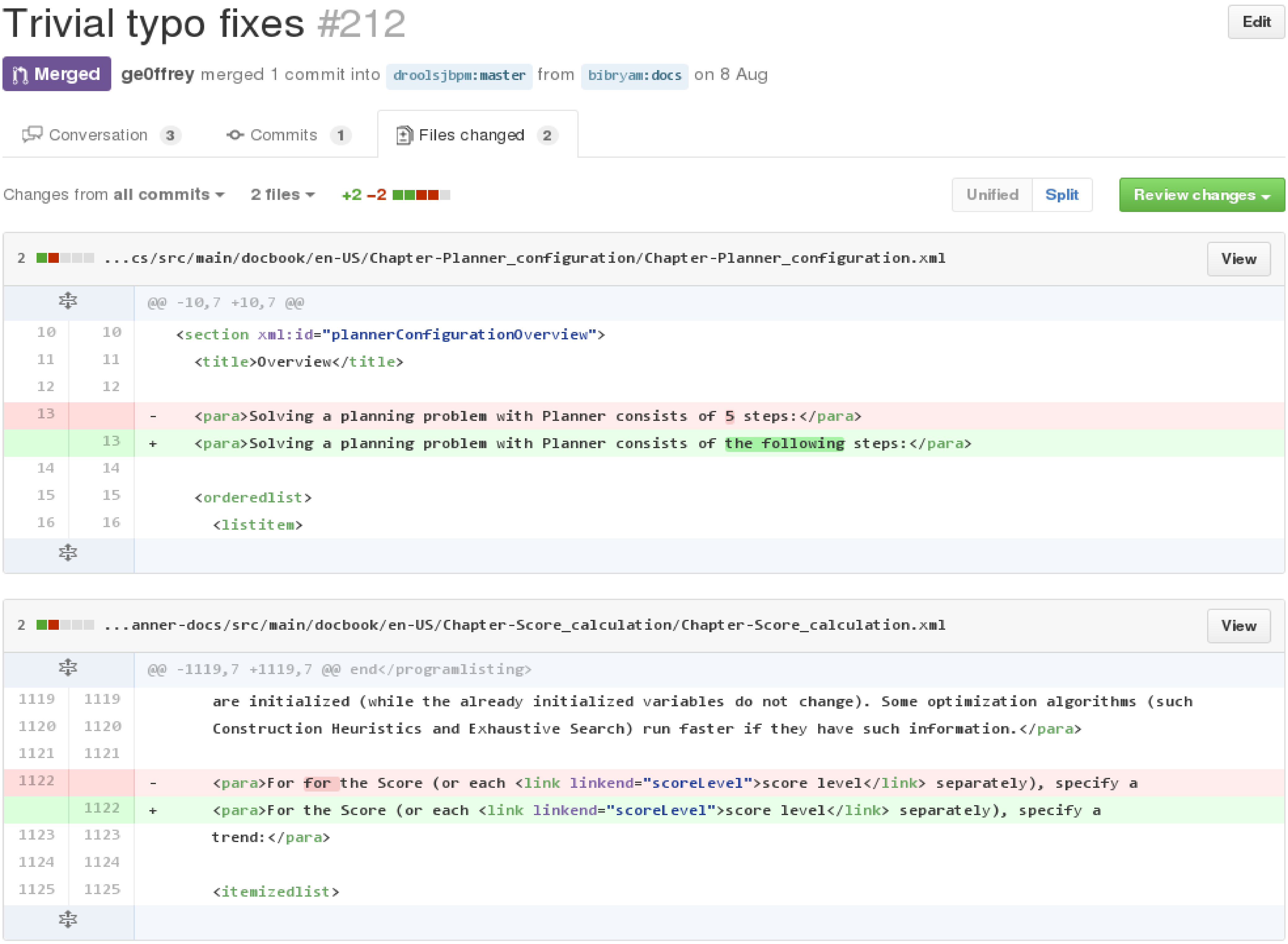
□ **Reproducer for PLANNER-642: modified vehicle routing example (not fix)** — 💬 3
#216 opened on 26 Aug by nbolleboom

□ **Add home page URL to all POMs** ✓ — 💬 2
#215 by yurloc was merged on 24 Aug

□ **PLANNER-580 Make org.optaplanner.core.api.score.Score class hierarchy JavaScript-compile friendly** ✓ — 💬 7
#214 by mcimbora was merged on 24 Aug

□ **Benchmark report consistency fix** ✓ — 💬 4
#213 by yurloc was merged on 20 Aug

□ **Trivial typo fixes** — 💬 3
#212 by bibryam was merged on 8 Aug



Trivial typo fixes #212

Merged ge0ffrey merged 1 commit into droolsjbpm:master from bibryam:docs on 8 Aug

Changes from all commits 2 files +2 −2

2 ...cs/src/main/docbook/en-US/Chapter-Planner_configuration/Chapter-Planner_configuration.xml

```
@@ -10,7 +10,7 @@
    <section xml:id="plannerConfigurationOverview">
      <title>Overview</title>

-     <para>Solving a planning problem with Planner consists of 5 steps:</para>
+     <para>Solving a planning problem with Planner consists of the following steps:</para>

      <orderedlist>
        <listitem>
```

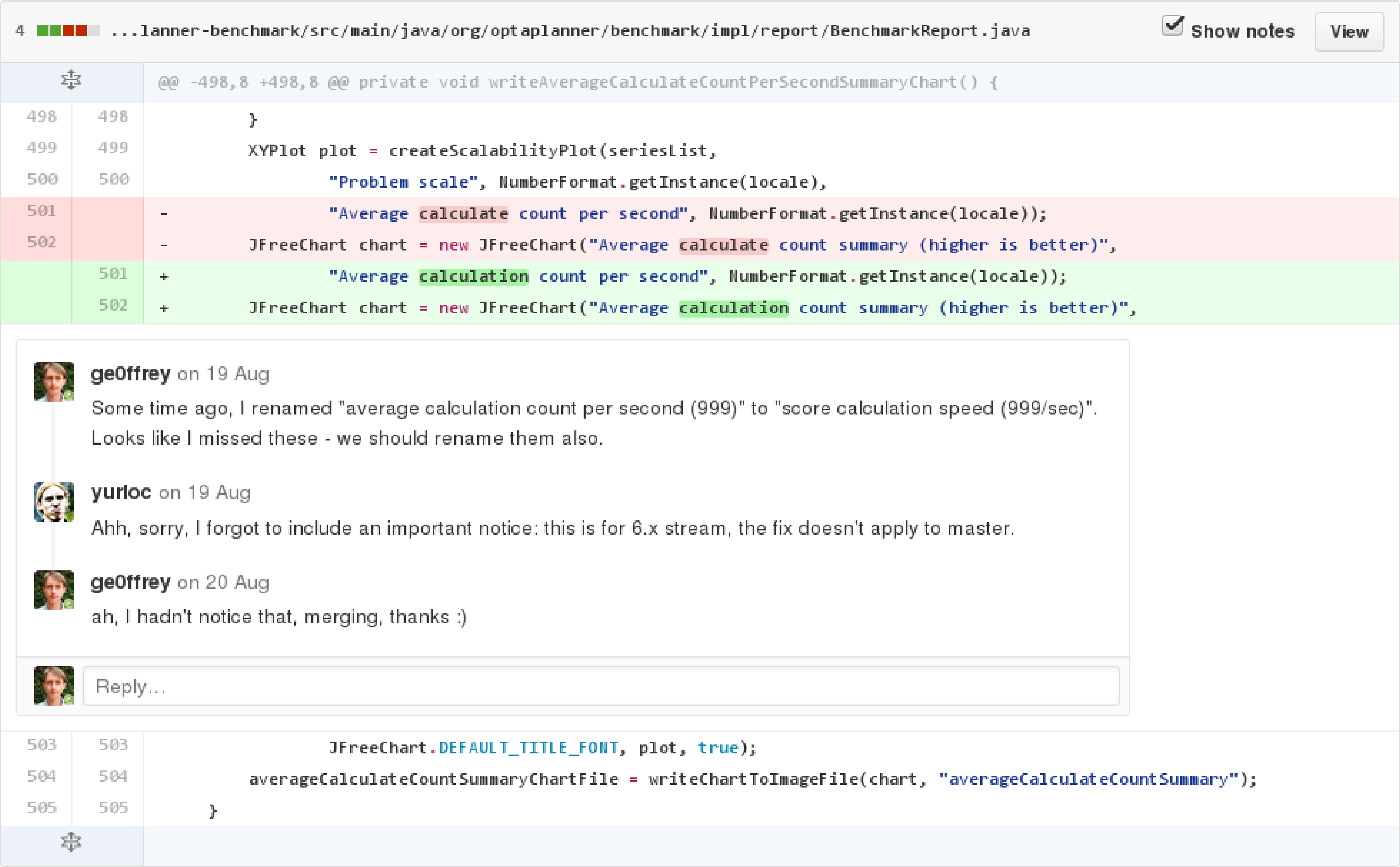
2 ...anner-docs/src/main/docbook/en-US/Chapter-Score_calculation/Chapter-Score_calculation.xml

```
@@ -1119,7 +1119,7 @@ end</programlisting>
        are initialized (while the already initialized variables do not change). Some optimization algorithms (such
        Construction Heuristics and Exhaustive Search) run faster if they have such information.</para>

-       <para>For for the Score (or each <link linkend="scoreLevel">score level</link> separately), specify a
+       <para>For the Score (or each <link linkend="scoreLevel">score level</link> separately), specify a
        trend:</para>

        <itemizedlist>
```

Review



...lanner-benchmark/src/main/java/org/optaplanner/benchmark/impl/report/BenchmarkReport.java

```
@@ -498,8 +498,8 @@ private void writeAverageCalculateCountPerSecondSummaryChart() {
         }
         XYPlot plot = createScalabilityPlot(seriesList,
                 "Problem scale", NumberFormat.getInstance(locale),
-                "Average calculate count per second", NumberFormat.getInstance(locale));
-        JFreeChart chart = new JFreeChart("Average calculate count summary (higher is better)",
+                "Average calculation count per second", NumberFormat.getInstance(locale));
+        JFreeChart chart = new JFreeChart("Average calculation count summary (higher is better)",
```

ge0ffrey on 19 Aug

Some time ago, I renamed "average calculation count per second (999)" to "score calculation speed (999/sec)". Looks like I missed these - we should rename them also.

yurloc on 19 Aug

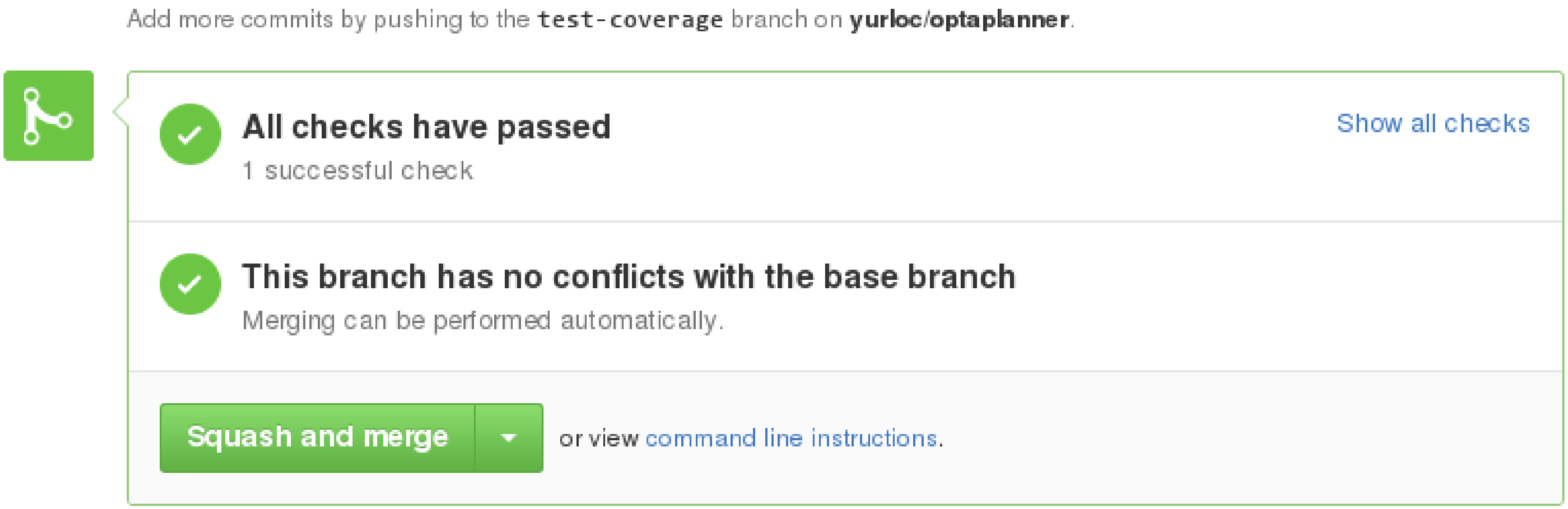
Ahh, sorry, I forgot to include an important notice: this is for 6.x stream, the fix doesn't apply to master.

ge0ffrey on 20 Aug

ah, I hadn't notice that, merging, thanks :)

```
                 JFreeChart.DEFAULT_TITLE_FONT, plot, true);
         averageCalculateCountSummaryChartFile = writeChartToImageFile(chart, "averageCalculateCountSummary");
     }
```

Merge a Pull Request



Add more commits by pushing to the `test-coverage` branch on **yurloc/optaplanner**.

All checks have passed

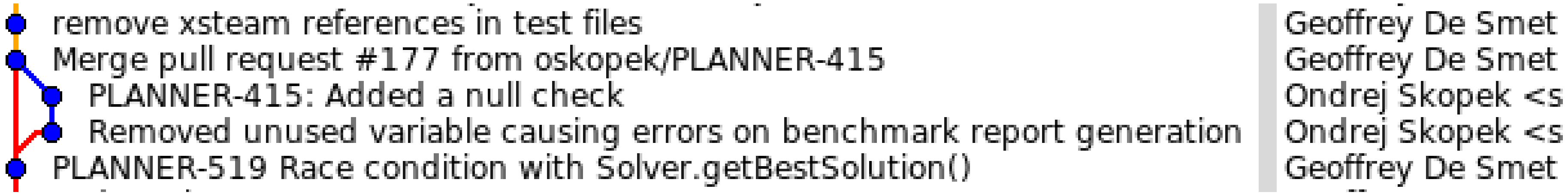
1 successful check

This branch has no conflicts with the base branch

Merging can be performed automatically.

or view command line instructions.

Fork merged to blessed



remove xsteam references in test files	Geoffrey De Smet
Merge pull request #177 from oskopek/PLANNER-415	Geoffrey De Smet
PLANNER-415: Added a null check	Ondrej Skopek <s
Removed unused variable causing errors on benchmark report generation	Ondrej Skopek <s
PLANNER-519 Race condition with Solver.getBestSolution()	Geoffrey De Smet

What makes (Open Source) projects mature?

4. Business model

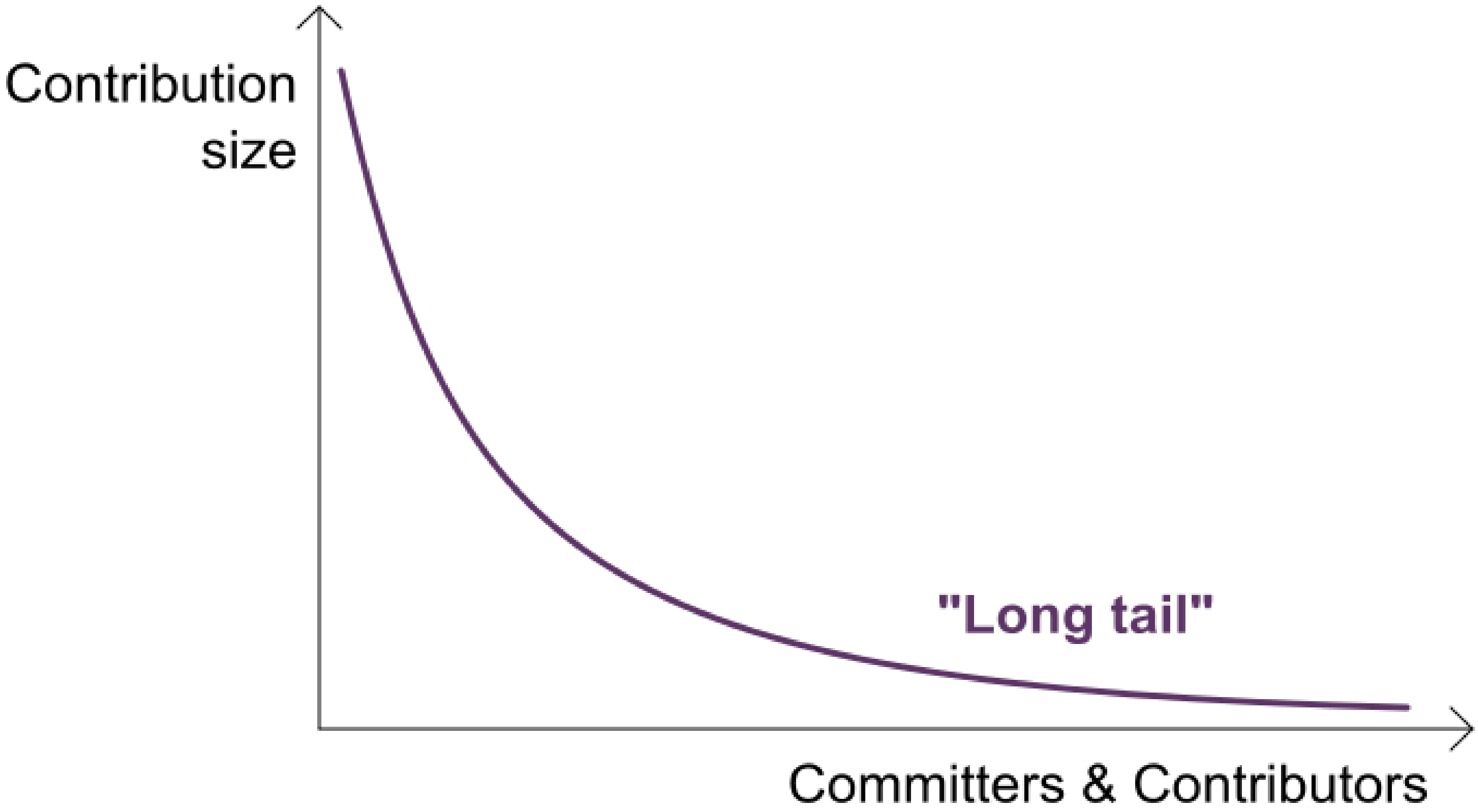
Governance

Who controls an Open Source project?

Meritocracy

Profile	Project benefit	Person benefit	How many?	Code written
Committer Write rights	Develops features Writes documentation	Accept/reject PR's Votes in discussions	1-20 per project	90%
Customer Pays for support	Indirectly pays wages of committers	Roadmap influence Prioritized issues Support/certification		
Contributor Contributed code	Bugfixes & improvements for own use	Gains respect Influence in discussions	5%	10%
User Uses project	Word of mouth Reports issues	Well reported issues are considered	95%	0%

Healthy Open Source project



Healthy Open Source project

- **Some of the committers needs to be payed to work on it full time.**
- Possible to buy support

Communication

- Issue tracker
- Mailing list
  - gmane.org (NNTP or web) avoids inbox flood
- **IRC** (90s chat, like Slack)
  - Most Open Source projects are on Freenode
  - Bot mentions new commits/issues ⇒ sparks discussions
  - Video conferencing for complex discussions

Governance models

- Multi-company model
  - Apache Foundation
  - Eclipse Community
- One-company model
  - Red Hat
  - Pivotal
  - Oracle
  - Docker Inc.
  - ...

Apache Foundation

- Neutral ground
- Infrastructure sponsored
- Voting system:
  - +1: Do the change
  - +0: I don't care
  - -1: I **veto** the change (requires motivation)
- Politics can kill successful projects
  - Log4J 1.x died when main committer got veto'ed
  - Maven 3 flatlined after dispute
    with main committing company (now mostly fixed)

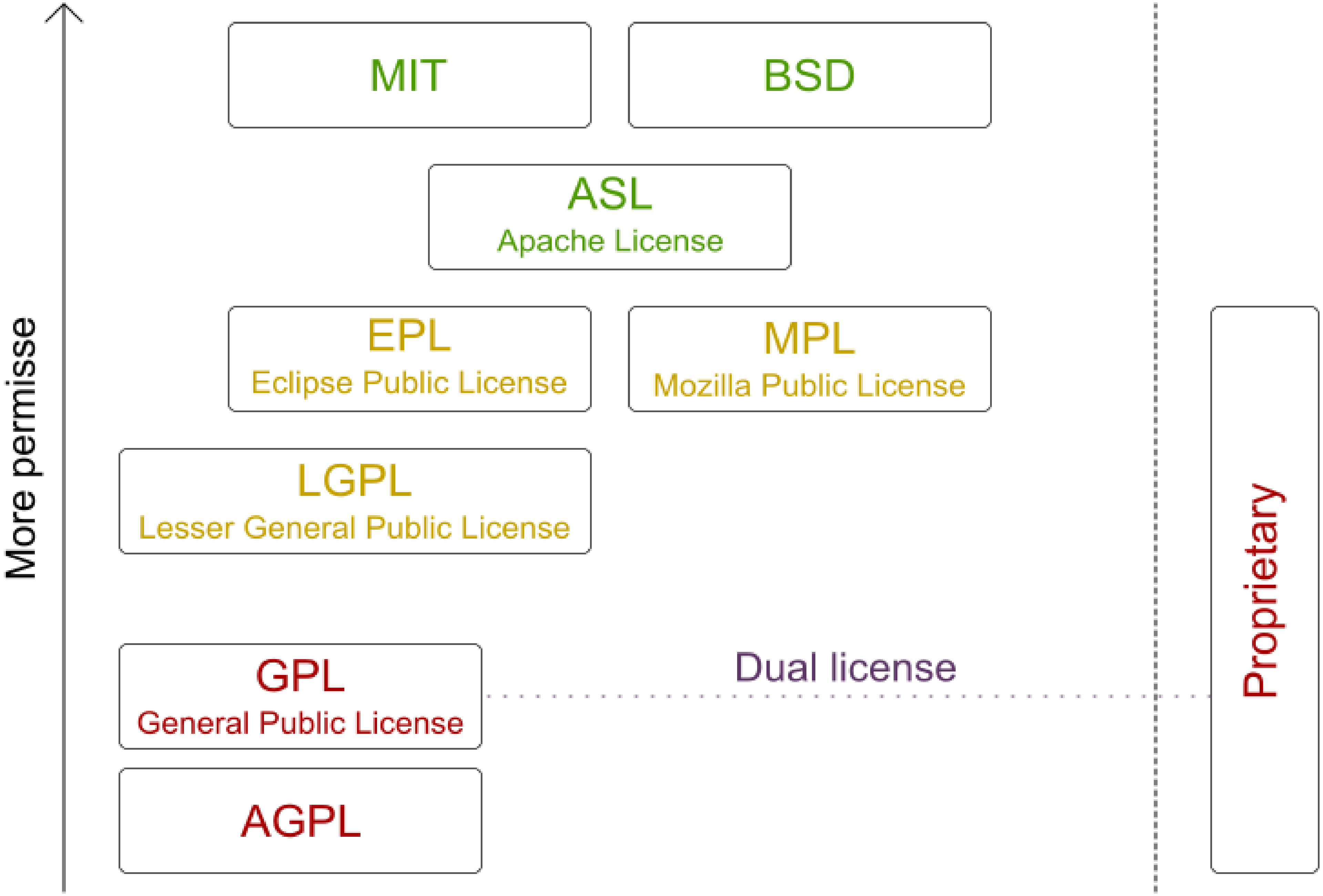
One company model

- Clear, sustainable business model
  - Paid full-time committers
- (Perceived) power abuse ⇒ Fork
  - OpenOffice ⇒ LibreOffice
  - Hudson ⇒ Jenkins
- Company hierarchy between committers
- Potential conflict of interest
  - Depends on the business model
  - Project lead balances community vs company needs

Open Source business models

- Dual-licensing (GPL/proprietary)
    - MySQL

Commercial friendliness for consumers



Open Source business models

- Dual-licensing (GPL/proprietary)
  - MySQL
- Sell proprietary enterprise features
  - IntelliJ
- Sell support/consultancy
  - Red Hat
  - Most Apache projects
- Get external input (on not core business software)
  - Google
  - Facebook

What makes (Open Source) projects mature?

5. Everything that makes proprietary projects mature

Typical quality indicators

- Test coverage
  - Unit tests
  - Integration tests
  - Stress tests
- Continuous integration
- Documentation

Is an Open Source dependency always better than a proprietary one?

Depends on the project!

(but it helps)

Summary

Summary

- Reuse is better than writing it yourself
- Have only mature projects in your dependency tree
- Look for maturity indicators
  - Open Source projects can't hide them

Q & A

Slides	ge0ffrey.github.io/ge0ffrey-presentations/ (https://ge0ffrey.github.io/ge0ffrey-presentations/)
OptaPlanner	www.optaplanner.org (http://www.optaplanner.org)
Red Hat	www.redhat.com (http://www.redhat.com)
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