Mutationtesting with PIT

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Daniel Bolliger

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Partner-read

- 2 years old
- Built with DDD
- We know what it does
- UnitTests 195
- Coverage 72%

Coverage 71.5%

New Code: Since 0.17.3-SNAPSHOT

	Coverage	Uncovered Lines	Uncovered Conditions
partner-partner-read-srv-acceptance	–	–	–
partner-partner-read-srv-arch	–	–	–
partner-partner-read-srv-as-impl	68.8%	22	2
partner-partner-read-srv-bs-impl	76.5%	43	0
partner-partner-read-srv-common	84.7%	12	6
partner-partner-read-srv-docker	–	–	–
partner-partner-read-srv-domain	61.6%	20	23
partner-partner-read-srv-ipackage	–	–	–
partner-partner-read-srv-openliberty-ear	–	–	–
partner-partner-read-srv-openliberty-health	0.0%	12	–
partner-partner-read-srv-openliberty-subscriber	0.0%	28	–
partner-partner-read-srv-persistence	83.4%	13	49
partner-partner-read-srv-replicator	79.2%	57	1
partner-partner-read-srv-war	59.9%	120	10
partner-partner-read-srv-was-ear	–	–	–
partner-partner-read-srv-was-subscriber	0.0%	16	–
pom.xml	–	–	–

pitest

- Offers a large amount of mutators
- Each can be en-/disabled
- Can be highly customized

https://pitest.org/

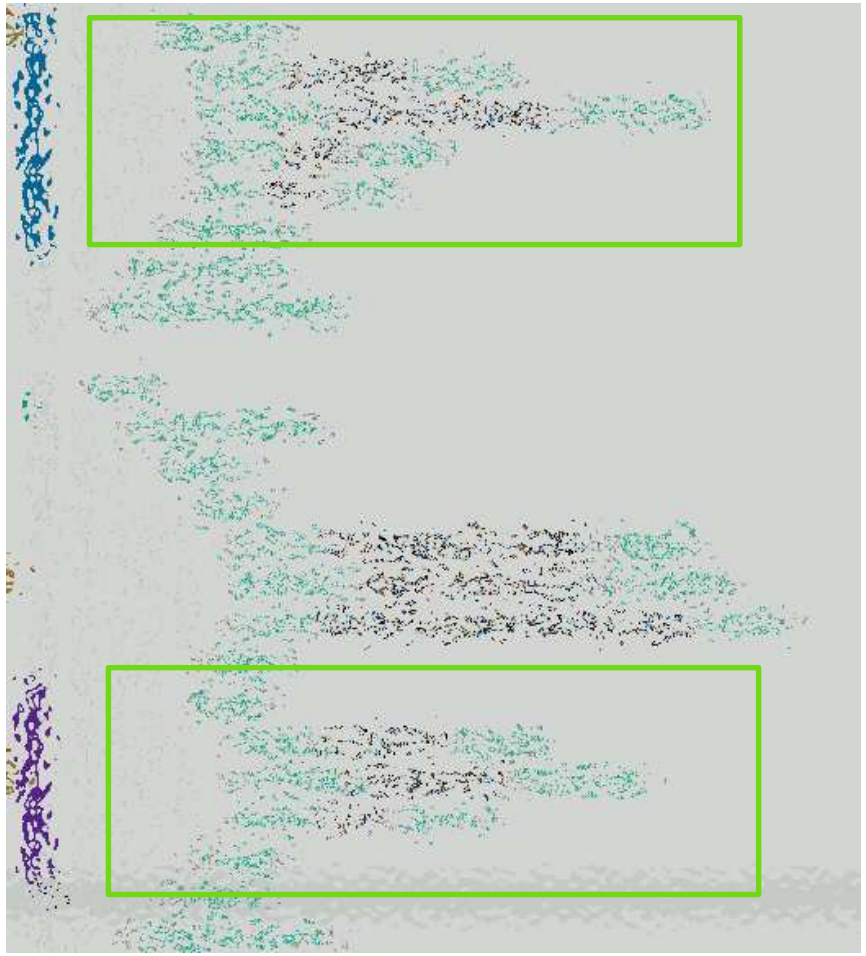
Available mutators and groups

The following table list available mutators and whether or not they are part of a group :

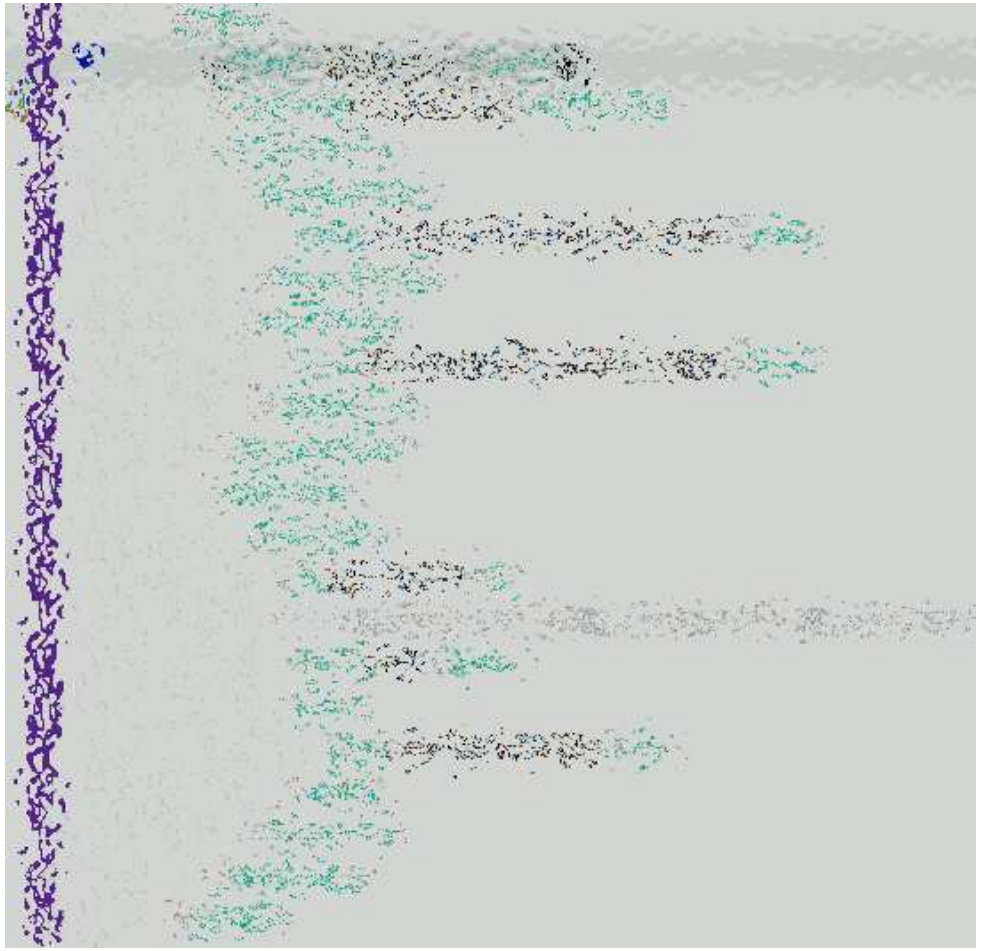
Mutators	"OLD_DEFAULTS" group	"DEFAULTS" group	"STRONGER" group	"ALL" group
Conditionals Boundary	yes	yes	yes	yes
Increments	yes	yes	yes	yes
Invert Negatives	yes	yes	yes	yes
Math	yes	yes	yes	yes
Negate Conditionals	yes	yes	yes	yes
Return Values	yes			yes
Void Method Calls	yes	yes	yes	yes
Empty returns		yes	yes	yes
False Returns		yes	yes	yes
True returns		yes	yes	yes
Null returns		yes	yes	yes
Primitive returns		yes	yes	yes
Remove Conditionals			EQ_ELSE case	yes
Experimental Switch			yes	yes

Maven integration

- Main-pom



- Pom in submodules



pitest-maven

- ➕ Simple configuration
- ➕ Good reports
- ➕ Works on single maven-modules
- ➕ Gives overview over project
- ➕ Build can be broken when threshold is reached

- ⛔ Works only on single maven-modules
- ⛔ Overhelming reports
- ⛔ Not suitable for integration in buildprocess (my oppinion)
- ⛔ Configuration is difficult, when thresholds are defined

https://pitest.org/quickstart/maven/

PitMP

Plugin to test multi-module-projects

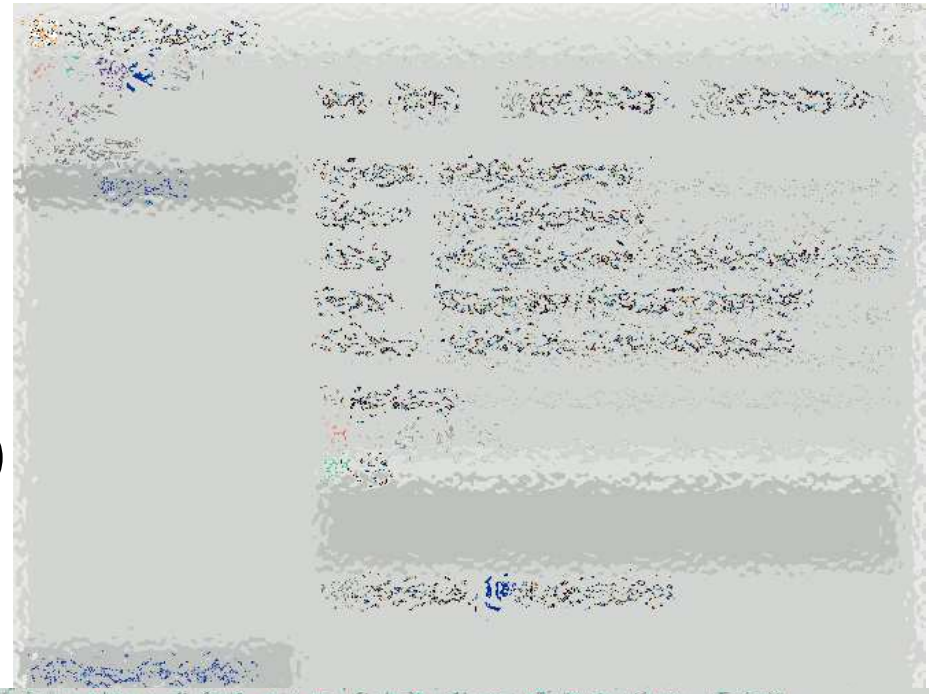
➕ Generates report over all submodules (like intellij-plugin)

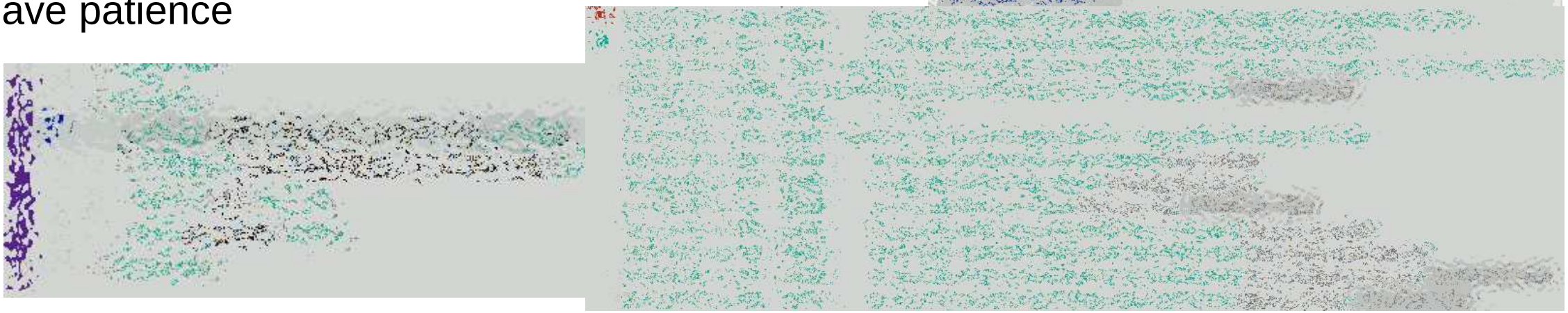
⛔ Dead since 3 years
⛔ Newer versions of pit-plugin not supported

https://github.com/STAMP-project/pitmp-maven-plugin

Intellij

- Install plugin (PIT mutation testing Idea plugin)
- Add a run-configuration
- Run the configuration
- ClassNotFound (javax.enterprise.concurrent.Trigger)
- Add javax.enterprise.concurrent-api in a submodule
- Run the configuration
- Have patience





Intellij

- ➕ Simple configuration
- ➕ Good reports
- ➕ Works on all modules
- ➕ Gives overview over project

- ⛔ Overhelming reports
- ⛔ Running time

```
================================================================================
> scan classpath : < 1 second
> coverage and dependency analysis : 14 seconds
> build mutation tests : 4 seconds
> run mutation analysis : 12 minutes and 58 seconds
--------------------------------------------------------------------------------
> Total  : 13 minutes and 18 seconds
--------------------------------------------------------------------------------

================================================================================
- Statistics
================================================================================
>> Generated 3701 mutations Killed 1264 (34%)
>> Mutations with no coverage 2299. Test strength 90%
>> Ran 2364 tests (0.64 tests per mutation)

Process finished with exit code 0
```

https://plugins.jetbrains.com/plugin/7119-pit-mutation-testing-idea-plugin

Conclusion

- My expectations
  - Use PIT to check our quality of tests and keep or improve it
  - Easy way to find out, where borders of values are not checkt

- My findings
  - It is easy to run
  - It needs time to customize
  - Gives a good overview of project
  - Reports over not covered classes, methods (maybe configurable)
  - Use of frameworks who generates classes (lombok, mapstruct) falsifies reports
  - Difficult to use in „normal“ build-process

References

- Images und Icons
  - https://www.pngjoy.com/
  - https://icon-icons.com/
  - Ninjas: https://www.spiegel.de/kultur/kino/teenage-mutant-ninja-turtles-remake-von-michael-bay-a-997275.html

Daniel Bolliger
daniel.bolliger@css.ch