Appendix to the paper “Empirical Evaluation of Continuous Test-Driven Development in Industrial Settings”

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***Abstract*—This document contains the appendixes to the paper "Empirical Evaluation of Continuous Test-Driven Development in Industrial Settings". It describes two tools we developed and used in the CTDD practice evaluation: RSActivitySensor and Random Block Generator.**

Appendix A
Appendix A — RSActivitySensor

This appendix contains description of the details of Resharper data gathering plug-in, we named RSActititySensor. Resharper is a Microsoft Visual Studio extension that adds a large set of additional functionalities to Visual Studio IDE. Those functionalities are for example refactorings, detecting code smells, IDE navigation, test management. A part of Resharper Ultimate family of products is dotCover. It enables CT in Resharper. Developers are able to write their own plugins for Resharper. RSActivitySensor is such a plugin that extends Resharper. RSActivitySensor contains two types of components: sensors and recorders. Sensors monitor Resharper executions and capture the information about those executions. Recorders are storing the data captured by sensors. Table I shows sensors and recorders implemented by us at the moment of performing the experiment.

TABLE I
Main modules in Resharper data gathering plug-in RSActititySensor

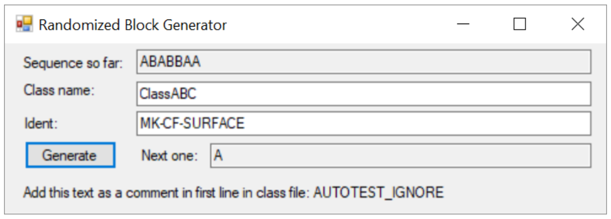
Component	Function
UnitTestResultsSensor	Captures results from ReSharper’s unit tests runner (for both manual test execution and CT).
SolutionWideIssuesSensor	Captures changes in number of issues found in the solution.
LocalIssuesSensor	Captures changes in number of issues found in the currently active (edited) file.
DatabaseRecorder	Saves the captured data in a relational database.
FileRecorder	Saves the captured data in a file.

RSActivitySensor uses the same method and database structure to store the data as NActivitySensor [2]. It also uses JSON format to store the activity reports. An example of such report is shown in Listing 1. It is fairly easy to read by human as well as to process it automatically.

Listing 1. Resharper test execution finished example log
```
{
  "TestName": "Check_ShouldReturnFalseWhenNameIsNull",
  "Status": 0,
  "StatusText": "Success",
  "FinishDateTime": "2017-07-03T11:04:46.9460172+02:00",
  "Categories": "",
  "ClassName": "NameCheckerTests"
}
```

Appendix B
Appendix B — Random Block Generator

This appendix contains short description of the Random Block Generator tool. Random Block Generator is a standalone Windows Forms program written in .NET Framework/C#. It is a tool used in the evaluation by the developers. When the developer was about to create a new class he used the Random Block Generator to check if he needs to decorate the newly created class with a comment that forced the usage of traditional TDD over the CTDD. The tool is presented on Figure 1.



Sequence so far: ABABBAA
Class name: ClassABC
Ident: MK-CF-SURFACE
Next one: A
Add this text as a comment in first line in class file: AUTOTEST_IGNORE

Fig. 1. Random block generator tool

Algorithm for the Random Block Generator was taken from [1]. In our implementation we use the System.Random method from .NET Framework to randomly determine the next condition. The block length was set to 2. If the maximal block length was reached the condition was not drawn but the opposite to the previous condition was administered.

References

[1] I. Bulte and P. Onghena. An r package for single-case randomization tests. *Behavior research methods*, 40:467–478, 2008.

[2] L. Madeyski and M. Kawalerowicz. Software Engineering Needs Agile Experimentation: A New Practice and Supporting Tool. In *Software Engineering: Challenges and Solutions*, volume 504 of *Advances in Intelligent Systems and Computing*, pages 149–162. Springer, 2017.