Internship

Identifying and acquiring objects to debug object-oriented programs.
RMoD team, 2022
Inria Lille - Nord Europe, France

The objective of this internship is to study the practical problems of acquiring objects to debug object-oriented programs. The intern will characterize the scenarios in which developers need to identify objects to debug and explore these scenarios by implementing prototypes in Pharo.

Keywords : Object-Centric Debugging, Object-Oriented Programming, Software Engineering

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Requirements : Master 1 or 2 student
Duration : 6 months.
Language : Français/English.

This internship is an introductory work for a PhD offer [1] and can possibly be immediately followed by the PhD.

This internship takes place within the ANR project OCRE.

1 Description of the project

Debugging is difficult and costly. Object-centric debugging is a young technique arguing that focusing the scope of debugging on specific objects considerably eases the tracking and the understanding of hard bugs in Object-Oriented Programs (OOP). But it lacks fundamental bricks to be applicable in practice. Therefore, it has never been empirically evaluated. The objectives of the OCRE project are to study the fundamental and practical limits that hinder the implementation, the evaluation, and the adoption of object-centric debugging.

We propose to build the first generation of object-centric debuggers, in order to identify and evaluate its real benefits to OOP debugging. We argue that these debuggers have the potential to drastically lower the cost (time and effort) of tracking and understanding hard bugs in OOP.

2 Problems

To determine and obtain objects to debug is difficult, especially in the case of real complex bugs where the symptoms of a bug appear far from the objects producing that bug.

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1. https://jobs.inria.fr/public/classic/fr/offres/2021-04101

Furthermore, in a running program there might be lots of similar objects among which we must determine one faulty object. As of today, there are no clear and comprehensive ways of determining and obtaining faulty objects in a running program. One reason for that is the lack of characterization of developers' needs regarding this problem.

Therefore, we ask ourselves the following questions :
— What are the scenarios in which developers want to acquire specific objects for debugging ?
— Following these scenarios, how to find faulty objects to debug among thousands or millions, especially when such objects are not directly available when we observe the program ?

3 Tasks

— Study the literature,
— discuss with our team's developers to understand and characterize the scenarios of acquiring objects to debug,
— implement prototypes answering these scenarios (with the Pharo language),
— evaluate the implemented prototypes through demonstrations and small user experiments.

4 References

1. J. Ressia, A. Bergel, and O. Nierstrasz. Object-centric debugging. In Proceeding of the 34rd international conference on Software engineering, ICSE '12, 2012.

2. Object Miners : Acquire, Capture and Replay Objects to Track Elusive Bugs. Steven Costiou, Mickaël Kerboeuf, Clotilde Toullec, Alain Plantec, Stéphane Ducasse. Journal of Object Technology, Volume 19, no. 1. 2020.