Jingbo **Lu**

Principle Scientist

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Research Interests

My areas of interest are compilers and programming languages. In particular, my current research focuses on static program analysis. I have great interest in developing fundamental static and dynamic program analysis techniques and tools to improve the usability, reliability and security of complicated software systems.

Experience

2023 - present
Beijing, China

Principle Scientist
Sectrend

2020 - 2022
Sydney, Australia

Postdoctoral Fellow
University of New South Wales (UNSW)
supervisor : Scientia Prof. Jingling Xue

Education

2016 - 2020
Sydney, Australia

Ph.D. in Computer Science and Engineering
University of New South Wales (UNSW)
Advisor : Scientia Prof. Jingling Xue

2014 - 2016
Sydney, Australia

M.Eng in Information Technology
University of New South Wales (UNSW)

2009 - 2013
Tianjin, China

B.Sc in Applied Physics
Nankai University (NKU)
Advisor(s) : Prof. Xinyu Wang

Projects

2022

Qilin, Fine-Grained Context- Sensitive Pointer Analysis Framework for Java

Open Source

Description : Qilin is a generalized (modern) alternative to support the current research trend on exploring fine-grained context-sensitivity (where different variables/objects in a method can be analyzed under (i.e., qualified by) different context abstractions at the variable level), precisely, efficiently, and modularly. To meet these four design goals, Qilin is developed as an imperative framework consisting of a fine-grained pointer analysis kernel with parameterized context-sensitivity that supports on-the-fly call graph construction and exception analysis, solved iteratively based on a carefully-crafted incremental worklist-based constraint solver, on top of its handlers for complex Java features.

2021 **Conch**, A context debloating tool for accelerating all the object-sensitive pointer analysis
Open Source

Description : Conch identifies context-independent objects by verifying three linearly verifiable conditions (which are almost always necessary for objects in the real-world applications to be context-sensitive) and then eliminates redundant contexts composed of these objects (which are usually not precision-beneficial). Conch can speed up object-sensitive pointer analysis substantially and analyze more programs scalably at only a negligible loss of precision.

2021 **SelectX**, A lightweight precise callsite-sensitive pointer analysis accelerating tool
Open Source

Description : SelectX enables selective context-sensitivity in k-CFA, by correlating the context-sensitivity of a variable/object selected at a program point and its effects on avoiding spurious points-to relations elsewhere.

2021 **Turner**, A sweet spot between accuracy and efficiency in existing pre-analyses for accelerating objectsensitive pointer analysis
Open Source

Description : Turner is designed to enable object-sensitive pointer analysis to run significantly faster than the precision-preserving approach and achieve significantly better precision than the currently best non-precision-preserving approach. Turner is the first intra-procedural pre-analysis in selecting precision-critical variables and objects.

2019 **Eagle**, A lightweight precision-preserving object-sensitive pointer analysis accelerating tool
Open Source

Description : Eagle enables k-obj to analyze a method with partial context-sensitivity, i.e., context-sensitively for only some of its selected variables/allocation sites. Eagle makes these selections during a lightweight pre-analysis by reasoning about context-free-language (CFL) reachability at the level of variables/objects in the program, based on a new CFL-reachability formulation of k-obj.

2018 **Druid**, a Java and Android analysis framework

Description : Druid is a pointer analysis framework that integrates a wide range of mainstream context sensitive technologies. It combines the advantages of the major mainstream platforms in the past, and redesigns the control process for context-sensitive pointer analysis needs. Its usability and extendibility have been greatly improved.

Publications

ECOOP'24 — Dongjie He*, **Jingbo Lu***, and Jingling Xue. A CFL-Reachability Formulation of Callsite-Sensitive Pointer Analysis with Built-in On-the-Fly Call Graph Construction. In 38th European Conference on Object-Oriented Programming(ECOOP'24), 2024.

ASE'23 — **Jingbo Lu**, Dongjie He, Wei Li, Yaoqing Gao, and Jingling Xue. Automatic Generation and Reuse of Precise Library Summaries for Object-Sensitive Pointer Analysis. In 38th IEEE/ACM International Conference on Automated Software Engineering (ASE'23), 2023.

TOSEM'23 — Dongjie He, **Jingbo Lu** and Jingling Xue. IFDS-based Context Debloating for Object-Sensitive Pointer Analysis. In ACM Transactions on Software Engineering and Methodology (TOSEM'23), 2023.

TSE'22 — Dongjie He, **Jingbo Lu**, Yaoqing Gao and Jingling Xue. Selecting Context-Sensitivity Modularly for Accelerating Object-Sensitive Pointer Analysis. In IEEE Transactions on Software Engineering (TSE'22), 2022.

ECOOP'22 — Dongjie He, **Jingbo Lu** and Jingling Xue. Qilin : A New Framework for Supporting Fine-Grained Context-Sensitivity in Java Pointer Analysis. In 36th European Conference on Object-Oriented Programming (ECOOP'22), 2022.

ASE'21 — Dongjie He, **Jingbo Lu** and Jingling Xue. Context Debloating for Object-Sensitive Pointer Analysis. In 36th IEEE/ACM International Conference on Automated Software Engineering (ASE'21), pages 79 – 91, 2021.

SAS'21 — **Jingbo Lu**, Dongjie He and Jingling Xue. Selective Context-Sensitivity for k-CFA with CFL-Reachability. In 28th International Static Analysis Symposium (SAS'21), pages 261 – 285, 2021.

ECOOP'21 — Dongjie He, **Jingbo Lu**, Yaoqing Gao, and Jingling Xue. Accelerating Object-Sensitive Pointer Analysis by Exploiting Object Containment and Reachability. In 35th European Conference on Object-Oriented Programming (ECOOP'21), LIPIcs, Vol. 194, pp. 16 :1 – 16 :31, 2021.

TOSEM'21 — **Jingbo Lu**, Dongjie He and Jingling Xue. Eagle : CFL-Reachability-based Precision-Preserving Acceleration of Object-Sensitive Pointer Analysis with Partial Context Sensitivity. In 2019 ACM Transactions on Software Engineering and Methodology (TOSEM'21), 30(4), 2021.

OOPSLA'19 — **Jingbo Lu** and Jingling Xue. Precision-Preserving Yet Fast Object-Sensitive Pointer Analysis with Partial Context Sensitivity. In 2019 ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA'19), pages 148 :1 – 148 :29, Athens, 2019.

Academic Services

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