Yusuke Izawa, Ph.D., PyPy Contributor

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Education

2020-2023 **Ph.D. Mathematical and Computing Science, Tokyo Institute of Technology**.
Thesis title: *Supporting multi-scope and multi-level compilation in a meta-tracing just-in-time compiler.* (GPA 3.49)

2018-2020 **M.Sc. Mathematical and Computing Science, Tokyo Institute of Technology**.
Thesis title: *Stack Hybridization: A Mechanism for Bridging Two Compilation Strategies in a Meta Compiler Framework.*

2014-2018 **B.Sc. Mathematical and Computing Science, Tokyo Institute of Technology**.
Thesis title: *BacCaml: A Meta-JIT Compiler Based on Both Tracing and Method JIT Compilations.*

Employment History

2023.04 – now IBM Research – Tokyo, Research Scientist.

2023.04 – 2023.4 JSPS Research Fellow PD. (declined)

2021.08 – 2021.10 IBM Research – Tokyo, Research Internship (Paid).

2021.04 – 2023.3 JSPS Research Fellow DC2.

2020.11 – 2023.3 Tokyo Institute of Technology, Dept. of Math. and Comp., Research Assistant.

Grants, Honours and Scholarships

2023 **Long-Term Performance Award.** Award from IBM, based on skills needed for the future, long-term caree potential, and strong indivisual performance.

Research Fellowship for Young Scientists (JSPS PD). Fellowship from the Japan Society for the Promotion of Science (JSPS), covering living expenses. Research expenses covered by KAKENHI. (declined)

2021 **Research Fellowship for Young Scientists (JSPS DC2)**. Fellowship from the Japan Society for the Promotion of Science (JSPS), covering living expenses. Research expenses covered by KAKENHI.

2020 **JST Strategic Basic Research Programs ACT-X**. Research expenses covered by Japan Science and Technology Agency (JST).

Tokyo Tech Tsubame Scholarship for Doctoral Students. Covering living expenses.

2019 **Travel Grants by Information Science Incentive Fund**. By dept. of mathematical and computing science, Tokyo Tech.

2nd Place, Graduate Category, ACM Student Research Competition, *Association for Computing Machinery*. [*]

2014 **Scholarship by the Showa Scholarship Foundation**. Covering living expensed by Showa Scholarship Foundation.

Selected Publications and Talks

Journal

1. Yusuke Izawa, Hidehiko Masuhara, Carl Friedrich Bolz-Tereick, and Youyou Cong. "Threaded Code Generation with a Meta-Tracing JIT Compiler." In: *Journal of Object Technology* (2022), 2:1–11. ISSN: 1660-1769. DOI: 10.5381/jot.2022.21.2.a1. arXiv: 2106.12496.

2. Shusuke Takahashi, Yusuke Izawa, Hidehiko Masuhara, and Youyou Cong. "An approach to collect object graphs for data-structure live programming based on a language implementation framework." In: *Journal of Information Processing* 30 (2022), pp. 451–463. DOI: 10.2197/ipsjjip.30.451.

Conference Proceedings

1. Yusuke Izawa, Junichiro Kadomoto, Hidetsugu Irie, and Shuichi Sakai. "A Functional Reactive Programming Language for Wirelessly Connected Shape-Changeable Chiplet-Based Computers." In: SPLASH Companion 2023. Cascais, Portugal: Association for Computing Machinery, Aug. 30, 2023. ISBN: 979-8-4007-0384-3/23/10. DOI: 10.1145/3618305.3623608.

2. Yusuke Izawa, Hidehiko Masuhara, and Carl Friedrich Bolz-Tereick. "Two-level Just-in-Time Compilation with One Interpreter and One Engine." In: *The ACM SIGPLAN Workshop on Partial Evaluation and Program Manipulation*. PEPM 2022. Virtual, Jan. 17, 2022. arXiv: 2201.09268. URL: https://popl22.sigplan.org/details/pepm-2022-papers/3/Two-level-Just-in-Time-Compilation-with-One-Interpreter-and-One-Engine.

3. Yusuke Izawa and Hidehiko Masuhara. "Amalgamating Different JIT Compilations in a Meta-Tracing JIT Compiler Framework." In: *Proceedings of the 16th ACM SIGPLAN International Symposium on Dynamic Languages*. DLS 2020. Virtual, USA: Association for Computing Machinery, Nov. 17, 2020, pp. 1–15. ISBN: 9781450381758. DOI: 10.1145/3426422.3426977.

4. Yusuke Izawa. "BacCaml: The Meta-Hybrid Just-in-Time Compiler." In: *Proceedings of the Conference Companion of the 3rd International Conference on Art, Science, and Engineering of Programming*. Programming 2019. Genova, Italy: Association for Computing Machinery, Apr. 2, 2019, pp. 1–3. ISBN: 9781450362573. DOI: 10.1145/3328433.3328466.

5. Yusuke Izawa, Hidehiko Masuhara, and Tomoyuki Aotani. "Extending a Meta-Tracing Compiler to Mix Method and Tracing Compilation." In: *Proceedings of the Conference Companion of the 3rd International Conference on Art, Science, and Engineering of Programming*. Programming 2019. Genova, Italy: Association for Computing Machinery, Apr. 2, 2019, pp. 1–3. ISBN: 9781450362573. DOI: 10.1145/3328433.3328439.

Talk

1. Yusuke Izawa, Hidehiko Masuhara, and Carl Friedrich Bolz-Tereick. *Interpreter Taming to Realize Multiple Compilations in a Meta-Tracing JIT Compiler Framework*. The 7th MoreVMs workshop (MoreVMs'23). Tokyo, Japan, Mar. 13, 2023. URL: https://2023.programming-conference.org/home/MoreVMs-2023.

2. Yusuke Izawa and Hidehiko Masuhara. *Taming an Interpreter for Threaded Code Generation with a Tracing JIT Compiler*. The 17th Workshop on Implementation, Compilation, Optimization of Object-Oriented Languages, Programs and Systems (ICOOOLPS 2022). Berlin, Germany, June 7, 2022. URL: https://2022.ecoop.org/home/ICOOOLPS-2022.

3. Shusuke Takahashi, Yusuke Izawa, Hidehiko Masuhara, and Youyou Cong. *Efficient Object Graph Recording with Truffle for Live Data-Structure Programming*. Truffle/GraalVM Languages Workshop (Truffle 2022). Berlin, Germany, June 7, 2022. URL: https://2022.ecoop.org/home/truffle-2022.

4. Yusuke Izawa, Hidehiko Masuhara, Carl Friedrich Bolz-Tereick, and Youyou Cong. *Threaded Code Generation with a Meta-tracing JIT Compiler*. The 16th Workshop on Implementation, Compilation, Optimization of Object-Oriented Languages, Programs and Systems (ICOOOLPS 2021). Virtual, July 13, 2021. arXiv: 2106.12496v4. URL: https://conf.researchr.org/track/ecoop-issta-2021/ecoop-issta-2021-icooolps.

Selected Projects

2021- **Adaptive RPython.** This project lets the RPython framework do an adaptive compilation, which can select an appropriate compilation strategy depending on a runtime situation.

2020- **Poly2Kanon.** Kanon is a live programming environment that can visualize data structures while editing code. Poly2Kanon aims to extend Kanon to support multi-language and multi-environment features.

2019-2020 **BacCaml.** It is a simple meta-tracing compiler framework, which can perform trace- and method-based compilations. It implements RPython-like tracing compilation by extending the MinCaml compiler.

Selected Academic Services

2024 Program Committee, MPLR 2024.
Program Committee, MoreVMs 2024.
Program Committee, ICCQ 2024.

2023 Program Committee, ICSME 2023 (Industry Track).
Artifact Evaluation Committee, The Programming Journal, Volume 8.
Program Committee, ICCQ 2023.

2022 Artifact Evaluation Committee, The Programming Journal, Volume 7.

2021 Artifact Evaluation Committee, PACT 2021.
Artifact Evaluation Committee, ECOOP 2021.

2020 Member of Student Volunteer, SPLASH 2020.
Co-reviewer of Onward! Essays, SPLASH 2020.
External reviewer of Scala Symposium, ECOOP 2020.

2019 Member of Student Volunteer, Programming 2019.

Teaching

2020 Programming II, Tokyo Institute of Technology, Math. and Comp. Science, TA.

2019 Programming II, Tokyo Institute of Technology, Math. and Comp. Science, TA.
Introduction to Computer Science, Tokyo Institute of Technology, TA.

2018 Programming II, Tokyo Institute of Technology, Math. and Comp. Science, TA.
Information Literacy I, Tokyo Institute of Technology, TA.

Skills

Languages English (fluent), Japanese (native)

Coding OCaml (S), Scala (S), Python (S), C (A), Java (A), Ruby (A), Shell (A), R (B), SQL (C), LaTeX(SS)

Misc. Academic research, teaching, training, consultation, LaTeX typesetting and publishing.