

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 career potential, and strong individual 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](https://doi.org/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/ipsjip.30.451](https://doi.org/10.2197/ipsjip.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](https://doi.org/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](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](https://doi.org/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](https://doi.org/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](https://doi.org/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](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](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](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-icoolps](https://conf.researchr.org/track/ecoop-issta-2021/ecoop-issta-2021-icoolps).

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, ICCQ 2024.
■ Program Committee, MoreVMs 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 ■ Co-reviewer of Onward! Essays, SPLASH 2020.

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.