Takaaki FUKAI

Postdoctral researcher in RIKEN Center of Computational Science

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Affiliation

- Postdoctral researcher in High Performance Big Data Research Team, RIKEN Center of Computational Science (R-CCS)
- Visited Researcher at Information Technology Center, The University of Tokyo

Work Experience

January 2020-Current: Postdoctral researcher in High Performance Big Data Research Team RIKEN Center of Computational Science (R-CCS)

June 2019-Current: Visited Researcher at Information Technology Center, The University of Tokyo

April 2018-December 2019: Software Developer in IBM Japan
I have worked as a QA engineer of a web application and a DevOps engineer of a public cloud service and a private cloud production. My technical experiences in this position are software test, CI/CD, Jenkins, Docker, Kubernetes and Helm.

Education

September 2018: Doctor of Philosophy in Engineering, University of Tsukuba
Supervisor: Professor Kazuhiko Kato

March 2015: Master of Engineering, University of Tsukuba
Supervisor: Professor Kazuhiko Kato

March 2013: Bachelor of Engineering, Okayama University
Supervisor: Professor Hideo Taniguchi

Award

- **IEEE Computer Society Japan Chapter Young Author Award 2019**.
  IEEE Computer Society Tokyo/Japan Joint Chapter, December 2019.
- **Best Paper Award**.
  The 10th IEEE International Conference on Cloud Computing Technology and Science, December 2018.
- **Best Paper Award**.
  The 8th IEEE/ACM International Conference on Utility and Cloud Computing, December 2015.

Research Interests

My research interests include operating systems, virtualization software, firmware security, and cloud computing. In my past research, I mainly worked on improving the serviceability of bare-metal instances in IaaS clouds. I proposed a live migration scheme and a firmware

protection scheme for the bare-metal instances. In these works, I exploited a thin-hypervisor which OS-independently runs without device virtualization. I am also interested in light-weight nested-virtualization and contributed to (2) in this technical respect. I am currently working on a VMM live refreshing with on-demand nested virtualization, and on new hardware emulation system for developing and evaluating applications.

Publications

Journal Paper

1. Takaaki Fukai, Takahiro Shinagawa, Kazuhiko Kato.
   Live Migration in Bare-metal Clouds.
   IEEE Transactions on Cloud Computing, Jul 2018.
   (Open Access: `https://ieeexplore.ieee.org/document/8401692`)

International Conference/Workshop Papers (Refereed)

1. Takaaki Fukai, Satoru Takekoshi, Kohei Azuma, Takahiro Shinagawa and Kazuhiko Kato.
   BMCArmor: A Hardware Protection Scheme for Bare-Metal Clouds.
   In Proceedings of the 9th IEEE International Conference on Cloud Computing Technology and Science (CloudCom 2017), Dec 2017.

2. Takaaki Fukai, Yushi Omote, Takahiro Shinagawa, and Kazuhiko Kato.
   OS-Independent Live Migration Scheme for Bare-metal Clouds.
   In Proceedings of the 8th IEEE/ACM International Conference on Utility and Cloud Computing (UCC 2015), Dec 2015.
   [**Best paper award**].

International Conference/Workshop Posters (Refereed)

1. Ryosuke Yasuoka, Takaaki Fukai and Takahiro Shinagawa.
   Toward On-demand Nested Virtualization for Live-Refreshing Cloud Systems.
   The Fifteenth EuroSys Conference 2020 (EuroSys '20), poster, April, 2020 (To be appear).

2. Takaaki Fukai, Yushi Omote, Takahiro Shinagawa, and Kazuhiko Kato.
   Live Migration of Bare-metal Instances.
   5th Asia-Pacific Workshop on Systems (APSys 2014), June, 2014

Other publications

1. Masanori Misono, Masahiro Ogino, Takaaki Fukai, Takahiro Shinagawa.
   FaultVisor2: Testing Hypervisor Device Drivers against Real Hardware Failures.
   In Proceedings of the 10th IEEE International Conference on Cloud Computing Technology and Science (CloudCom 2018), Dec 2018.
   (Acceptance Ratio: 19.8%) [**Best paper award**].

2. Iori Yoneji, Takaaki Fukai, Takahiro Shinagawa and Kazuhiko Kato.
   Unified Hardware Abstraction Layer with Device Masquerade.
   In Proceedings of the 33rd ACM Symposium On Applied Computing (ACM SAC 2018), Apr 2018.

3. Ilias Avramidis, Michael Mackay, Posco Tso, Takaaki Fukai, Takahiro Shinagawa.
   Live Migration on ARM-based Micro-datacentres.
   In Proceedings of the 3rd Workshop on Edge Computing (EdgeCom 2018), Jan 2018.

Skills

Expertise Intel VT-x, Nested Virtualization, Thin Hypervisor (BitVisor), Operating systems, Linux kernel, device drivers, Firmware security, QEMU/KVM, IaaS Clouds, System level performance analyze

Technical experiences Docker, kubernetes, CI/CD, Microservice, software test

Software Programming Skills C (10+ years), Shell script(10+ years), Python, Java (Include Android application), Groovy, x86 assembly, ML, haskell, HSP, and reading more programming languages (Go, Ruby)

Platforms Linux, Mac, Windows

Languages Japanese, English