# Keichi Takahashi

*Ph.D. Candidate at Osaka University*

## Education

2016–Present **Ph.D. in Information Science**, *Osaka University*, Osaka.
Humanware Innovation Program Scholarship

2014–2016 **M.Sc. in Information Science**, *Osaka University*, Osaka.
Master Thesis: "A Cross-layer Architecture for Integrating SDN-enabled Interconnect with MPI Library"
Humanware Innovation Program Scholarship

2010–2014 **B.Eng. in Electronic and Information Engineering**, *Osaka University*, Osaka.
Bachelor Thesis: "Design and Implementation of Software Defined Networking Controller for Accelerating Collective Reduction Operation in MPI"

## Work Experience

2014–Present **Freelance Software Engineer**, Osaka.
Mainly working on web applications
- Implemented several REST API back-ends using Scala and Play framework
- Implemented several web application front-ends using React and AngularJS
- Designed and developed a meta-programming library in Scala to automatically generate API endpoints from model definition
- Designed an infrastructure for realt-time video streaming on AWS

2013–2014 **Software Engineer (part-time)**, *Fenrir Inc.*, Osaka.
Worked on Sleipnir, a Chromium-based web browser
- Implemented UI interactions and animations in cooperation with UI/UX designers
- Implemented several new features involving interoperation between JavaScript and C++

2010–2012 **Software Engineer (part-time)**, *Crev Inc.*, Osaka.
Worked on factory automation, image processing and signal processing
- Designed and developed an algorithm to detect emission spectrum lines from plasma spectroscopic data of plasma
- Designed and developed an algorithm to automatically analyze the surface texturing of solar cells from electron microscopic images
- Developed a user-space driver for a USB-connected pressure sensor
- Took part in development of a factory automation system for food plants

## Languages

Japanese Native Proficiency
English Full Professional Proficiency
German Limited Proficiency

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## Skills

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| Programming Languages | Professional programming experience in C, C++, C#, JavaScript, Python and Scala. Experience in Go, Haskell, Ruby and PHP. |
| Parallel Computing | Experience in MPI and OpenMP. |
| Server Administration | Deployed and operated several small-scale computing clusters. Experience with software including (but not limited to): Slurm (Job Scheduler), Kubernetes (Container Orchestrator), Ansible (Configuration Management), Docker, QEMU/KVM, Fluentd (Log Collector), Prometheus (Monitoring System) and Kibana/Grafana (Visualization). |

## Publications

### Journal

[1] Keichi Takahashi, Susumu Date, Dashdavaa Khureltulga, Yoshiyuki Kido, Hiroaki Yamanaka, Eiji Kawai, and Shinji Shimojo. UnisonFlow: A Software-Defined Coordination Mechanism for Message-Passing Communication and Computation. *IEEE Access*, 6(1), 2018.

[2] Susumu Date, Hirotake Abe, Dashdavaa Khureltulga, Keichi Takahashi, Yoshiyuki Kido, Yasuhiro Watashiba, Pongsakorn U-chupala, Kohei Ichikawa, Hiroaki Yamanaka, Eiji Kawai, and Shinji Shimojo. SDN-accelerated HPC Infrastructure for Scientific Research. *International Journal of Information Technology*, 22(1), 2016.

### International Conference (with Review)

[3] Yohei Takigawa, Keichi Takahashi, Susumu Date, Yoshiyuki Kido, and Shinji Shimojo. A Traffic Simulator with Intra-node Parallelism for Designing High-performance Interconnects. In *2018 International Conference on High Performance Computing & Simulation (HPCS 2018)*, July 2018.

[4] Hiroaki Morimoto, Khureltulga Dashdavaa, Keichi Takahashi, Yoshiyuki Kido, Susumu Date, and Shinji Shimojo. Design and Implementation of SDN-enhanced MPI Broadcast Targeting a Fat-Tree Interconnect. In *2017 International Conference on High Performance Computing & Simulation (HPCS 2017)*, pages 252–258, July 2017.

[5] Keichi Takahashi, Susumu Date, Dashdavaa Khureltulga, Yoshiyuki Kido, and Shinji Shimojo. PFAnalyzer: A Toolset for Analyzing Application-Aware Dynamic Interconnects. In *2017 International Conference on Cluster Computing (CLUSTER 2017)*, pages 789–796, September 2017.

[6] Akihiro Misawa, Susumu Date, Keichi Takahashi, Takashi Yoshikawa, Masahiko Takahashi, Masaki Kan, Yasuhiro Watashiba, Yoshiyuki Kido, Chonho Lee, and Shinji Shimojo. Highly Reconfigurable Computing Platform for High Performance Computing Infrastructure as a Service: Hi-IaaS. In *7th International Conference on Cloud Computing and Services Science (CLOSER 2017)*, pages 163–174, April 2017.

[7] Takuya Yamada, Keichi Takahashi, Masaya Muraki, Susumu Date, and Shinji Shimojo. Network Access Control Towards Fully-controlled Cloud Infrastructure. In *Ph.D. Consortium, 8th International Conference on Cloud Computing Technology and Science (CloudCom2016)*, December 2016.

[8] Susumu Date, Hirotake Abe, Khureltulga Dashdavaa, Keichi Takahashi, Yoshuyuki Kido, Yasuhiro Watashiba, Pongsakorn U-Chupala, Kohei Ichikawa, Hiroaki Yamanaka, Eiji Kawai, and Shinji Shimojo. An Empirical Study of SDN-accelerated HPC Infrastructure for Scientific Research. In *International Conference on Cloud Computing Research and Innovation (ICCCRI)*, October 2015.

[9] Baatarsuren Munkhdorj, Keichi Takahashi, Khureltulga Dashdavaa, Yasuhiro Watashiba, Yoshiyuki Kido, Susumu Date, and Shinji Shimojo. Design and Implementation of Control Sequence Generator for SDN-enhanced MPI. In *5th International Workshop on Network-aware Data Management (NDM'15)*, November 2015.

[10] Pisit Makpaisit, Kohei Ichikawa, Putchong Uthayopas, Susumu Date, Keichi Takahashi, and Khureltulga Dashdavaa. An Efficient MPI_Reduce Algorithm for OpenFlow-Enabled Network. In *15th International Symposium on Communications and Information Technologies (ISCIT'15)*, October 2015.

[11] Keichi Takahashi, Dashdavaa Khureltulga, Baatarsuren Munkhdorj, Yoshiyuki Kido, Susumu Date, Hiroaki Yamanaka, Eiji Kawai, and Shinji Shimojo. Concept and Design of

SDN-Enhanced MPI Framework. In *2015 European Workshop on Software Defined Networks (EWSDN 2015)*, pages 109–110, September 2015.

[12] Keichi Takahashi, Dashdavaa Khureltulga, Yasuhiro Watashiba, Yoshiyuki Kido, Susumu Date, and Shinji Shimojo. Performance evaluation of SDN-enhanced MPI_Allreduce on a cluster system with fat-tree interconnect. In *2014 International Conference on High Performance Computing & Simulation (HPCS 2014)*, pages 784–792, jul 2014.

### Poster and Oral Presentation (without Review)

[13] Keichi Takahashi. An MPI Framework for HPC Clusters Deployed with Software-Defined Networking. In *27th Workshop on Sustained Simulation Performance (WSSP27)*, March 2018.

[14] Keichi Takahashi. Towards Realizing a Dynamic and MPI Application-aware Interconnect with SDN. In *26th Workshop on Sustained Simulation Performance (WSSP26)*, October 2017.

[15] Takuya Yamada, Keichi Takahashi, Masaya Muraki, Yoshiyuki Kido, Susumu Date, and Shimojo Shinji. A Proposal of Access Control Mechanism Towards User-dedicated PRAGMA-ENT for IoT Era. In *The Pacific Rim Application and Grid Middleware Assembly (PRAGMA) Workshop 31*, 2016.

[16] Takuya Yamada, Keichi Takahashi, Masaya Muraki, Yoshiyuki Kido, Susumu Date, and Shimojo Shinji. A Proposal of Access Control Mechanism for the IoT world. In *ICT Virtual Organization of ASEAN Institutes and NICT (ASEAN IVO) Meeting*, September 2016.

[17] Khureltulga Dashdavaa, Munkhdorj Baatarsuren, Keichi Takahashi, Susumu Date, Yoshiyuki Kido, and Shinji Shimojo. A MPI Concept with Efficient Control of Network Functionality Based on SDN. In *The Pacific Rim Application and Grid Middleware Assembly (PRAGMA) Workshop 29*, October 2015.

[18] Keichi Takahashi, Baatarsuren Munkhdorj, Khureltulga Dashdavaa, Susumu Date, Yoshiyuki Kido, and Shinji Shimojo. Control Sequence Generator for Generic SDN-enhanced MPI Framework. In *The Pacific Rim Application and Grid Middleware Assembly (PRAGMA) Workshop 28 (Lightning Talk Best Idea Award)*, April 2015.

### Patent

[19] Susumu Date, Yoshiyuki Kido, Keichi Takahashi, Takuya Yamada, Masaya Muraki, Yasutsugu Ishibashi, and Rei Umetani. Sharing Economy System (pending), 2018.