

Kiwamu Okabe - Research and Development Engineer

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Interests

I launched my career on developing embedded devices at Ricoh Company, Ltd, and also learned application design using functional language such like Haskell. I found Metasepi project¹ what is trying to apply strong type to embedded programming. For my first challenging, I developed an embedded Haskell compiler named Ajhc², and published some research papers³.

Today, I choose ATS language⁴ as embedded functional language, and found “Japan ATS User Group⁵” what holds Japanese translations about the language. And I’m implementing⁶ these technology on tiny MCU such like ARM Cortex-M series and 8bit AVR for practical use.

Metasepi is very experimental and ambitious project, however I believe that it also introduces an by-product “the technology to design real software with predictable manpower and safety” regardless of embedded domain.

Work Experience

February 2016 - Present: Software Enginner (contract employee) at Life Robotics Inc.

- Design GUI application running on Linux OS

August 2014 - Present: Part-time researcher at RIKEN Advanced Institute for Computational Science

- Research embedded functional programming

July 2013 - Present: Self-employed Software Engineer at METASEPI DESIGN

- Research and develop Ajhc Haskell Compiler
- Support to develop any embedded software
- ATS language consulting
- Manage Metasepi Project and develop the core technology

March 2015 - February 2016: System Enginner (contract employee) at Centillion Japan Co., Ltd.

- Software engineering for cloud computing

¹<http://www.metasepi.org/>

²<http://ajhc.metasepi.org/>

³<http://www.metasepi.org/papers.html>

⁴<http://www.ats-lang.org/>

⁵<http://jats-ug.metasepi.org/>

⁶<http://fpiot.metasepi.org/>

September 2014 - December 2014: Software engineer (trustee agreement) at Axsh co., LTD.

- Develop an OpenFlow application named “OpenVNet” ⁷

March 2012 - July 2013: Software Engineer (permanent employee) at MIRACLE LINUX CORPORATION

- Verify PowerPC Linux and debug/fix SMP Race Condition
- Debug and fix PowerPC crash command’s virtual memory paging BUG
- Design new Windows installer using NSIS
- Introduce and maintain new git server for internal use
- Verify and tune performance of Digital Signage on new hardware

April 2001 - February 2012: Software Development Engineer (permanent employee) at Ricoh Company, Ltd.

April 2010: Port OS to new x86 hardware

I ported NetBSD-2.0 to new x86 hardware, and calculated boot time before porting OS.

April 2008: Develop and technical support NetBSD OS

I became technical leader to maintain and support Ricoh’s multifunction printer. Also I debugged and fix many kernel level BUGs. I designed power down process by software trigger.

April 2006: Develop POSIX thread library

I replaced user level POSIX thread library with NetBSD-2.0 m:n thread. My efforts are following.

- Research the presence of thread-safe and cancel-safe in kernel, libc and libpthread.
- Write test code to get thread-safe and cancel-safe.
- Add API into the m:n thread library. Because printer application depend on the missing API.
- Debug and fix signal BUGs in the m:n thread library.

June 2004: Tune multifunction printer boot time as 10 seconds

Before my tune, the printer boot time is 30 seconds. Ricoh’s multifunction printer “imagio” ⁸ use the method and tool, ever now. Develop a tool analyze log dumped by bootloader, kernel, init process and application. Analyze IPC network, and advice how to get speed to application developer. Split application as groups for pre-boot and post-boot.

October 2003: Develop new BIOS for multifunction printer

Develop new custom BIOS together at the United States.

⁷<https://github.com/axsh/openvnet>

⁸<http://www.ricoh.co.jp/imagio/>

November 2002: Design secure boot for multifunction printer on x86

I re-designed bootloader to support public key algorithm authentication, and designed the format include secure key in SD card

July 2001: Develop BIOS and bootloader for multifunction printer on x86 architecture

My first work at Ricoh. Ricoh's multifunction printer "imagio"⁹ use my bootloader design, ever now. Also I designed hardware dependent data structure to configure bootloader and kernel, and Option BIOS to boot on SD card

Education

- March 2001: Master of Engineering from Department of Electrical and Electronic Engineering, Tokyo Metropolitan University.
The thesis: "Multimode Quartz Crystal Microbalance"¹⁰

Publications and Reports

- Kiwamu Okabe and Hongwei Xi. "Arduino programing of ML-style in ATS"¹¹. ML workshop, 2015.
- Kiwamu Okabe and Takayuki Muranushi. "Systems Demonstration: Writing NetBSD Sound Drivers in Haskell"¹². Haskell Symposium, 2014.
- Kiwamu Okabe. "ATS 言語を使って不変条件を API に強制する".¹³ 夏のプログラミング・シンポジウム 2014, 2014.
- Kiwamu Okabe, Hiroki MIZUNO and Hidekazu SEGAWA. "強い型による OS の開発手法の提案"¹⁴. 第 55 回プログラミング・シンポジウム, 2014.

Activities*Open-source projects***Metasepi Project**¹⁵

- Challenge to create an open-source Unix-like operating system designed with strong type such as ML or Haskell.
- Rewriting NetBSD kernel using Ajhc Haskell compiler. <https://github.com/metasepi/netbsd-arafura-s1>

Ajhc Haskell compiler¹⁶

- Extend and add embedded features to Jhc Haskell Compiler <http://repetae.net/computer/jhc/>.
- Ajhc has thread-safe and reentrant runtime. Also has Erlang style GC. It means Ajhc's Haskell context has own GC heap. GC can run on tiny CPU such as Cortex-M3 with 32kB RAM.

⁹<http://www.ricoh.co.jp/imagio/>

¹⁰<http://ci.nii.ac.jp/naid/110004076869>

¹¹<http://www.metasepi.org/doc/metasepi-icfp2015-arduino-ats.pdf>

¹²<http://metasepi.org/doc/metasepi-icfp2014-demo.pdf>

¹³http://www.metasepi.org/doc/20141101_prosym_summer2014.pdf

¹⁴http://metasepi.org/doc/20140110_prosym55.pdf

¹⁵<http://metasepi.org/>

¹⁶<http://ajhc.metasepi.org/>

Japan ATS User Group ¹⁷

- An user group for ATS language <http://www.ats-lang.org/> promotion of utilization. Translating ATS documents into Japanese.

Debian Maintainer ¹⁸

- Maintained uim package at Debian squeeze, and packages using Haskell at sid.

Carettah ¹⁹

- A presentation tool written with Haskell. My slides http://www.slideshare.net/master_q/ are created by the tool.

Computer Skills

- Languages: Haskell, C, ATS, Intel assembler, Ruby
- Platforms: Linux, NetBSD, Android NDK, MinGW

Reference available upon request

- Kentaro Kuroiwa Research Chief - Centillion Japan Co., Ltd.
- Yasuhiro Yamazaki CEO - Axsh Co., Ltd.
- Takayuki Muranushi - RIKEN Advanced Institute for Computational Science
- Takashi KODAMA CEO - MIRACLE LINUX CORPORATION
- Shigeya SENDA - Ricoh Company, Ltd.
- Hitoshi Sekimoto Professor - Tokyo Metropolitan University, Department of Electrical and Electronic Engineering

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¹⁷<http://jats-ug.metasepi.org/>

¹⁸<http://qa.debian.org/developer.php?login=kiwamu@debian.or.jp>

¹⁹<http://carettah.masterq.net/>