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Brief

I launched my career on developing embedded devices using Unix-like kernel at Ricoh Company, Ltd. The experience was not only for designing device drivers but also including debug of virtual memory. And I have experience in IoT platfom such as ARM Cortex-M MCU and RTOS. Also I learned application design using functional language such as Haskell[1], and published some research papers[2] about such languages.
I would like to continue to pursue quality improvement technologies (including security) regardless of the software layer.

Skill Sets

Deep knowledge for Unix-like Kernel and User Space

I am an expert for Unix-like kernel such as Linux, because I provided technical support for NetBSD[3], which is a Unix-like OS similar to Linux, at Ricoh. My skill is not only for NetBSD but also Linux. In fact, a race condition bug in PowerPC Linux kernel was fixed by me in only five days at MIRACLE LINUX.

Wide experience in IoT platform

I have a wide experience in IoT platform such as FreeRTOS, ChibiOS/RT[4], ARM Cortex-M, ESP8266, AVR and MSP430. Also I launched a new IoT business using TWELITE wireless platform[5] at Centillion Japan.

Research Security and Quality

A prototype of own Secure-OS similar to OP-TEE[6] was designed by me at SELTECH. It runs with the other RTOS on ARM Cortex-M MCU. Also I have a wealth of experience in strong static typing language such as Haskell and verification of C language such as VeriFast[7], which are useful to keep the quality of products.

Computer Skills

- Languages: C (12 years), Haskell (5 years), Intel/ARM assembler (5 years), Ruby (5 years), C++ (3 years), PHP (2 years), OCaml (2 years), SQL (1.5 years), Python (1 year), Erlang (1 year), JavaScript (1 year), R (1 year), Go (0.5 years)
- Platforms: Linux (15 years), NetBSD (12 years), Cygwin (2 years), FreeRTOS (1.5 years), ChibiOS/RT (1.5 years), Android NDK (1 year), MinGW (1 year), Yocto (1 year)
- Database: MySQL (2 years)

[1] https://www.haskell.org/
[2] http://www.metasepi.org/papers.html
[3] http://netbsd.org/
[4] http://www.chibios.org/
[5] https://mono-wireless.com/
[6] https://github.com/OP-TEE/optee_os
[7] https://github.com/verifast/verifast

Work Experience

August 2022 - Present: Systems Engineer (permanent employee) at Systemi.co.ltd

Responsibilities:

- Entrusted development of web applications

Key Achievements:

- Published a payment application running on Android tablet designed with Kotlin language

Reasons for considering a career change:

- Because I wanted to contribute to projects with a long-term perspective rather than short-term work such as contracted development
- Because I realized that embedded development is what I am suited for, not web server-side or Android application development

May 2021 - Present: Freelance Researcher

Responsibilities:

- Improving the quality of open source OS

Key Achievements:

- Found the root causes of FreeBSD OS bugs and vulnerabilities with SRE postmortem style, and avoided them with ATS and VeriFast[8]

August 2021 - February 2022: Systems & Applications Engineer (permanent employee) at NXP Japan Ltd.

Responsibilities:

- Technical support for NXP Microprocessors

Key Achievements:

- Supported audio application using Yocto Linux and Android platform

Reason for changing job:

- Because I was engaged primarily in customer support and did not have the authority to commit to source code, I did not realize the progress and contribution I was working daily

[8] `https://github.com/metasepi/postmortem`

December 2020 - April 2021: Software Engineer (permanent employee) at Donuts Co. Ltd.

Responsibilities:

- Maintained an ERP web application using PHP, Zend Framework, JavaScript, MySQL, and AWS

Key Achievements:

- Created a black-box testing tool running Docker to get better performance and keep quality
- Created a summarizer of MySQL query log using Go language

Reason for changing job:

- The sheer complexity of the business logic and the absence of design documentation made the code extremely difficult to be maintained

July 2013 - November 2020: Freelance Researcher

Responsibilities:

- Researched and developed Ajhc Haskell Compiler[9]
- ATS language[10] evangelist for embedded devices
- Verification evangelist using VeriFast[11], which is a verifier C language programs annotated with pre-conditions and postconditions

Key Achievements:

- Published some research papers[12]
- Translated ATS documents into Japanese[13]
- Translated VeriFast documents into Japanese[14]

October 2019 - March 2020: Software Engineer (trustee agreement) at QuantumCore CORPORATION

Responsibilities:

- Ported a machine learning called “reservoir computing” onto ARM Cortex-M MCU
- Ported the machine learning onto Android platform

Key Achievements:

- Developed a library for linear algebra running on ARM Cortex-M MCU

Reason for changing job:

- Due to commissioned embedded AI project frozen

[9] `http://ajhc.metasepi.org/`
[10] `http://www.ats-lang.org/`
[11] `https://github.com/verifast/verifast`
[12] `http://www.metasepi.org/papers.html`
[13] `http://jats-ug.metasepi.org/`
[14] `https://github.com/jverifast-ug/translate`

February 2018 - July 2018: Software Architect at (contract employee) SHINKAWA LTD.

Responsibilities:

- Researched and developed new software platform for wire bonding during semiconductor device fabrication

Key Achievements:

- Created a parser to understand SHINKAWA own embedded script language
- Evaluated EtherCAT[15] protocol for the realtime application

Reason for changing job:

- Initially, I joined SHINKAWA as a "Linux expert," but as the team was organized, the person they needed was a hardware engineer

August 2014 - October 2017: Part-time Researcher at RIKEN Advanced Institute for Computational Science

Responsibilities:

- Researched functional programming for embedded platform

Key Achievements:

- Published some research papers[16]

Reason for changing job:

- Because RIKEN AICS was going to outsource compilers for supercomputers instead of making them, and my research theme was no longer in line with theirs

November 2016 - October 2017: Expert Engineer (permanent employee) at SELTECH CORPORATION

Responsibilities:

- Researched and developed new Secure-OS for ARM Cortex-M platform

Reason for changing job:

- Due to the dissolution of the Secure OS project for Cortex-M microcontrollers that I was working on

February 2016 - November 2016: Software Engineer (contract employee) at Life Robotics Inc.

Responsibilities:

- Developed GUI application running on Ubuntu OS, using C++ and Qt[17] for single arm robot

Key Achievements:

- Designed a network protocol for the robotics application

Reason for changing job:

- Commuting time was taking 4 hours round trip, and I was reaching my physical limit

[15] `https://www.ethercat.org/`
[16] `http://www.metasepi.org/papers.html`
[17] `https://www.qt.io/`

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

Responsibilities:

- Technical support for stock chart application using JavaScript
- Maintained MySQL database servers
- Manager for offshore development in China

Key Achievements:

- Launched new IoT business for farming
- Design a platform[18] to accelerate R[19] programs

Reason for changing job:

- For the opportunity to return to embedded development after a career that had once moved to the web server side

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

Responsibilities:

- Developed an OpenFlow application named "OpenVNet"[20]

Key Achievements:

- Provisioned and automated deploying the OpenVNet on AWS platform using Ruby and GNU make

Reason for changing job:

- Because they did not receive commensurate compensation for the hours worked

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

Responsibilities:

- Developed own Digital Signage platform running on Intel architecture using Linux OS, C++, OpenGL, GTK+[21], GStreamer[22]
- Supported and debugged own Linux distribution

Key Achievements:

- Debugged and fixed a race condition in the SMP kernel on PowerPC platform
- Debugged and fixed bug of crash[23] command's PowerPC virtual memory
- Designed new Windows installer using NSIS[24]

Reason for changing job:

- I wanted to do business with a Haskell compiler that I had been developing privately

[18] `https://github.com/centillion-tech/kick-r`
[19] `https://www.r-project.org/`
[20] `https://github.com/axsh/openvnet`
[21] `https://www.gtk.org/`
[22] `https://gstreamer.freedesktop.org/`
[23] `http://people.redhat.com/~anderson/`
[24] `http://nsis.sourceforge.net/`

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

Responsibilities:

- Developed own platform for multi-function printer based on NetBSD OS

Key Achievements:

- Developed OptionBIOS and bootloader for the platform on Intel architecture
- Designed secure boot for the platform on Intel architecture
- Compressed boot time of the printer onto 10 seconds
- Verified m:n POSIX thread library

Reason for changing job:

- Because we wanted to develop a smaller organization with faster decision making

Education

- March 2001: Master of Engineering from Department of Electrical and Electronic Engineering, Tokyo Metropolitan University.
  The thesis: "Multimode Quartz Crystal Microbalance"[25]

Publications and Reports

- Kiwamu Okabe and Hongwei Xi. "Arduino programing of ML-style in ATS"[26]. ML workshop, 2015.
- Kiwamu Okabe and Takayuki Muranushi. "Systems Demonstration: Writing NetBSD Sound Drivers in Haskell"[27]. Haskell Symposium, 2014.
- Kiwamu Okabe. "ATS 言語を使って不変条件を API に強制する".[28] 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"[29]. 第 55 回プログラミング・シンポジウム, 2014.

Activities

Open-source projects

Metasepi Project[30]

- 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`

[25] `http://ci.nii.ac.jp/naid/110004076869`
[26] `http://www.metasepi.org/doc/metasepi-icfp2015-arduino-ats.pdf`
[27] `http://metasepi.org/doc/metasepi-icfp2014-demo.pdf`
[28] `http://www.metasepi.org/doc/20141101_prosym_summer2014.pdf`
[29] `http://metasepi.org/doc/20140110_prosym55.pdf`
[30] `http://metasepi.org/`

Ajhc Haskell compiler[31]

- 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.

Japan ATS User Group[32]

- An user group for ATS language promotion of utilization. Translating ATS documents into Japanese.

Debian Maintainer[33]

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

Last updated: December 7, 2022

[31] `http://ajhc.metasepi.org/`
[32] `http://jats-ug.metasepi.org/`
[33] `http://qa.debian.org/developer.php?login=kiwamu@debian.or.jp`