Younghwan Go

Contact Information

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Research Interests

Routing, VPN, IPv4/IPv6
Networked Systems, Mobile Network, Network Security

Skills

C/C++, Java, Python, Scala, Ruby, React, Android, CUDA, OpenCL, SQLite, Linux shell scripting, Unix/GNU Linux

Professional Experience

Cisco Meraki, San Francisco, California, USA

Senior Engineering Manager @ MX Security & SD-WAN Appliance *Feb 2022 – Present*

- I currently lead MX Services Org of 5 teams: SDWAN, Service Provider, Security, Backend, Fast. Org consists of 3 managers and ~30 engineers (junior engineer ~ senior tech lead) located in US, Europe, and Asia). Backend team is a new team created with me. I manage the Org's roadmap of projects with feature scoping, resource planning, customer issue backlog management, and hiring.
- Until Oct 2023, I led 5 teams: Routing, VPN, SDWAN, Service Provider, Fast. Teams consist of 2 managers and ~20 engineers (junior engineer ~ senior tech lead) located in US, Europe, and Asia. VPN, SDWAN, Service Provider, Fast teams are new teams created with me.

Engineering Manager @ MX Security & SD-WAN Appliance *Oct 2020 – Feb 2022*
Senior Software Engineer @ MX Security & SD-WAN Appliance *Dec 2017 – Oct 2020*

- As a member of MX Routing team, I worked on the design and implementation of IPv4/IPv6 routing features in MX device firmware such as AutoVPN, VLAN, static routes, DHCP, and IP firewall. I also led full stack projects for Backend (build data fetcher for MX stats gathering, optimize/fix existing daemons), SRE (scale AutoVPN cloud, build server monitoring tools), and UI (build device config generation, render device performance as graph/table). I also led cross-team/organization projects (work with Cisco BUs to integrate proprietary routing feature into firmware, create and teach in Software Engineering Onboarding).
- MX Monitor: A framework for monitoring MX device performance metrics
  - I worked on a new framework that monitors MX device's performance such as CPU usage and throughput, as well as state of routing features. I did a full stack implementation: 1) device aggregator in firmware that components register to store series of data; 2) database change to store new dataset; 3) backend process to pull data from device; 4) UI to fetch data from database, calculate raw data, and render graph/table.
- VPN Server Scaling: Cloud infra for AutoVPN
  - I worked on a full infra support to monitor and scale Meraki's proprietary site-to-site VPN (AutoVPN). I built a monitoring tool to periodically report VPN server's status, and alert on-duty engineers in case VPN service goes down. I also built the backend support to pull VPN server status, then calculate the least-loaded server to be automatically selected for use. I also modified VPN server code to scale its capacity by 2x.
- Training Path for Software Engineering Onboarding
  - I currently work as a main committee member that created the first training path for software engineering onboarding at Meraki. I lead the overall logistics (planning, work assignments) as well as teach during onboarding with modules I built (firmware training, org overview, tools training, and security best practices).

Samsung Research America, Mountain View, California, USA *June – Sep* *2015*

Research Intern @ Distributed Systems, CSIC (*Mentor: Juan Colmenares, Daniel Waddington*)

- SPEX: A framework for system performance exploration and analysis
  - I worked on building a performance exploration and analysis framework that characterizes third-party systems' performance in relation to configuration parameters. It enables automatic performance exploration for systems by monitoring the system's performance with probes and varying configuration parameters depending on pluggable exploration policy module.

NEC Laboratories America, Princeton, New Jersey, USA *June – Sep* *2013*

Summer Research Assistant @ Storage Group (*Mentor: Nitin Agrawal, Cristian Ungureanu*)

- Simba: Reliable, consistent and efficient data sync platform for mobile apps
  - I worked on building a reliable data management service with an abstraction layer that unifies metadata tabular and file object data. I also built a high-level API for mobile app developers to use, which transparently handles data storage and synchronization. It guarantees reliability and consistency during network and device failures, and minimizes resource usage with delay-tolerant data transfers.

Education

Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Republic of Korea

- **Ph.D. student**, Electrical Engineering *Feb 2018*
  - Advisor: KyoungSoo Park
  - Thesis: "Design Consideration for Secure and Reliable Networked Systems with High Performance"
- **M.S. student**, Electrical Engineering & Information Security *Feb 2013*
  - Advisor: KyoungSoo Park
  - Thesis: "Research on Offloading Delay-tolerant Cellular Traffic via Wi-Fi"
- **B.S.**, Electrical Engineering *Feb 2011*

Research Experience

Networked and Distributed Computing Systems Laboratory *Feb 2011-*

Graduate Researcher, School of Electrical Engineering, KAIST

- **APUNet**: High-performance APU-accelerated network packet processor [**NSDI'17**]
- **Simba**: Reliable, consistent and efficient data sync platform for mobile apps [**FAST'15, EuroSys'15**]
- **Abacus**: Accurate cellular data traffic charging via high-speed accounting system [**NDSS'14**]
- **Cedos**: Disruption- and delay-tolerant mobile network system for mobile apps [**MobiSys'15, ToN'17**]
- **SPEX**: A framework for system performance exploration and analysis [**EWiLi'16**]
- **SIoT**: Secure network platform for IoT devices via access-controlled gateway
- **GPU-SE**: GPU-based parallel symbolic execution system for high-speed malware detection
- **HumanSign**: Human-attestable Internet message composition framework

Publications

[1] YoungGyoun Moon, Donghwi Kim, **Younghwan Go**, Yeongjin Kim, Yung Yi, Song Chong, and KyoungSoo Park, *"Cedos: A Network Architecture and Programming Abstraction for Delay-Tolerant Mobile Apps"*, In IEEE/ACM ToN, 25(2), pp. 646-661, April, 2017.

[2] **Younghwan Go**, Muhammad Jamshed, YoungGyoun Moon, Changho Hwang, and KyoungSoo Park, "*APUNet: Revitalizing GPU as Packet Processing Accelerator*", In Proceedings of NSDI, Boston, MA, March 2017.

[3] **Younghwan Go**, and Juan A. Colmenares, *"Enabling Performance Exploration and Analysis for Multi-parametric Systems"*, In Proceedings of EWiLi, Pittsburgh, PA, October 2016.

[4] YoungGyoun Moon, Donghwi Kim, **Younghwan Go**, Yeongjin Kim, Yung Yi, Song Chong, and KyoungSoo Park, "*Practicalizing Delay-Tolerant Mobile Apps with Cedos*", In Proceedings of MobiSys, Florence, Italy, May 2015.

[5] Dorian Perkins, Nitin Agrawal, Akshat Aranya, Curtis Yu, **Younghwan Go**, Harsha Madhyastha, and Cristian Ungureanu, "*Simba: Tunable End-to-End Data Consistency for Mobile Apps*", In Proceedings EuroSys, Bordeaux, France, April 2015.

[6] **Younghwan Go**, Nitin Agrawal, Akshat Aranya, and Cristian Ungureanu, "*Reliable, Consistent, and Efficient Data Sync for Mobile Apps*", In Proceedings of FAST, Santa Clara, CA, February 2015.

[7] YoungGyoun Moon, Donghwi Kim, **Younghwan Go**, Yung Yi, Song Chong, and KyoungSoo Park, *"Cedos: a Practical Cellular Data Offloading System for Mobile Users"*, In Proceedings of ATC, Philadelphia, PA, June 2014. (Poster Session)

[8] **Younghwan Go**, Jongil Won, Denis Foo Kune, EunYoung Jeong, Yongdae Kim, and KyoungSoo Park, "*Gaining Control of Cellular Traffic Accounting by Spurious TCP Retransmission*", In Proceedings of NDSS, San Diego, CA, February 2014.

[9] **Younghwan Go**, Denis Foo Kune, Shinae Woo, KyoungSoo Park, and Yongdae Kim, "Impact of Malicious TCP Retransmission on Cellular Traffic Accounting", In Proceedings of S3, Miami, FL, September 2013. – **Awarded Best Paper**

[10] **Younghwan Go**, Denis Foo Kune, Shinae Woo, KyoungSoo Park, and Yongdae Kim, "*Towards Accurate Accounting of Cellular Data for TCP Retransmission*", In Proceedings of HotMobile, Jekyll Island, GA, February 2013.

[11] **Younghwan Go**, YoungGyoun Moon, and KyoungSoo Park, *"Deploying a Practical Mobile CDN System with Delay-Tolerant Data Offloading"*, In Telecommunications Review (TR), 22(5), pp. 667-677, October 2012.

[12] **Younghwan Go**, YoungGyoun Moon, and KyoungSoo Park, *"Enabling DTN-based Data Offloading in Urban Mobile Network Environments"*, In Proceedings of CFI, Seoul, South Korea, September 2012. (Poster Session)

[13] **Younghwan Go**, YoungGyoun Moon, Giyoung Nam, and KyoungSoo Park, "*A Disruption-tolerant Transmission Protocol for Practical Mobile Data Offloading*", In Proceedings of MobiOpp, Zurich, Switzerland, March 2012.

[14] Muhammad Jamshed, **Younghwan Go**, and KyoungSoo Park, *"Suppressing Malicious Bot Traffic Using an Accurate Human Attester"*, In Proceedings of NSDI, Boston, MA, March 2011. (Poster Session)

Invited Talks

Gaining Control of Cellular Traffic Accounting by Spurious TCP Retransmission

- A3 Foresight Program - Gyeongju, Korea *Jul. 14 2014*
- Columbia University - CS Conference room 452 *Sep. 25 2013*

- Princeton University - Computer Science 402 *Sep. 19 2013*

HumanSign: Accurate Bot Detection with Reliable Human Attestation

- A3 Foresight Program - Shanghai, China *Jun. 29 2012*

Teaching Experience

Korea Advanced Institute of Science and Technology (KAIST)

Teaching Assistant, School of Electrical Engineering

- EE209 Programming for Electrical Engineering - *Preceptor* *Fall 2012, Spring/Fall 2016*
  - I carried out a weekly recitation class, teaching the basics of C programming such as abstract data types, heap memory management with assembly language, stack implementation, sorting algorithms, and shell.
- EE205 Data Structures and Algorithms for Electrical Engineering *Fall 2015*
- EE323 Computer Networks *Spring 2015*
- EE505 Electronics Design Lab. <Linux Programming> - *Head TA* *Fall 2014*
- EE505 Electronics Design Lab. <Confidence Interval> *Spring 2014*
- EE515 Theory of Hacking *Fall 2013*
- EE505 Electronics Design Lab. <GPU Programming (CUDA)> *Spring 2013*

Research Projects (Selected)

APUNet: High-performance APU-accelerated network packet processor *Jan 2015 – Mar 2017*

Many research works have exploited GPU's highly-parallel computation capacity and large memory bandwidth to accelerate packet processing in network applications. However, a recent work argues that GPU's inherent memory access latency hiding feature is the key enabler for high performance, and optimizing CPU code with this feature can outperform GPU. We revisit this claim and find that (a) there are many compute-bound algorithms that do benefit from GPU's parallel computation capacity while CPU-based optimizations fail to help, and (b) the relative performance advantage of CPU over GPU in the work is mostly due to data transfer bottleneck in PCIe communication of discrete GPU rather than the lack of capacity of GPU itself. Then, we suggest that integrated GPU in recent APU platforms can be used as the most cost-effective packet processing accelerator without the PCIe bottleneck. We address a number of practical issues in fully exploiting the capacity of APU and show that network applications based on APU achieve multi-10 Gbps performance for many compute/memory-intensive algorithms.

Simba: Reliable, consistent and efficient data sync platform for mobile apps *Jun 2013 – May 2015*

Mobile apps need to manage data, often across devices, to provide users with a variety of features such as seamless access, collaboration, offline editing, and cloud processing. To do so reliably, an app must anticipate and handle a host of failures such as network disruption, app crash, server unavailability, and device power loss, all while preserving data consistency. For use in a mobile environment, it is also essential for the app to be frugal with resources such as cellular bandwidth and batter power. We present Simba, a data management service that provides mobile app developers with a high-level local-programming abstraction unifying tabular and object data and transparently handles data storage and sync in a reliable, consistent, and efficient manner. We show Simba's effectiveness in rapid development of robust mobile apps that are consistent under all failure scenarios unlike apps developed with Dropbox. Simba-apps are also demonstrably frugal with cellular resources.
(**Project Page:** http://pages.cs.wisc.edu/~nitina/Simba.php)
(**Open Source:** https://github.com/SimbaService/Simba)

Abacus: Accurate cellular data traffic charging via high-speed accounting system *Feb 2012 – Feb 2014*

Packet retransmission is a fundamental TCP feature that ensures reliable data transfer between two end nodes. Interestingly, when it comes to cellular data accounting, TCP retransmission creates an important policy issue. Regardless of the policies, however, we find that TCP retransmission can be abused to manipulate the current practice of cellular traffic accounting. We investigate the TCP retransmission accounting policies of cellular ISPs and show that it is easy to launch either the "usage-inflation" attack on the ISPs that blindly account for every IP packet by arbitrarily sending retransmission packets even when there is no packet loss or the "free-riding" attack on ISPs that do not account for retransmission by tunneling the payload under fake TCP headers that look like retransmission. To counter the attacks, we implement and evaluate Abacus, a light-weight accounting system that reliably detects "free-riding" attacks even in the 10 Gbps links.
(**Project Page:** http://abacus.kaist.edu/)

Cedos: Disruption- and delay-tolerant mobile network system for mobile apps *May 2011 – May 2015*

Delay-tolerant Wi-Fi offloading is known to improve overall mobile network bandwidth at low delay and low cost. Yet, in reality, we rarely find mobile apps that fully support opportunistic Wi-Fi access. This is mainly because it is still challenging to develop delay-tolerant mobile apps due to the complexity of handling network disruptions and delays. In this work, we present Cedos, a practical delay-tolerant mobile network access architecture in which one can easily build a mobile app. We demonstrate the practicality of Cedos by porting mobile Firefox and VLC video streaming client to using our API. We also implement delay/disruption-tolerant podcast client and run a field study. We find that up to 92.4% of the podcast traffic is offloaded to Wi-Fi, and one can watch a streaming video in a moving train while offloading 48%

of the content to Wi-Fi without a single pause.
(**Project Page:** http://cedos.kaist.edu/)
(**Open Source:** https://github.com/ndsl-kaist/cedos)

SPEX: A framework for system performance exploration and analysis *Jun 2015 – Oct 2016*
Tuning third-party systems is time-consuming and sometimes challenging, particularly when targeting multiple embedded platforms. Unfortunately, system integrators, application developers, and other users of third-party systems lack proper tools for conducting systematic performance analysis on those systems, and have no easy way to reproduce the systems' advertised performance and identify configurations that yield excellent, fair, or poor behavior. To fill this void we introduce SPEX, a framework aimed at making it easier to characterize third-party systems' performance in relation to configuration parameters. SPEX enables automatic performance exploration for systems with no need to access their source code. It offers the flexibility to dene pluggable policies that steer the exploration process by varying configuration parameters of the observed system. Our results show that SPEX adds little overhead to the monitored system, and suggest that it can be effective in providing useful information to third-party system users.

Relevant Coursework

Programming for Electrical Engineering, Embedded Systems, Computer Architecture, Computer Networks, Data Structures, Operating Systems, Distributed Computing Systems, Communications and Computing Lab, Information Security, Cyber Attack and Response, Wireless Mobile Internet and Security, Theories for System Research, Networked Systems and Security

Honors

KAIST Annual Honor Roll Award 2015
KAIST Breakthroughs of the Year 2015, Spring with Abacus Project
KAIST Annual Honor Roll Award 2014
KAIST EE Research Achievement of the Year 2014 with Abacus Project
Microsoft Research Asia Fellowship 2013 – Nomination Award Winner
Best paper award for ACM S3 2013

References

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