

Qiaobin Fu

CONTACT INFORMATION	Computer Science Department, Boston University, 111 Cummington Mall Rm 138, Boston, MA 02215	<i>Mobile:</i> +1 (617) 396 - 0510 <i>E-mail:</i> qiaobinf@bu.edu
RESEARCH INTEREST	Computer networking, XIA, high-speed networking, cloud computing, DoS protection, Software-defined networking (SDN)	
EDUCATION	<i>PhD student in Computer Science</i> Boston University (BU), Boston, MA	Sept. 2014 to Present
	<i>M.S. in Computer Science</i> University of Chinese Academy of Sciences (UCAS), Beijing, China	Sept. 2011 to Jul. 2014
	<i>B.E. in Software Engineering</i> Dalian University of Technology (DUT), Dalian, China	Sept. 2007 to Jun. 2011
PUBLICATIONS	<ol style="list-style-type: none">[1] Tong Yang, Alex X. Liu, Yulong Shen, Qiaobin Fu, Dagang Li, Xiaoming Li. Fast OpenFlow Table Lookup with Fast Update. In IEEE INFOCOM 2018.[2] Tong Yang, Alex Liu, Muhammad Shahzad, Dongsheng Yang, Qiaobin Fu, Gaogang Xie, and Xiaoming Li. "A Shifting Framework for Set Queries." In IEEE/ACM ToN 2017.[3] Michel Machado, Cody Doucette, Qiaobin Fu, and John W. Byers. "Gatekeeper: A Network Capability System for Pioneers." Poster presented at NENS'16, October 7, 2016.[4] Tong Yang, Alex X. Liu, Qiaobin Fu, Dongsheng Yang, Steve Uhlig, Xiaoming Li. "Fit the Elephant in a Box - Towards IP Lookup at On-chip Memory Access Speed." In IEEE ICNP 2016, Poster.[5] Tong Yang, Alex X. Liu, Muhammad Shahzad, Yuankun Zhong, Qiaobin Fu, Zi Li, Gaogang Xie, and Xiaoming Li. "A Shifting Bloom Filter Framework for Set Queries." In <i>Proceedings of the 42th International Conference on Very Large Data Bases (VLDB)</i>, Vol. 9, New Delhi, India, September, 2016.[6] Tong Yang, Gaogang Xie, Yanbiao Li, Qiaobin Fu, Alex X. Liu, Qi Li and Laurent Mathy. "Guarantee IP Lookup Performance with FIB Explosion." In <i>Proceedings of the ACM SIGCOMM Conference (SIGCOMM)</i>, Chicago, Illinois, August, 2014.	
TALKS AND PRESENTATION	<ol style="list-style-type: none">[1] Qiaobin Fu. "Alibi Routing". Presented at the Boston University Network Reading Group, Boston University, October 13, 2015. Paper originally published in SIGCOMM 2015 by Dave Levin et al.[2] Qiaobin Fu, Michel Machado, and John W. Byers. "Worldwide Mentorship on Linux XIA via Google Summer of Code". Poster presented at FIA Project Meetings, MIT, June 2, 2015.[3] Qiaobin Fu. "A Faster Bloom Filter: Less Overhead, Similar False Positive Rate". Poster presented at the Computer Science Department Corporate Partners Day, Boston University, March 20, 2015.[4] Qiaobin Fu. "Cuckoo Filter: Practically Better Than Bloom". Presented at the Boston University Network Reading Group, Boston University, February 23, 2015. Paper originally published in CoNEXT 2014 by Bin Fan et al.	

- [5] **Qiaobin Fu**. “Guarantee IP Lookup Performance with FIB Explosion”. Presented at the Boston University Network Reading Group, Boston University, September 15, 2014.
- [6] **Qiaobin Fu**. “Guarantee IP Lookup Performance with FIB Explosion”. Presented at the ACM SIGCOMM conference, Chicago, Illinois, August 19, 2014.

RESEARCH AND
PROJECT

Graduate Research Assistant @ Boston University

Gatekeeper: A DDoS Protection System

Prof. John W. Byers

May 2016 to Present

- The open-source project is at <https://github.com/AltraMayor/gatekeeper>
- Conducted research on DDoS defense schemes
- Implemented and deployed the Gatekeeper system in collaboration with partner ISP
- Investigated memory prefetching techniques to accelerate networking applications
- Investigated data streaming algorithms to black hole the overloading destinations

XIA: eXpressive Internet Architecture

Prof. John W. Byers

Sept. 2014 to Present

- The open-source project is at <https://github.com/AltraMayor/XIA-for-Linux>
- Extended Open vSwitch (OVS) to support XIA, and built a network marketplace - <https://github.com/BU-NU-CLOUD-SP16/Building-a-Network-Marketplace-with-XIA>
- Conducted experiments on hash table algorithms for mapping XID types to loaded principals - <https://github.com/mengxiang0811/GSoC15-perfect-hashing>
- Mentored the GSoC 2017 Linux XIA project - “Implementing the Ethernet principal”
- Mentored the GSoC 2016 Linux XIA project - “Upgrading the FIB hash table of principals to the relativistic hash table”
- Mentored the GSoC 2015 Linux XIA project - “Implementing perfect hashing for mapping XID types to loaded principals”

Research Assistant @ Institute of Computing Technology

Guarantee IP Lookup Performance with FIB Explosion

Prof. Gaogang Xie

Dec. 2013 to Feb. 2014

- This project proposes a memory efficient lookup scheme, which can be easily implemented on FPGA, GPU, CPU and Many-core platforms. For IPv4 FIBs, the amortised raw lookup average measure exceeds 300 Gbps for small 64-byte packets on both the CPU and GPU platform
- Conducted research and experiments on the scheme for both IPv4 and IPv6 FIBs

Research on URL Matching Algorithms in Wireless Router and its Application (Master Thesis)

Prof. Gaogang Xie

Dec. 2013 to Jun. 2014

- Research in time-efficient and space-efficient algorithms on URL matching

Service-Aware Oriented Network Measurement Platform (973 Program)

Prof. Gaogang Xie

Sept. 2010 to Nov. 2013

- Designed and implemented the system architecture with a specialized NIC , achieving a throughput of 4Gbps
- Participated in research on massive network traffic index and query, proposed an efficient index method, and reduced response time to 10% and index disk space to 50% at most, compared with Fastbit
- Implemented a Bandwidth Control System, supporting enterprise application with various types of control policies
- Proposed a time efficient algorithm based on PAT tree and Hash table to implement a virtual link module. A virtual link can be a collection of multiple physical links or a cluster of clients classified by specific rules

- Designed and implemented a Network Data Export System. Export content includes raw packet and flow. Flow Export formats, such as Netflow V5/V9 and sFlow, are supported. Export methods include file, JSON and socket

Netflow Probe

Prof. Gaogang Xie Mar. 2012 to Jul. 2012

- Improved total system performance by 5 times, resulting in a throughput of 10Gbps
- Added support for commodity NIC, Intel 82599 10GbE, by Netmap solution

Research Assistant @ Dalian University of Technology

Search Results Clustering

Prof. Xianchao Zhang Nov. 2008 to Jun. 2009

- Investigated and analyzed the characteristics of traditional text clustering algorithms
- Developed a clustering system based on Suffix Tree and Key Features respectively

Distance-vector v.s. Path-vector routing protocol Fall 2015

Flow scheduling schemes: FIFO v.s. RR v.s. DRR Fall 2015

Go-Back-N v.s. Selective-Repeat ARQ Fall 2015

Using an Echo Application to Measure TCP Performance Fall 2015

Movie Preference Prediction Fall 2014

Identification of co-authorship links by snapshot from DBLP Fall 2014

Identification of social links by sampled Flickr's network Fall 2014

Node Distances in Probabilistic Graph Databases Fall 2014

An Efficient URL Filtering Engine for Home Gateway Dec. 2013 to Jun. 2014

Reconstruction of Linux-0.11 OS Kernel (C) Apr. 2012 to Jun. 2012

Sina Micro-blog Real Time Indexing System (Lucene) Feb. 2012 to Apr. 2012

P2P Traffic Management System (C) Mar. 2010 to Aug. 2010

Personalized Ranking of Search Results (C++) Jun. 2009 to Feb. 2010

A Tiny Search Engine - Happy Search (Java, MySQL) Mar. 2009 to Jun. 2009

PATENT

- [1] **Qiaobin Fu**, Guangxing Zhang, Gaogang Xie, Taihua He and Shangwen Dong.
 "A Smart Method and Apparatus for DDoS Defense." ICT, Chinese Academy of Sciences, filed in China.

INTERNSHIP

Congestion Control at Data Center Networks (Upcoming)

Summer internship at Google, Sunnyvale, CA, USA May 2018 to Aug. 2018

Hadoop Dynamic Scaling

Research internship at Argonne National Laboratory, USA May 2017 to Aug. 2017

- Investigated scalability patterns of a geospatial analysis application, UrbanFlow
- Proposed scaling policies that will optimize response time for various workloads
- Developed an OpenStack-based dynamic scaling engine that can enact such policies

Network Monitoring and Control System with Multi-cards

Industry Innovation Center for Future Network, China Oct. 2012 to May 2013

- Research in high performance monitoring system
- Participated in design and implementation of a system architecture for the platform

ABILITIES AND SKILLS

- Proficient in C/C++
- Familiar with Linux kernel environment and Networking software development
- Practical experience in MapReduce, Shell, Java, Python, and Spirent TestCenter
- English Proficiency: TOEFL 98(R28; L22; S20; W28), GRE(V151; Q170; AW3.0)

TEACHING EXPERIENCE

- Google Summer of Code (GSoC), Mentor 2015 to 2018
- CS 655 - Computer networks, TA Fall 2017

- CS 350 - Fundamentals of computing systems, TA 2015 to 2018
- CS 103 - Internet technologies and web programming, TA Fall 2015
- CS 101 - Introduction to computing, TA Summer 2015

AWARDS

- Meritorious Winner in Mathematical Contest in Modeling (MCM) 2010
- Outstanding Graduate of Liaoning Province (2%) 2011
- China's National Scholarship, Ministry of Education of China (2%) 2008, 2010
- China's National Endeavour Scholarship, Ministry of Education of China 2009
- Outstanding Graduate Student, CAS 2012
- First Prize in Mathematical Contest in Modeling in Northeast China 2009
- Second Prize in ACM/ICPC Programming Contest of Liaoning Province 2008
- Scholarship for innovation of technology, DUT (4%) 2008 – 2010
- Course-completion certificate of School of Innovation Experiment, DUT (2011)
- First Prize in Robocup Contest in School of Software, DUT (2008)
- Scholarship for social practice, DUT (4%) (2010)
- Second Prize in China National Mathematics Olympiad (2006)