EMINE UGUR KAYNAR

111 Cummington Mall , MCS 230, Boston, MA 02215, USA
https://www.ugurkaynar.com/
ukaynar@bu.edu 857-250-5678

EDUCATION

Ph.D. Candidate in Computer Science
Boston University *Sep 2013 - present*
Thesis title: "Caching Architecture for Datacenters" GPA: 3.8/4.00
Advisor: Orran Krieger

M.Sc. in Computer Science
State University of New York at Binghamton *Sep 2011 - August 2013*
Thesis title: "Impact of encryption on live virtual machine migration" GPA: 3.75/4.00
Advisor: Ping Yang

B.Sc. in Information Systems Engineering
Bogazici University, Istanbul, Turkey (Dual Diploma Program) *Sep 2007 - May 2011*
State University of New York at Binghamton

RESEARCH INTERESTS

My research interests lie broadly in the fields of **storage systems**, **cloud computing** and **big data analytics**. Currently, my research is focused on storage-related topics including **caching systems**, **erasure coding** and **distributed storage systems**.

PUBLICATIONS

- Mania Abdi, Amin Mosayyebzadeh, Mohammad Hossein Hajkazemi,**E. Ugur Kaynar**, Ata Turk, Larry Rudolph, Orran Krieger, Peter Desnoyer, "A Community Cache with Complete Information", **USENIX FAST'20**.
- **E. Ugur Kaynar**, Mania Abdi, Mohammad Hossein Hajkazemi, Ata Turk, Raja R Sambasivan, Larry Rudolph, David Cohen, Peter Desnoyers, Orran Krieger,"D3N: A multi-layer cache for the rest of us", **IEEE Big Data'19**.

  E. Ugur Kaynar, Mohammad Hossein Hajkazemi, Mania Abdi, Ata Turk, Raja R Sambasivan, Larry Rudolph, David Cohen, Peter Desnoyers, Orran Krieger,"D3N: A multi-level cache for improving big-data applications' performance in datacenters with imbalanced networks (Poster Only)", **USENIX ATC'18**.
- Apoorve Mohan, Ata Turk, Ravi S Gudimetla, Sahil Tikale, Jason Hennesey, **E. Ugur Kaynar**, Gene Cooperman, Peter Desnoyers, Orran Krieger, "M2: Malleable Metal as a Service", **IEEE IC2E'18**.
- Jason Hennessey, Sahil Tikale, Ata Turk, **E. Ugur Kaynar**, Chris Hill, Peter Desnoyers, Orran Krieger, "HIL: Designing an Exokernel for the Data Center", **ACM SoCC'16**.
- Ata Turk, Ravi S. Gudimetla, **E. Ugur Kaynar**, Jason Hennessey, Sahil Tikale, Peter Desnoyers, Orran Krieger, "An Experiment on Bare-Metal BigData Provisioning", **USENIX HotCloud'16**.
- Yaohui Hu, Sanket Panhale, Tianlin Li, **E. Ugur Kaynar**,, Danny Chan, Umesh Deshpande, Ping Yang, Kartik Gopalan. "Performance Analysis of Encryption in Securing the Live Migration of Virtual Machines", **IEEE CLOUD'15**.

RESEARCH SUMMARIES

- **D4N: Directory Based Global Storage Solution for Data Centers** *Spring'20 - Present*
  In this project, we propose a restructuring of the cloud storage stack, allowing composability and innovation in cloud storage systems while giving users the flexibility to both move their data and associated services between different clouds and regions and to build novel services out of provider and third-party components. As part of this work we propose an architecture - D4N, Directory Based Global Storage System - based on immutable storage, designed to work at a global scale, across clouds and organizations.

- **D3N: A multi-layer cache for big-data analytics** *Summer'16 - Summer'19*
  D3N is a novel multi-layer cooperative caching architecture that mitigates network imbalances by caching data on the access side of each layer of hierarchical network topology. The prototype of D3N, which incorporates a two-layer cache has been implemented as a modification to Ceph RADOS Gateway and is currently being productized and integrated into upstream Ceph by RedHat. To fully utilize bandwidth within each layer under dynamic conditions, D3N provides an algorithm that adaptively adjusts cache sizes based on observed workload patterns and congestion. D3N is highly-performant and significantly improves big-data jobs performance.

- **Erasure Coding for Performance** *Summer'18 - Present*
  In this project, we provide a detailed performance comparison of replication and erasure coding in a modern distributed object store deployment using a simple mathematical model and empirical analysis, and investigate the impact of storage solution characteristics (e.g. disk capacity, network bandwidth) and workloads I/O profiles (read/write ratios) on the performance. In addition, we show that a simple read cache increases the write fraction of the workload significantly, where erasure coding has an great advantage. For both approaches, we point the possible improvements which may improve the performance of redundancy solutions.

- **Bare-Metal Imaging** *Fall'15 - Spring'16*
  Designed and implemented The Bare Metal Imaging (BMI) service which provisions and deprovision baremetal nodes so that boundaries between clusters could be changed dynamically.

- **Impact of Encryption on Live VM Migration** *Fall'12 - Spring'13*
  Analyzed the impact of encryption on live VM migration and compared different migration techniques (pre-copy, post-copy, demand paging...etc.) when VM migration traffic is encrypted using different encryption algorithms.

INTERNSHIP EXPERIENCE

Redhat Inc.
Research Intern June 2017 - Present

- Design and implement D4N storage solution for data centers.
- Examine a detailed analysis of the performance comparison of the two redundancy schemes in a Ceph Object Storage deployment using a simple mathematical model and empirical analysis, and investigate the impact of storage solution characteristics (e.g. disk capacity, network bandwidth) and workloads I/O profiles (read/write ratios) on the performance.
- Evaluate performance of CEPH Object Storage while simulating OSD node failure and recovery.
- Examine the performance of D3N cache architecture for Object Storage system by running diverse I/O-intensive workloads.

Index Group A.S., Turkey
Software Developer Intern Summer 2010

- Developed and maintained custom modifications to the company's ERP system. Implemented database transactions using stored procedures and took backups for disaster recovery.

Arti Technology A.S., Istanbul, Turkey
Software Developer Intern January-March 2010

- Worked as a tester in shopping chart application for Iphone, called SAF RecipeBox and mobile application titled Turkcell Goller Cepte. I designed and executed test procedures and reported incidents.

TEACHING AND MENTORING EXPERIENCE

Teaching Assistant
Department of Computer Science, Boston University

- CS 591/ EC500 Cloud Computing Spring 2016
- CS 108 Introduction to Application Programming Spring & Fall 2014/2015
- CS 111 Introduction to Computer Science Summer 2015

Department of Computer Science, SUNY at Binghamton

- CS458/CS558 Introduction to Computer Security Spring 2013
- CS 571 Programming Languages Fall 2012

Project Mentoring
Department of Computer Science, Boston University

- Team of PhD students, CS 591/ EC500 - Cloud Computing Class Project Spring 2019
  Ceph RGW-Prefetching: Implementation of a prefetching mechanism for the existing two level RGW read only cache.
- Team of MSc students, CS 591/ EC500 - Cloud Computing Class Project Spring 2016
  Mass Open Cloud Monitoring Platform: Deployment of the cloud monitoring infrastructure (*Openstack Monasca+Kafka+InfluxDB+Grafana*) that collects a number of different metrics from several layers of the cloud in the MOC datacenter.

TALKS

- D3N: A multi-layer cache for data centers **DevConf.us '19**
- D3N: A multi-layer cache for data centers **MassOpenCloud Workshop '18**
- Big Data as a Service at Mass Open Cloud **OpenStack Summit '17**
- Big Data Caching for Datacenters **MassOpenCloud Workshop '16**
- Automated Deployment of Big Data Processing Environment **New England Networks and Systems Day '15**

PROFESSIONAL SKILLS

- **Programming/Scripting:** Python, C/C++, Bash, Java, LATEX.
- **Storage Systems:** Ceph, HDFS
- **Big Data Ecosystems:** Hadoop, Spark, Hive, Pig, Zookeeper.
- **System Profiling:** perf, blktrace, gdb, fio, sysstat, tcpdump, fio, strace, pbench, wireshark
- **Others:** Ansible, Openstack, Monasca, Ceilometer, Kafka, InfluxDB, MongoDB, Grafana.

ORGANIZER

- Seminar of the System Research Group at Boston University 2019-2020
- MassOpenCloud Reading Group 2016-2018

AWARDS & HONORS

Usenix NSDI Conference Diversity Travel Grant, 2019

MEMBERSHIPS

Usenix, IEEE, ACM, ACM's Women in Computing, Women Techmakers, System Research Group at Boston University

ACTIVITIES

Filmmaking: Member of Bogazici Cinema Club. I am interested in films and film making. I made an amateur short film called "So-called Right" in 2013.
Sports: 3 times Bronze medalist in 100m backstroke in *Women National Open Swimming Championship of Turkey* from 2000 to 2002. Captain of Samsun Gazi Swimming Club from 2005 to 2009.

REFERENCES

Prof. Orran Krieger	okrieg@bu.edu	http://www.bu.edu/cci/okrieg/
Prof. Larry Rudolph	rudolph@csail.mit.edu	http://people.csail.mit.edu/rudolph/
Prof. Peter Desnoyers	pjd@ccs.neu.edu	http://www.ccs.neu.edu/home/pjd/
Dr. Ata Turk	ataturk@bu.edu	http://ataturk.github.io/
Brett Niver	bniver@redhat.com	https://www.linkedin.com/in/brettniver/