Sundaresan Rajasekaran

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EDUCATION

THE GEORGE WASHINGTON UNIVERSITY
September 2017 (Expected) | **Doctor of Philosophy** in Computer Science
Advisor: Prof. Timothy Wood
GPA: 3.81/4.00

STANFORD UNIVERSITY
2012 | **Certificate of Entrepreneurship**
PI/Advisor: Prof. Nan Zhang
NSF Award Number: 1158737

THE GEORGE WASHINGTON UNIVERSITY
2011 | **Master of Science** in Computer Security and Information Assurance
Advisor: Prof. Poorvi Vora
GPA: 3.80/4.00

THE GEORGE WASHINGTON UNIVERSITY
2010 | **Master of Science** in Computer Science
Advisor: Prof. Nan Zhang
GPA: 3.51/4.00

ANNA UNIVERSITY, India
2008 | **Bachelor of Engineering** in Computer Science
Advisor: Prof. Thirunadana Sikamani
Percentage: 72%

WORK EXPERIENCE

THE GEORGE WASHINGTON UNIVERSITY
2015 – Present | **Graduate Research Assistant**
- Conducted extensive experiments on Cloud Platforms such as AWS, Azure and Google Cloud.
- Migrated batch jobs from Virtual Machines to Docker on AWS.
- Implemented modules that run on VM Manager to reduce performance bottlenecks.
- Published several projects on top-tier conferences and Journals.

2013 – 2015 | **HPC Research Intern**
- Helped physically build the cluster from ground up.
- Assist with the operation and maintenance of the university's 100 node HPC GPU cluster using SLURM.
- Identified and reduced performance overhead by 25% in the cluster caused by improper job scheduling.
- Implemented the initial prototype of running OpenStack on the HPC cluster.

2012 – 2013 | **System Administrator Intern**
- Used Puppet/Chef to manage to automate maintenance of the university's data center.
- Monitored and maintained DNS, WINS, NTP, DHCP for the servers.
- Moved 20% of the physical servers to AWS, and cut 70% of the costs on power.
- Wrote scripts in Python to automate database initialization and run patches to reduce 20% downtime.

2009 – 2011 | **Graduate Research Assistant**
- Developed power-aware software systems that utilized 10% less power in the data center.
- Implemented a system that efficiently mined Enterprise search engine corpus.
- Assisted in developing privacy preserving location (Anonymous GPS) based systems.
- Was one among 12 students to receive the first ever NSF I-Corps award to carry the research at Stanford University.

2011 – 2012 | Graduate Teaching Assistant
- Spring 2012 | Discrete Mathematics, Undergraduate level
- Fall 2011 | Network Security, Graduate level
- Spring 2011 | Algorithms and Data Structures, Undergraduate level

ANNA UNIVERSITY, INDIA
2013 | Visiting Lecturer
- Conducted a collaborative research project in Cloud Computing.
- Taught and trained 25 undergraduate students on several projects in xen virtualization.
- Trained students to conduct quality research in Operating Systems.

RESEARCH

Areas: Operating Systems, Virtualization, Resource allocation, Performance, Security and Data Science.

Mission: My research focus is on virtual machines and operating systems, combining a deep understanding of resource management in the cloud and systems security issues with an expertise in developing systems with real-world impact.

PUBLICATIONS

1. In submission | CRIMES: Using Evidence to Secure the Cloud, Sundaresan Rajasekaran, Zhen Ni, Harpreet Singh Chawla, Neel Shah, Timothy Wood, Emery Berger
   - Implemented a framework for online detection of attacks in Virtual Machines.
   - Improved the performance of Xen Hypervisor's checkpointing mechanism by 70%.
   - Languages used: C, C++ and Python with ~10K lines of code.

2. HotCloud'16 | Scalable Cloud Security via Asynchronous Virtual Machine Introspection, Sundaresan Rajasekaran, Zhen Ni, Harpreet Singh Chawla, Neel Shah, Timothy Wood, Emery Berger
   - Implemented a novel security mechanism for Cloud Systems.
   - Used memory introspection techniques to protect VMs from memory based attacks.
   - Languages used: C and Python with ~2K lines of code.

3. IC2E'16 | Multi-Cache: Dynamic, Efficient Partitioning for Multi-Tier Caches in Consolidated VM Environments, Sundaresan Rajasekaran, Shaohua Duan, Wei Zhang, Timothy Wood
   - Implemented a standalone disk-storage simulator from scratch.
   - Developed models to analyze terabytes of storage trace data in sub-millisecond interval.
   - Languages used: C++ and Python with ~3K lines of code.

4. ACM Sigmetrics PER'15 | Minimizing Interference and Maximizing Progress for Hadoop Virtual Machines, Wei Zhang, Sundaresan Rajasekaran, Shaohua Duan, Timothy Wood, Mingfa Zhu
   - Implemented a Hadoop Job scheduler for customized load balance.
   - Modified the Linux CPU scheduler to avoid interference between VMs.
   - Languages used: Java and C with ~5K lines of code.

5. CCGrid'14 | MIMP: Deadline and Interference aware scheduling of Hadoop Virtual Machines, Wei Zhang, Sundaresan Rajasekaran, Timothy Wood, Mingfa Zhu
   - Implemented a new priority level built into Xen Hypervisor Credit Scheduler.
   - Implemented a tool to study the resource utilization of 192 production servers.
   - Languages used: C, C++ and Python with ~5K lines of code.

6. TKDE'14 | On Skyline Groups, Nan Zhang, Chengkai Li, Naeemul Hassan, Sundaresan Rajasekaran, Gautam Das
   - Developed mathematical models and algorithmic techniques for output compression, input pruning, and search space pruning.
   - For search space pruning, I developed novel anti-monotonic properties to filter out candidate groups.
   - Languages used: Matlab and R with ~1K lines of code.

7. TPDS'14 | Swiper: Exploiting Virtual Machine Vulnerability in Third-Party Clouds, Ron C Chiang, Sundaresan Rajasekaran, Nan Zhang, H Howie Huang
   - Implemented a novel workload based performance attack of Cloud Systems.

- Conducted extensive experimentation of the attack on Amazon Web Services platform.
- Languages used: C, C++, Java and Python with ~3K lines of code.

8. ASBD'13 | **Big Data in the Background: Maximizing Productivity while Minimizing Virtual Machine Interference**, Wei Zhang, Sundaresan Rajasekaran, Timothy Wood
   - Implemented several algorithms to increase the CPU and memory utilization of the Cloud.
   - Proposed and tested models to efficiently run Hadoop jobs using data centers' spare resources.
   - Languages used: C, Java and Python with ~2K lines of code.

9. CIKM'13 | **On Skyline groups**, Chengkai Li, Nan Zhang, Naeemul Hassan, Sundaresan Rajasekaran, Gautam Das
   - Implemented statistically sound techniques to find skyline groups.
   - Languages used: Matlab, R and Python with ~1K lines of code.

SKILL SET

Programming: C, C++, Python, Java, Matlab, Android, Swift
Cloud Platforms: AWS, Azure, Google Cloud
Cloud tools: OpenStack, Docker, Puppet, Chef
System Tools: Bash scripting, Git, Gnuplot, LaTeX
Operating Systems: Unix, Windows, Mac

PROFILES

GitHub: http://github.com/SunnyRaj
Google Scholar: Sunny Rajasekaran

VOLUNTEERING

- Taught C programming to K-12s
- Taught Python programming to K-12s
- Book reading to the blind

AWARDS AND HONORS

2016 | **Won** NASA Space Apps challenge
2013 | **Best teacher**, Anna University
2012 | **Speaker**, I-Corps program at NSF on University Startups Conference
2011 | **Entrepreneur Lead**, Stanford University