Sundaresan Rajasekaran

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EDUCATION

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

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

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

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

WORK EXPERIENCE

THE GEORGE WASHINGTON UNIVERSITY
2009 – Present | **Cloud Computing Research Fellow**

- Conducted extensive experiments on Cloud Platforms such as AWS, Azure and Google Cloud.
- Improved the performance of the Virtual Machine's backing up (checkpointing) mechanism by 70%.
- Developed models to analyze terabytes of storage trace data in a sub-millisecond interval.
- Implemented a standalone disk-storage simulator from scratch.

- Migrated batch jobs from Virtual Machines to Docker on AWS.
- Implemented modules that run on Virtual Machine Manager to reduce performance bottlenecks.
- Published on several top-tier peer-reviewed conferences and journals.

- Implemented a novel security mechanism for Cloud Systems.
- Implemented a new workload based performance attack of Cloud Systems.
- Conducted extensive experimentation of security attacks on Amazon Web Services platform.
- Implemented a framework for online detection of such type of attacks in Virtual Machines in AWS.
- Used memory introspection techniques to protect VMs from memory based attacks.

- Implemented a Hadoop Job scheduler for customized load balance.
- Modified the Linux CPU scheduler to avoid interference between Virtual Machines.
- Implemented several algorithms to increase the CPU and memory utilization of the Cloud.
- Proposed and tested models to run Hadoop jobs using data centers' spare resources efficiently.
- Implemented a new priority level built into Xen Hypervisor Credit Scheduler.

- Developed power-aware software systems that utilized 10% less power in the data center.
- Implemented a tool to study the resource utilization of 192 production servers.

- Implemented a system that efficiently mined Enterprise search engine corpus.
- Assisted in developing privacy preserving location (Anonymous GPS) based systems.

• Implemented statistically sound techniques to find skyline groups.
• For search space pruning, I developed novel anti-monotonic properties to filter out candidate groups.
• Developed mathematical models and algorithmic techniques for output compression, input pruning, and search space pruning.
• Was one among 12 students to receive the first ever NSF I-Corps award to carry the research at Stanford University.

2013 – 2015 | High Performance Computing Researcher

• 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

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

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

2. HotCloud'16 | Scalable Cloud Security via Asynchronous Virtual Machine Introspection, Sundaresan Rajasekaran, Zhen Ni, Harpreet Singh Chawla, Neel Shah, Timothy Wood, Emery Berger

3. IC2E'16 | Multi-Cache: Dynamic, Efficient Partitioning for Multi-Tier Caches in Consolidated VM Environments, Sundaresan Rajasekaran, Shaohua Duan, Wei Zhang, Timothy Wood

4. ACM Sigmetrics PER'15 | Minimizing Interference and Maximizing Progress for Hadoop Virtual Machines, Wei Zhang, Sundaresan Rajasekaran, Shaohua Duan, Timothy Wood, Mingfa Zhu

5. CCGrid'14 | MIMP: Deadline and Interference aware scheduling of Hadoop Virtual Machines, Wei Zhang, Sundaresan Rajasekaran, Timothy Wood, Mingfa Zhu

6. TKDE'14 | On Skyline Groups, Nan Zhang, Chengkai Li, Naeemul Hassan, Sundaresan Rajasekaran, Gautam Das

7. TPDS'14 | **Swiper: Exploiting Virtual Machine Vulnerability in Third-Party Clouds**, Ron C Chiang, Sundaresan Rajasekaran, Nan Zhang, H Howie Huang

8. ASBD'13 | **Big Data in the Background: Maximizing Productivity while Minimizing Virtual Machine Interference**, Wei Zhang, Sundaresan Rajasekaran, Timothy Wood

9. CIKM'13 | **On Skyline groups**, Chengkai Li, Nan Zhang, Naeemul Hassan, Sundaresan Rajasekaran, Gautam Das

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

REFERENCES

All contact information will be provided on request
Prof. Timothy Wood, Associate Professor in the Computer Science Dept. at George Washington University
Prof. Gabriel Parmer, Associate Professor in the Computer Science Dept. at George Washington University
Dr. Donald durousseau, Director, Research Technology Services at George Washington University
Neel Shah, Member of Technical Staff, Cloud Operating Systems Group, VMware