Sandeep Kumar

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Education

- [2017 -] Doctor of Philosophy in Computer Science
  School of Information and Technology, Indian Institute of Technology, New Delhi, India
  Advisor: Prof. S. R. Sarangi
- [2011 - 2013] Master of Engineering in Computer Science, First Class
  Department of Computer Science and Automation, Indian Institute of Science, Bangalore, India
  Adviser: Prof. K. Gopinath
  Thesis: Modeling Storage Performance in an HPC System
- [2007 - 2011] Bachelor of Technology in Computer Science, First Division
  Guru Gobind Singh Indraprastha Univeristy, New Delhi, India

Research Interest

Security, Distributed and Parallel Systems, Operating Systems, Mobile Systems, IOT, Applied machine Learning.

Current Research Projects

- Analyzing applications performance in a TEE setting
  The impact of running an application in a TEE setting, especially in Intel SGX, has not been studied in-depth. Through this project, we aim to gain a deeper understanding of the working of Intel SGX and open previosly unknown avenues for peformance optimization and security improvement.

  Advisor: Prof. Smruti R. Sarangi
- Hardware assisted Control Flow Integrity
  We are looking at ways to ensure the control flow integrity of a binary. Several attacks are mounted on the execution of a binary, which violates confidentiality or integrity or both. A trusted execution environment, which guarantees a secure execution environment, has severe limitations in its current form. We are exploring ways to alleviate these problems.

  Advisor: Prof. Smruti R. Sarangi

Selected Publications

- **Sandeep Kumar** and Smruti R. Sarangi. A Secure File System for Intel SGX. [under review].
- **Sandeep Kumar**, Aravinda Prasad, Smruti R. Sarangi, and Sreenivas Subramoney. Page Table Management for Heterogeneous Memory Systems . In arXiv, 2021.
  https://arxiv.org/abs/2103.10779
- **Sandeep Kumar**, Diksha Moolchandani, Takatsugu Ono, and Smruti Sarangi. F-LaaS: A Control-Flow-Attack Immune License-as-a-Service Model . In IEEE SCC, Milan, Italy, 2019.
  https://ieeexplore.ieee.org/document/8814192
- **Sandeep Kumar**, K. Gopinath, L. Rocchi, P. T. Sukumar, S. Kulkarni, and J. Sampath, "Towards a portable human gait analysis & monitoring system," 2018 International Conference on Signals and Systems (ICSigSys), Bali, 2018, pp. 174-180.
  https://ieeexplore.ieee.org/document/8372660/
- **Sandeep Kumar**, S. Padakandla, C. L, P. Parihar, K. Gopinath, and S. Bhatnagar, "Scalable Performance Tuning of Hadoop MapReduce: A Noisy Gradient Approach," 2017 IEEE 10th International Conference on Cloud Computing (CLOUD), Honolulu, CA, 2017, pp. 375-382.
  https://ieeexplore.ieee.org/document/8030611/

Work Experience

Jun 2020- Jan 2021 | **Intel Labs**, Bangalore, India
Research Intern
I was involved with improving the support for Intel Optane DC memory in Linux kernel.

Sept 2014- July 2017 | **Indian Institute of Science**, Bangalore, India
Research Associate
Worked on auto-tuning of Hadoop Map-reduce using Stochastic algorithms and Human gait analysis. Details in the publication section.

Jul 2013-Jun 2014 | **Dell R&D**, Bangalore, India
Software Development Engineer
Responsible for BIOS configuration and system management tools, *DCC* (Dell Command Configure) and *OMCI* (Open Manage Client Instrumentation) respectively. DCC allows BIOS configuration from the Desktop (Windows and Linux) and OMCI allows remote management application programs to access information about the client computer.

Selected Course Projects

- **Toy C Compiler** [2018]
  Implemented a Toy C Compiler using Flex Bison and LLVM as part of the Compiler Course Work. It contains LLVM IR code generation and implementation of some basic optimizations.
  Code: https://github.com/sandeep007734/Toy-C-Compiler-using-Flex-Bison-LLVM (private repository).

- **Distributed Computing.** [2012]
  Wrote Distributed Programs to solve TSP (Travelling sales man problem), ABP (Alpha Beta pruning search) and MST (Minimum spanning tree) using *rpcgen* in C++ and showed a speed up of factor 9, 6 and 2.5 respectively when the number of servers went up from 1 to 6.
  Advisor: Prof. R.C. Hansdah
  Report: https://goo.gl/BnTpTF

Scholarships and Grants

2018 A grant to spend one month in Kyushu University Japan for research collaboration.
2017 Visvesvaraya PhD Scheme for Electronics & IT
2011 642 Rank in GATE (Graduate Aptitude Test in Engineering) Exam 2011 (Total Students: 136027)

Training and Conferences

June, 2020 ISCA, Valencia, Spain (attended remotely due to Covid-19)
Dec, 2019 HiPC, Hyderbad, India
Jul, 2018 Indo-Japan collaboration, Fukuoka, Japan
Jul,2019 IEEE SCC, Milan, Italy
Dec, 2017 HiPC, Jaipur, Rajashtan, India
Jul, 2017 IEEE Cloud, Hawaii, USA

Teaching experience

Operating System	[Fall 2021], [Spring 2019], and [Spring 2018]
Advanced Distributed Systems	[Spring 2020]
Data structures	[Fall 2019]
Introduction to Computer Science	[Fall 2018]
Cryptography	[Fall 2017]

Interests and Activities

1. Reading books — Goodreads profile: https://goo.gl/bEjjJJ
2. Running, cycling, and occasional hiking trips — Strava profile: https://goo.gl/F1ow46

References

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