BHUSHAN PRADIP JAIN
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LinkedIn Profile

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Education	**Ph.D. in Computer Science - System Security**	**Aug 2022**

University of North Carolina at Chapel Hill, Chapel Hill, NC
Thesis Title : Economically Protecting Complex, Legacy Operating Systems Using Secure Design Principles
Advisor: Prof. Donald Porter
Research Interests : Virtualization, Cloud, and System Security, Security Metrics
Areas of Expertise : Linux Kernel, Container, VM, Hypervisor, Data Analysis

Master of Science (M.S.) in Computer Science — **May 2016**
Stony Brook University, Stony Brook, NY — GPA: 3.93
Courses taken : Operating Systems, Analysis of Algorithms, Advanced Compiler Design, Fundamentals of Computer Networks, Network Security, Computer Architecture, Advanced Computer Architecture, Virtualization

Bachelor of Technology (B.Tech.) in Computer Science — **May 2009**
College of Engineering, Pune, India — GPA: 3.46

Academic Experience

Research Assistant — **Sep 2016 - present**
for **Prof. Donald Porter**, Computer Science Department, University of North Carolina at Chapel Hill

Research Assistant — **Sep 2012 - Aug 2016**
for **Prof. Donald Porter**, Computer Science Department, Stony Brook University

Teaching Assistant
Computer Science Department, Stony Brook University — **Jan 2013 - May 2013** / **Aug 2011 - May 2012**

- Spring 2013 Graduate Course CSE534 **Fundamentals of Computer Networks** for **Prof. Vyas Sekar**
- Spring 2012 Undergraduate Course CSE110 **Introduction to Computer Science** for **Prof. Michael S. Tashbook**
- Fall 2011 Graduate Course CSE509 **Computer System Security** for **Prof. R. Sekar**

Industry Experience

Research Intern, System Security Group
IBM TJ Watson Research Center — **Jan 2014 - March 2016** / **July 2013 - Sep 2013**

- Leverage hardware support to remove hypervisor and guest OS from the TCB of an application running in a VM with **Dr. Dimitrios Pendarakis**, **Dr. Rick Bovie**, and **Dr. Gurney Hunt**. (IBM's version of Intel SGX)

Research Intern, Storage Group
IBM Almaden Research Center — **May 2012 - Aug 2012**

- Optimizations for Block-level Deduplication in Primary Storage with **Dr. Maohua Lu**, and **Dr. David Chambliss**

Software Developer, Storage Group

IBM India Software Lab   **Jul 2009 - Jul 2011**

IBM Scaled Out Network Attached Storage (SONAS)
- Design scenarios to integrate and certify third-party products such as **VMware Infrastructure** consisting of *vSphere* and *ESX server* and **Symantec Antivirus** with SONAS and author White Papers indicating the best practices
- Design, Development and Test Automation of **NDMP** (Network Data Management Protocol) component for SONAS to support NDMP based backup of data
- Development of **Wan-caching** feature for SONAS

Trainee

Tata Research Design and Development Centre   **Aug 2008 - Mar 2009**

Operating System for Giant Metrewave Radio Telescope
- Design and implementation of a control system for multi antennae Telescope

Intern

IBM India Software Lab   **May 2008 - Jul 2008**
- Design and development of a tool based on OpenPGP to help **secure data at rest as well as data in flight**, featuring enhanced policy support for file classification based on attributes and content semantics and was published as **IBM alphaWorks technology**

Publications

- Chia-Che Tsai, Jeongsok Son, **Bhushan Jain**, John McAvey, Raluca Ada Popa, and Donald E. Porter *Civet: An Efficient Java Partitioning Framework for Hardware Enclaves*, **USENIX Security 2020** (acceptance rate: 20.7%, 12/58)

- Amogh Akshintala, **Bhushan Jain**, Chia-Che Tsai, Michael Ferdman, and Donald E. Porter *x86-64 Instruction Usage among C/C++ Applications*, ACM **SYSTOR 2019** (acceptance rate: 36.3% ,16/44)

- Anrin Chakraborti, **Bhushan Jain**, Jan Kasiak, Tao Zhang, Donald E. Porter, and Radu Sion *dm-x: Protecting Volume-level Integrity for Cloud Volumes and Local Block Devices*, ACM **APSys 2017** (acceptance rate: 65.3% ,32/49)

- **Bhushan Jain**, Chia-Che Tsai, Donald E. Porter *A Clairvoyant Approach to Evaluating Software (In)security*, ACM **HotOS 2017** (acceptance rate: 31%, 29/94)

- Richard Boivie, Ek Ekanadham, **Bhushan Jain**, Eric Hall, Guerney Hunt, Mohit Kapur, Mehmet Kayaalp, Elaine Palmer, Dimitrios Pendarakis, David Safford, and Ray Valdez *Hardware Support For Malware Defense and End-To-End Trust*, **IBM** Technical Report **February 2017**

- Chia-Che Tsai, **Bhushan Jain**, Nafees Ahmed Abdul, and Donald E. Porter *What to Support when You're Supporting: A Study of Linux API Usage and Compatibility*, :login; magazine, Fall 2016, Volume 41, Number 3, pages 13–19

- Chia-Che Tsai, **Bhushan Jain**, Nafees Ahmed Abdul, and Donald E. Porter *A Study of Modern Linux API Usage and Compatibility: What to Support When You're Supporting*, ACM **EuroSys 2016** (acceptance rate: 21.1%, 38/180, **Awarded Best Paper**)

- Kavita Agarwal, **Bhushan Jain**, and Donald E. Porter *Containing the Hype*, ACM **APSys 2015** (acceptance rate: 29.4%, 20/68)

- **Bhushan Jain**, Mirza Basim Baig, Dongli Zhang, Donald E. Porter, Radu Sion *Introspections on the Semantic Gap*, IEEE Security and Privacy magazine, March/April 2015, Volume 13, No. 2, pages 48–55

- **Bhushan Jain**, Mirza Basim Baig, Dongli Zhang, Donald E. Porter, Radu Sion *SoK: Introspections on Trust and the Semantic Gap*, IEEE Security and Privacy **S&P 2014** (acceptance rate: 13.6%, 44/324, SoK acceptance rate: 8%)

- **Bhushan Jain**, Chia-Che Tsai, Jitin John, Donald E. Porter *Practical Techniques to Obviate Setuid-to-Root Binaries*, ACM **EuroSys 2014** (acceptance rate: 21%, 27/147)

- Chia-Che Tsai, Kumar Saurabh Arora, Nehal Bandi, **Bhushan Jain**, William Jannen, Jitin John, Harry A. Kalodner, Vrushali Kulkarni, Daniela Oliveira, Donald E. Porter *Cooperation and Security Isolation of Library OSes for Multi-Process Applications*, ACM **EuroSys 2014** (acceptance rate: 21%, 27/147)

- Sandeep Patil, Riyazahamad Shiraguppi, **Bhushan Jain**, Sasikanth Eda *Methodology for Usage of Emerging Disk to Ameliorate Hybrid Storage Clouds*, IEEE Cloud Computing for Emerging Markets **CCEM 2012**

- Balaji Palanisamy, Aameek Singh, Ling Liu, and **Bhushan Jain** *Purlieus: Locality aware Resource Allocation for MapReduce in a Cloud*, Super Computing, **SC 2011** (acceptance rate: 21%, 74/352)

- Sandeep Patil, Abhinay Nagpal, Suyash Jape, **Bhushan Jain** *Optimization of disk replacement as a large domain objective function* ACM International Conference on Computing Communication and Networking Technologies **ICCCNT 2010**

- **13 publications** in *Prior Art Database*

Patents Granted

- **10,628,579**:*System and method for supporting secure objects using a memory access control monitor, April 21, 2020*
- **10,579,436**:*Data relocation in global storage cloud environments, March 3, 2020*
- **9,922,181**:*Security model for network information service, April 20, 2018*
- **9,692,858**:*Security model for a memory of a network information system, June 27, 2017*
- **9,619,357**:*Hybrid storage devices, April 11, 2017*
- **9,514,145**:*Managing redundant immutable files using deduplication in storage clouds, December 6, 2016*
- **9,342,247**:*Leveraging a hybrid infrastructure for dynamic memory allocation and persistent file storage, May 17, 2016*
- **9,298,725**:*Deduplication with partitioning advice and automation, March 29, 2016*
- **9,250,812**:*Leveraging a hybrid infrastructure for dynamic memory allocation and persistent file storage, February 2, 2016*
- **9,213,715**:*Deduplication with partitioning advice and automation, December 15, 2015*
- **9,158,783**:*Managing redundant immutable files using deduplication in storage clouds, October 13, 2015*
- **9,116,936**:*Inline learning-based selective deduplicaiton for primary storage systems, August 25, 2015*
- **9,009,392**:*Leveraging a hybrid infrastructure for dynamic memory allocation and persistent file storage, April 14, 2015*
- **8,892,521**:*Managing redundant immutable files using deduplication in storage clouds, November 18, 2014*
- **8,839,399**:*Tenant driven security in a storage cloud, September 16, 2014*
- **8,682,868**:*Removal of data remanence in deduplicated storage clouds, March 25, 2014*
- **8,645,730**:*Systems and methods to improve power efficiency in hybrid storage clusters, February 4, 2014*
- **8,615,220**:*Methods and systems of call management, December 24, 2013*

- **8,612,699**:*Deduplication in a hybrid storage environment, December 17, 2013*
- **8,600,863**:*Financial services card that provides visual indicator according to available balance defined policies, December 3, 2013*
- **8,468,138**:*Managing redundant immutable files using deduplication in storage clouds, June 18, 2013*

Technical Skills	**Languages:** C, JAVA, Python, SQL, Shell Scripting **Platforms:** Linux, x86, POWER **Tools:** QEMU, gdb, git

Professional Achievements

- **Best Paper Award** at EuroSys 2016 for the paper *A Study of Modern Linux API Usage and Compatibility: What to Support When You're Supporting*
- **IBM PhD Fellowship** for academic years 2014-2015 and 2015-2016
- **Computer Science Departmental Fellowship** at Stony Brook University for academic year 2011-2012
- **IBM 1st - 5th Plateau Awards** for invention and creative contributions
- Received **IBM Rookie of the Year Award** for 2009 for being the best performer in IBM India
- Received 1st Runner up award for **Data Security and Privacy Project with Significant Business Impact** in IBM India

Community Service

- Shadow Program Committee for ACM **AsiaCCS 2017**.
- Co-authored **NSF-BSF grant proposal** for rowhammering internal DRAM in SSDs, NICs, and SmartNICs (Status: Recommended)

developerWorks Articles

- AIX V6.1 Remote Login Session Management - Provisions for automatic session for regulatory compliance.
- Securing remote AIX V6.1 data at rest using the SLES Encrypt File Container.
- IBM SONAS storage for AIX and Linux environment.
- Information Lifecycle Management for AIX data using IBM SONAS.

Technical White Papers

- IBM SONAS with VMware best practices for a virtualized environment.
- Antivirus scanning with Symantec Endpoint Protection for IBM SONAS.