SHIVAM SAXENA

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EDUCATION

- **Georgia Institute of Technology** **Aug 2024 - present**
  Master of Science in Computer Science, Computing Systems track
- **Indian Institute of Technology Kharagpur** **Jul 2017 - Jun 2021**
  B.Tech. Hons. in Electronics and Electrical Communication Engineering CGPA 9.12/10
  (with Minor in Computer Science and Engineering)
- **Somerville School, Delhi** **2017**
  All India Senior School Certificate Examination 95.4%

PROFESSIONAL EXPERIENCE

Microsoft **Jan 2023 - Jul 2023**

Software Engineer - Azure Managed Disks Bengaluru, IN

- Built features and services for block-level storage volumes used with Azure virtual machines. Contributed to fault tolerance and scalability efforts to maintain **99.999%** availability and **50K** disks per subscription per geographical region.
- Added features for managed disk snapshots - crash consistent read-only copies of data that can be used for ease of deployment and backups. Implemented incremental snapshots capability, leading to substantial cost savings in compute expenses.
- Worked on orchestration design for live disk migration capabilities to move disk volumes across data centers at **50+ MB/s**.
- Developed nuanced priority scheduling algorithms for jobs to progress by dynamically adjusting for error accumulation.
- Designed and developed a library to update storage nodes' health and load factor globally using exponential moving averages, and utilizing it to generate new copy assignments for disk slices by weighted random distribution strategy.

Microsoft **Jun 2021 - Dec 2022**

Software Engineer - Azure Blob Management Bengaluru, IN

- Contributed improvements to functionalities for simplifying business workflows and speed up data processing jobs.
- Worked on developing a Blob Inventory feature, built using a producer-consumer architecture to list and collate information about billions of blobs(Binary Large Object) each day for thousands of users based on various filtering conditions.
- Worked on Lifecycle Management service to perform batch operations on subsets of blobs based on multiple inclusion and exclusion criteria, reducing customer expenses by upto **50%** by automating management jobs like deletion, down-tiering etc.
- Designed and implemented a new bottom-up approach for quick deletion in hierarchical namespace accounts with **1B+** blobs.
- Remodeled the API calls and added support for pagination, resiliency against multiple call failures and optimized recursion.

NucleoDyne Systems(Appkido) **Jul 2020 - Aug 2020**

Software Engineering Intern Bay Area, CA(Remote)

- Worked on setting up and proof-of-concept development for select high-risk application vulnerabilities, published here.
- Gained an understanding of the Spring Framework for Java, and developed REST-based Spring Boot web applications utilizing the Spring Model View Controller(**MVC**) framework. Examined the **OWASP Top 10** to focus on the most critical security risks to web applications and develop guard-rails against them using Spring Security features.
- Worked with various authentication mechanisms in Spring including in-memory authentication,**JDBC** authentication, **LDAP**, **JWTs** etc. Devised role-based access control(RBAC) frameworks for REST apps using **OAuth 2.0** and Spring solutions.
- Formulated ways to serve dynamic content using JSP and Thymeleaf with these mechanisms. Implemented database connections, entities and queries using **Spring Data JPA** to save developer hours writing boilerplate code for data access layers.
- Assimilated these concepts and developed an application to expose **BOLA** API vulnerability. Secured sensitive endpoints by developing an "authorization engine", consisting of several Java Controllers in conjunction to validate all requests.

Edelcap Securities Limited **May 2020 - Jun 2020**

Systematic Trading Intern Mumbai, IN(Remote)

- Facilitated development of new methodologies and techniques in technical analysis based trading.
- Evaluated performance of various technical tools and indicators used in financial market analysis including RSI, ADX, Bollinger Bands, William's %R, etc. Implemented them using R and Rcpp for efficiency and ease of extensibility.
- Utilized these to develop a model to identify strong trends and suitable stop loss orders based on ADX and other thresholds, while dynamically updating averages to modify long and short positions for a variety of financial instruments.
- Implemented **ARIMA** model for forecasting and achieved increased annual returns of upto **8%** and Sharpe ratios of **0.45-0.5**.

ACADEMIC PROJECTS

Runtime enforcement with Behavior Control **Jan 2021 - Apr 2021**

With Prof. Manoj Kumar Mondal(partnership with Appkido/Altos Data), published here IIT Kharagpur

- Reviewed major application transaction models and classified them based on the number and lifetime of the application's processes and threads. Explored how different models communicate and execute code to service different APIs.
- Developed a Linux kernel module to achieve runtime security by controlling execution behavior of relevant process/thread(based on model). Sent various types of controls to the kernel module with an easily extensible JSON schema.
- Defended against remote code execution(RCE) by monitoring syscalls through input/output control interfaces(**ioctl**) and kernel probe tracers(**kprobes**), then failing these syscalls based on the specified controls by modifying the function args.
- Successfully protected against unauthorized data access from attack vectors e.g.SQL injection by developing a state machine to monitor successive syscalls.Maintained an in-memory state based on previous events to improve decision-making.

Face detection on low powered devices **May 2019 - Jul 2019**

With Prof. Chetan Singh Thakur IISc Bengaluru

- Implemented Viola-Jones algorithm for real-time face detection using Haar-like features in OpenCV + MATLAB/Octave.
- Employed a variant of the **AdaBoost** learning algorithm to both select the best features and to train classifiers that use them.
- Constructed strong classifiers as a linear combination of weighted simple weak classifiers. Arranged these strong classifiers in an attentional cascade to further speed up the algorithm by **15-20%**, achieving face detection accuracy of upto **85%**.

IEEE Workshop on Image Processing **Dec 2017**

Learned image processing algorithms such as blob and edge detection, noise filters, histograms etc. in OpenCV. Applied them to solve problems involving template matching, object tracking, path finding etc.

AWARDS AND HONORS

- Awarded **Best Outgoing Technology Man** 2020-21 among **150** graduating boarders by Radhakrishnan Hall, IIT Kharagpur
- Attained **206 Rank** and an honorable mention in **ACM ICPC, Amritapuri Regionals 2018** among 1000+ teams across India.
- Secured **All India Rank 940** in **Joint Entrance Examination (JEE) Advanced 2017**, conducted by IITs.
- Secured **All India Rank 337** in **Joint Entrance Examination (JEE) Main 2017**, amongst 1.2 million candidates.
- Qualified **National Standard Examination in Chemistry 2016** under merit index and selected to appear in INChO 2017.
- Qualified **National Standard Examination in Physics 2016** under state top 1% and selected to appear in INPhO 2017.
- Qualified **National Standard Examination in Astronomy 2016** and selected to appear in INAO 2017.
- Qualified **Regional Mathematics Olympiad 2015** from Delhi region with **Rank 17** and selected to appear in INMO 2016.
- Qualified **Kishore Vaigyanik Protsahan Yojana 2015** Stage 2 and secured **All India Rank 139**, conducted by Govt. of India.
- Qualified **Junior Science Talent Search Examination 2013-14** and secured **Rank 3**, conducted by Govt. of NCT of Delhi.

TECHNICAL SKILLS

- **Languages**: C, C++, Java, Python, Bash, MATLAB/Octave, R, C#, Latex, SQL, PHP, JSP, Verilog
- **Libraries**: Numpy, Pandas, Flask, BeautifulSoup, Apache Maven, Boost, OpenCV, Apache Thrift
- **Tools/Frameworks**: Git, Docker, Spring, Thymeleaf, Powershell, WinDbg, NTSD, Postman, MongoDB, AWS, Azure

RELEVANT COURSEWORK

Computer Networks*|Network Security*|Cyber Incident Response*|Programming and Data Structures#|Algorithms-1#|Machine Learning|Probability and Stochastic Processes|Signals and Systems|Matrix Algebra|Computational Number Theory|Object Oriented Systems|Information Retrieval|Computer Architecture and Operating Systems|Introduction to Internet|Natural Language Processing|Machine Intelligence and Expert Systems|Microcontroller and Embedded Systems#|Digital Image Processing (*-current) (#-with lab)

EXTRA-CURRICULAR ACTIVITIES

- Conducted introductory Python programming classes for 20 underprivileged school kids in the 11-15 age group.
- Secured **1st** position in multiple quizzes at IIT Kharagpur, including the Great Governor's Send-Off Quiz 2021 and Terramind 2020. Member of the **Gold** winning Quiz contingent of IIT Kharagpur at Inter IIT Cultural Meet 2019, held at IIT Bombay.
- Served as **Vice Captain** of Maths Olympiad Team of Radhakrishnan Hall of Residence. Managed a group of **15** boarders and conducted regular sessions on topics like number theory, combinatorics, geometry, functional equations etc. in preparation for the Open IIT and Inter Hall Maths Olympiad events 2019-20.
- Won several awards in Maths Olympiad events at IIT Kharagpur, including a **bronze** medal as part of the Radhakrishnan Hall team in the Inter-Hall General Championship 2018-19 and **2nd** position in the individual event at Kshitij fest 2019.
- Member of Radhakrishnan Hall football team 2017-18. Reached quarterfinals of the Inter-Hall football tournament.