Protick Bhowmick

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Experience

Summer Intern **Cisco** **May 2023 - August 2023**

- Collaborated with the **ThousandEyes** research team to build Endpoint event detection algorithm using Python and Apache Kafka, aiming to identify network outages in real time for diverse clients, including 180 Fortune 500 companies.
- Designed an algorithm for detecting Domain Name Resolution events and implemented in the existing pipeline. This algorithm significantly helped in accurately detecting DNS events, eliminating prior misattribution to VPNs, gateways, and other network elements.
- Analyzed network measurement data to establish data quality metrics using Presto and Apache Spark. Collaborated with the Engineering team to enhance and correct the data collection strategy.

Graduate Research Assistant **Virginia Tech** **Jan 2021 - Present**

- Conducted research in network security and measurement with an emphasis on **public key infrastructure**.
  - Performed a longitudinal measurement analysis on OCSP responders, utilizing multiple AWS EC2 machines in different vantage points using Python and Node.js. Analyzed the data using Apache Spark to establish that 13% of Certificate Authorities have unreliable OCSP infrastructure, high-lightening the security vulnerabilities of web PKI.
  - Improved the performance of Firefox's TLS handshake mechanism by fetching OCSP information over DNS using C++. This resulted in performance benefit for 31% of the top 1M Alexa domains in terms of first content full paint.

Software Engineer **Priyo Systems, Bangladesh** **Jan 2020 - Dec 2020**

- Developed and designed Priyo, the largest news aggregator platform in Bangladesh using Python, Django rest framework, PostgreSQL, MongoDB and Celery,
- Implemented **news recommendation system** using collaborative filtering techniques utilizing Apache Spark increasing 7% average time spent on site.
- Created an interactive map utilizing Django and React to visualize the spread of COVID-19 in Bangladesh, used and registered by over 500,000 users throughout the pandemic.

Software Engineer **iPay Systems, Bangladesh** **Nov 2018 - Dec 2019**

- Designed payment modules in **microservice architecture** using industry-standard security practices using Java, Spring Boot, PostgreSQL, Kafka and RabbitMQ.
- Led the development of **Bank gateway module** that enabled immediate money transfers with 12 banks in Bangladesh, increasing 6% active users of iPay.
- Implemented log management using ELK stack to improve visibility for the engineers.

Education

M.Sc. in Computer Science **Virginia Tech** **Jan 2021 - Dec 2023 (Expected)**

- **Thesis topic**: OCSP over DNS: introduced a highly performant X.509 certificate revocation checking scheme using DNS

Technical skills

- **Languages**: Python, Java, C++, C, JavaScript/HTML/CSS, SQL, Node.js
- **Technologies**: Django, Springboot, Apache Spark, PostgreSQL, JUnit, MongoDB, AWS, Docker, Redis, Selenium

Selected Projects and Publications

- **Revisiting the NXNS Attack** Measured security patches in DNS resolvers against NXNS attack in DNS resolvers around the world leveraging Luminati proxy network (Docker, EC2, Node.js, Python) [details]
- **Comparative analysis of CDN performance** Analyzed CDN usage among Tranco domain list and compared the CDNs with respect to different performance metrics (Python, socks5 proxy) [details]
- **Clustering of handwritten digits** Evaluated how agglomerative clustering performs on MNIST dataset; carried out poisoning and obfuscation attacks on single-linkage clustering exploiting the linkage criteria. (Python, scikit-learn) [details]
- **Measuring TTL Violation of DNS Resolvers at scale** (2022), Authors: **Protick Bhowmick**, Mohammad Ishtiaq Ashiq Khan, Casey Deccio, and Taejoong Chung (Published in Passive and Active Measurement Conference 2023)
- **A Comparative Analysis of Certificate Pinning in Android and iOS** (2022), Authors: Amogh Pradeep, Muhammad Talha Paracha, **Protick Bhowmick**, Ali Davanian, Abbas Razaghpanah, Taejoong Chung, Martina Lindorfer, Narseo Vallina-Rodriguez, Dave Levin, and David Choffnes (Published in Internet Measurement Conference 2022)