Santanu Sen

Bangalore, India

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Summary

Seasoned Software Development Engineer with a strong 19-year track record in designing, implementing, and leading the development of complex, large-scale distributed software systems. Currently serving in a technical leadership capacity, driving end-to-end project execution, cultivating collaboration across cross-functional teams, and providing mentorship. Recenet work involves spearheading multiple projects focused on enhancing space management within distributed file system environments.

Skills

Proficient in C, C++, Object Oriented Design, Design Patterns, Distributed Systems, Data Structures, Algorithms, Programming in Linux and Unix Environments, Multithreading, Multi-core Applications, IPC and File Systems.

Work Experience

NetApp India Pvt. Ltd.

Dec. 2018 - Present

Member Technical Staff — Bangalore, India

- Pioneered the design and implementation of core space management functionalities for OntapX, NetApp's next-generation disaggregated data management platform. This included contributing to the development of automatic space rebalancing, space reservation management ensuring guaranteed client operations, and proactive space reclamation mechanisms leveraging automated snapshot deletion.
- Led the complete development lifecycle for Granular Data Distribution on NAS volumes, conceiving and architecting novel solutions for efficient space guarantee management, automated healing processes, and robust lost data recovery strategies for distributed files (patent pending).
- Spearheaded the design and implementation of the multipart file layout export to pNFS clients, enhancing interoperability and performance.
- Led a critical initiative to replace fixed space reservation for the inode metafile with a dynamic allocation strategy, resulting in a 50% reduction in reserved volume metadata space and an 8x increase in the maximum file capacity per volume.
- Devised the optimization of the cluster-level space attribute reporting infrastructure by implementing a strategic caching mechanism. This resulted in a significant performance improvement, reducing REST API response times from over 5 seconds to under 1 second.
- Drove the containerization of core Ontap data management components, a foundational effort for NetApp's software-defined cloud storage solution, which evolved into the core of Google Cloud NetApp Volumes. Oversaw the implementation of critical system startup, software upgrade, and liveness/readiness probes for Data Management pods, proactively identifying numerous issues early in the development cycle.
- Engineered and implemented a critical memory protection scheme within the Data Management binary to safeguard system-critical memory pages from unintended modifications, demonstrating a deep understanding of system reliability and stability.

Infinera India Pvt. Ltd.

Jul. 2012 - Nov. 2018

Staff Software Development Engineer — Bangalore, India

- Ideated a significant enhancement to the Network Element Transaction Framework by introducing a private workspace for write transactions, enabling support for 15 simultaneous NMS connections on a 64-chassis Network Element cluster, over the previous limitation of 3 connections.
- Conceptualized and delivered a novel Network Element Link Traversal Framework to streamline fault correlation logic (later patented). This framework's adoption across multiple features led to a remarkable reduction in traversal-related bugs from an average of 2 per feature to zero.
- Architected and developed a declarative Fault Correlation and Management Framework for the Software Defined Network suite. This innovative framework enabled the dynamic specification of new alarm definitions and fault correlation rules without requiring recompilation (patent filed.)
- Engineered and implemented a reusable C++ Cryptographic Wrapper Library enabling digital signature verification and decryption for Instant Bandwidth licenses. This library's subsequent adoption across several other security features highlights its robust design and broad applicability.
- Contributed significantly to the full software development lifecycle – from object modeling to implementation and delivery – of numerous Network Element Management Plane Software modules. This included Optical Amplifiers, Broadcasting Modules, Multiplexers, Cross-Connects, and Protection Switching modules, demonstrating a comprehensive understanding of network element functionality across multiple releases.

Tejas Networks Ltd.

Jun. 2006 - Jun. 2012

Lead Engineer, R&D — Bangalore, India

- Led a performance optimization initiative for Network Element Software transactions by implementing backgrounding and batching of configuration database commits. This critical enhancement resulted in a significant reduction in centralized NMS-based circuit restoration timings from 40 seconds to sub-second, and earned an achievement award.
- Architected and implemented diverse Automatically Switched Optical Network (ASON) service classes leveraging Generalized Multi-Protocol Label Switching (GMPLS). Additionally, designed and developed a User Mode Linux-based simulation framework, which drastically reduced unit-testing time, showcasing a focus on development efficiency.
- Designed and developed a robust System Startup and Failover Manager featuring a state machine-based phased initialization of Network Element Software, demonstrating strong system design skills.
- Spearheaded efforts to improve the management layer security of Network Elements by implementing HTTPS support for the web server, robust user session management, and comprehensive audit logging of configuration changes. This initiative significantly enhanced the security posture of the network elements.
- Streamlined user management across multiple Network Elements by designing and implementing support for centralized RADIUS-based authentication. This key feature relieved operators from the cumbersome task of managing users individually on each network element, improving operational efficiency.

Education

Master of Technology in Computer Science and Engineering *2006*

National Institute of Technology, Durgapur, West Bengal, India

- CGPA: 9.58/10
- Thesis: Integrated Feature Analysis, Fuzzy Set Selection and Fuzzy Rule-Based System Identification in a Neuro-Fuzzy Paradigm

Bachelor of Engineering in Computer Science and Engineering *2004*

The University of Burdwan, West Bengal, India

- TCPA: 79.5%

Patents

Methods and Systems for Managing Multipart Files Stored in Networked Storage Systems *Dec. 2024*

Intellectual Property India, App. No. 202411105206, Status: Filed

Systems and Methods for Decoupled Optical Network Link Traversal *Jun. 2020*

USPTO, App. No. 16/136,810, Doc. Id: US 20200100003 A1, Status: Grant

Defining Architectures using Declarative Parametric Language *May. 2019*

USPTO, App. No. 16/415,853, Doc. Id: US 20200364061 A1, Status: Filed

Publications

A Neuro-Fuzzy Scheme for Integrated Input Fuzzy Set Selection and Optimal Fuzzy Rule Generation for Classification *Dec. 2007*

International Conference on Pattern Recognition and Machine Intelligence, pp 287-294, LNCS, vol. 4815, Springer

Honors & Awards

Spot Bonus Reward, NetApp

Awarded for delivering the last-minute design changes during the absence of the lead for the TCM project. *Apr. 2023*

Recognized for the design and development of Automatic Incremental Repair of multipart files. *Jul. 2022*

Rewarded for contributions to the Flex Group Rebalancing project and mentoring new joiners. *Jan. 2022*

Hackathon Notable Project Winner, NetApp Hackathon

Awarded for demonstrating the idea of ``Photon Asynchronous IO Using io_uring.'' *Nov. 2022*

Awarded for demonstratimg the idea of ``Vertical Pod Autoscaling for DMAP Containers.'' *Feb. 2020*

Peer Recognition Award, NetApp

Recognized for teamwork during the ``Quark Version Upgrade'' project by the Cloud Engineering Team Peers. *May. 2020*

Spot Bonus Reward, Infinera

Rewarded for significant contributions to design and development of FBM Management Plane Software. *Mar. 2017*

Rewarded for exceptional performance in design and development of Fault Integration and Alarm Correlation. *Jun. 2015*

Hackathon Star Project Award, Infinera Hackathon

Awarded for demonstrating the project titled ``Parametric Software.'' *Jun. 2015*

Achievement Award, Tejas Networks

Awarded for optimizations in management plane software to reduce ASON circuit restoration time. *Apr. 2011*

Overnight Contest Winner, Mukti, Annual National Level Technical Symposium, LUG, NIT Durgapur

Won First Prize in C Programming Contest. *Jan. 2006*

Secured Third Prize in System Admininstration Contest. *Jan. 2006*

Certifications & Test Scores

IBM Certified Associate Developer, IBM WebSphere Studio V5.0 *Apr. 2005*

IBM Certified Database Associate, IBM DB2 Universal Database V8.1 *Apr. 2005*

Secured a Percentile Score of 92.33 in Graduate Aptitude Test in Engineering *Mar. 2004*