Cheng XU Ph.D.

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Experienced Staff Software Developer with a robust background in designing and implementing secure, high-performance database and blockchain systems. Proficient in database management, blockchain, cryptography, and information security, with a comprehensive history of impactful research in academic and professional settings. Known for exceptional coding skills and significant contributions to major open source projects.

Professional Experience

Fortinet Vancouver, BC, Canada
Staff Software Developer *Feb 2024 – Present*
Senior Software Developer *Dec 2021 – Jan 2024*

- Initiated and spearheaded the CASB (cloud access security broker) signature project, designing the signature schema and implementing a comprehensive pipeline for maintenance, testing, and deployment of CASB signatures.
- Developed tools for signature quality assurance, including linters and automated CI/CD systems. Collaborated effectively with cross-functional teams to integrate CASB signatures with backend matching engines, enhancing overall security solutions.
- Contributed to the maintenance and enhancement of IoT device detection systems, focusing on maintaining a known device database using advanced web crawling and LLM techniques, and managed Kubernetes clusters for project pipelines.

Simon Fraser University Burnaby, BC, Canada
Visiting Post-doctoral Research Fellow *Mar 2020 – May 2022*

- Advisor: Prof. Jian Pei
- Designed novel techniques to build next-generation high-performance blockchain systems.
- Developed a blockchain prototype in Rust (https://github.com/hkbudb/slimchain) to validate the effectiveness of the novel design.

Hong Kong Baptist University Hong Kong
Senior Research Assistant / Post-doctoral Research Fellow *Dec 2018 – Apr 2021*
Ph.D. Candidate *Nov 2014 – Feb 2019*

- Advisor: Prof. Jianliang Xu
- Developed innovative algorithms and indexing methods for enhancing cloud-based query services, facilitating efficient and verifiable query processing in enterprise systems.
- Innovated novel techniques to enable integrity assured search in blockchain databases.
- Resulted to several high-impact research papers published in top-tier journals and conferences.

Syracuse University Syracuse, NY, USA
Visiting Scholar *Sep 2017 – Dec 2017*

- Advisor: Dr. Yuzhe Tang
- Designed and implemented a memory-access pattern secure software system on Intel SGX.
- Developed a dynamic program partitioning framework that supports a variety of external oblivious algorithms, optimizing for cache-miss efficiency.

Homebrew | https://brew.sh Hong Kong
Core Maintainer *Feb 2015 – Feb 2017*

- Served as a core maintainer for Homebrew, the most widely-used package manager on macOS.
- Led the implementation of many key enhancements including an improved tap system, the core/formulae separation, a sandboxing system, and a portable Ruby environment, along with numerous improvements and bug fixes.

Education

Hong Kong Baptist University — Hong Kong
Ph.D. in Computer Science — *Nov 2014 – May 2019*
Dissertation: Authenticated Query Processing in the Cloud
Advisor: Prof. Jianliang Xu

Huazhong University of Science and Technology — Wuhan, China
Bachelor of Engineering in Electronics & Information Engineering — *Sep 2009 – Jun 2014*

Skills

Programming C/C++, Rust, Java, Python, Ruby, Matlab, LaTeX, Bash, Javascript
Tools Docker, Kubernetes, Terraform, Vim, Tmux, Git, macOS, Linux
Languages English, Mandarin

Research Interests

- Authenticated query processing for outsourcing cloud computing.
- Searchable blockchain with integrity assurance.
- Privacy preserving query processing and access control.

Selected Publications

Complete List: Google Scholar [DKG_JaAAAAAJ] · DBLP [Xu_0004:Cheng]

1. X. Luo, J. Pei, **C. Xu**, W. Zhang, and J. Xu, "Fast shapley value computation in data assemblage tasks as cooperative simple games," in *Proceedings of the 2024 ACM SIGMOD International Conference on Management of Data (**SIGMOD '24**)*, Santiago, Chile, Jun. 2024, Full Paper.
2. X. Zhang, Q. Wang, **C. Xu**, Y. Peng, and J. Xu, "FedKNN: Secure federated k-nearest neighbor search," in *Proceedings of the 2024 ACM SIGMOD International Conference on Management of Data (**SIGMOD '24**)*, Santiago, Chile, Jun. 2024, Full Paper.
3. H. Wang, **C. Xu**, X. Chen, C. Zhang, H. Hu, S. Tian, Y. Yan, and J. Xu, "V^{2}FS: A verifiable virtual filesystem for multi-chain query authentication," in *Proceedings of the 40th IEEE International Conference on Data Engineering (**ICDE '24**)*, Utrecht, Netherlands, May 2024, Full Paper.
4. C. Zhang, **C. Xu**, H. Hu, and J. Xu, "COLE: A column-based learned storage for blockchain systems," in *Proceedings of the 22nd USENIX Conference on File and Storage Technologies (**FAST '24**)*, Santa Clara, CA, USA, Feb. 2024, pp. 329–345, Full Paper.
5. X. Luo, J. Pei, Z. Cong, and **C. Xu**, "On shapley value in data assemblage under independent utility," *Proceedings of the VLDB Endowment (**PVLDB**)*, vol. 15, no. 11, pp. 2761–2773, Jul. 2022, Full Paper.
6. H. Wang, **C. Xu**, C. Zhang, J. Xu, Z. Peng, and J. Pei, "vChain+: Optimizing verifiable blockchain boolean range queries," in *Proceedings of the 38th IEEE International Conference on Data Engineering (**ICDE '22**)*, Kuala Lumpur, Malaysia, May 2022, pp. 1928–1941, Full Paper.
7. **C. Xu**, C. Zhang, J. Xu, and J. Pei, "SlimChain: Scaling blockchain transactions through off-chain storage and parallel processing," *Proceedings of the VLDB Endowment (**PVLDB**)*, vol. 14, no. 11, pp. 2314–2326, Jul. 2021, Full Paper.
8. **C. Xu**, C. Zhang, and J. Xu, "vChain: Enabling verifiable boolean range queries over blockchain databases," in *Proceedings of the 2019 ACM SIGMOD International Conference on Management of Data (**SIGMOD '19**)*, Amsterdam, Netherlands, Jun. 2019, pp. 141–158, Full Paper.
9. C. Zhang, **C. Xu**, J. Xu, Y. Tang, and B. Choi, "GEM^2-Tree: A gas-efficient structure for authenticated range queries in blockchain," in *Proceedings of the 35th IEEE International Conference on Data Engineering (**ICDE '19**)*, Macau SAR, China, Apr. 2019, pp. 842–853, Full Paper.
10. **C. Xu**, J. Xu, H. Hu, and M. H. Au, "When query authentication meets fine-grained access control: A zero-knowledge approach," in *Proceedings of the 2018 ACM SIGMOD International Conference on Management of Data (**SIGMOD '18**)*, Houston, TX, USA, Jun. 2018, pp. 147–162, Full Paper.

Talks

1. Blockchain Privacy Preserving Techniques, *The 36th CCF National Database Conference*, Jinan, China, Oct. 2019.
2. Towards Searchable and Verifiable Blockchain, *1st Workshop on Blockchain and Data Management at 35th IEEE International Conference on Data Engineering*, Macau, Apr. 2019.

Awards

- SIGMOD Travel Award, ACM — *2018*
- Department RPg Performance Award, Hong Kong Baptist University — *2018, 2019*
- Yakun Scholarship Scheme for Mainland Postgraduate Students, Hong Kong Baptist University — *2018*