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, "V²FS: 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, pp. 1999–2011, 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, "GEM²-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