

# Cheng XU Ph.D.

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Senior software developer with proved experience in designing and implementing various high-performance, secure database and blockchain systems. Strong expertise in database, blockchain, cryptography, and information security with top-notch coding skills and open source project maintenance experience.

PROFESSIONAL EXPERIENCE	<b>Fortinet</b> <b>Senior Software Developer</b>	Burnaby, BC, Canada <i>Dec 2021 – Present</i>
	<b>Simon Fraser University</b> <b>Visiting Post-doctoral Research Fellow</b>	Burnaby, BC, Canada <i>Mar 2020 – May 2022</i>
	<ul style="list-style-type: none"><li>• Advisor: Prof. Jian Pei</li><li>• Designed novel techniques to build future generation high-performance blockchain systems.</li><li>• Developed a blockchain prototype in Rust (<a href="https://github.com/hkbudb/slimchain">https://github.com/hkbudb/slimchain</a>) to demonstrate the effectiveness of the novel design.</li></ul>	
	<b>Hong Kong Baptist University</b> <b>Ph.D. Candidate</b> <b>Senior Research Assistant / Post-doctoral Research Fellow</b>	Hong Kong <i>Nov 2014 – Feb 2019</i> <i>Dec 2018 – Apr 2021</i>
	<ul style="list-style-type: none"><li>• Advisor: Prof. Jianliang Xu</li><li>• Designed novel algorithms and indexes for cloud-based query services to support efficient verifiable query processing in a wide range of enterprise systems.</li><li>• Developed novel techniques to enable integrity assured search in blockchain databases.</li><li>• Resulted to several research papers published in top-tier journals and conferences.</li></ul>	
	<b>Syracuse University</b> <b>Visiting Scholar</b>	Syracuse, NY, USA <i>Sep 2017 – Dec 2017</i>
	<ul style="list-style-type: none"><li>• Advisor: Dr. Yuzhe Tang</li><li>• Designed and implemented a memory-access pattern secure software system on Intel SGX.</li><li>• Developed a dynamic program partitioning framework to support implementing a variety of external oblivious algorithms and achieving cache-miss obliviousness.</li></ul>	
	<b>Homebrew   <a href="https://brew.sh">https://brew.sh</a></b> <b>Core Maintainer</b>	Hong Kong <i>Feb 2015 – Feb 2017</i>
EDUCATION	<ul style="list-style-type: none"><li>• Acted as one of the core maintainers for the open source project Homebrew, which is the most popular package manager on macOS.</li><li>• Implemented several major features and improvements including better tap system, core/formulae split, sandbox system, portable Ruby, and many bug fixes.</li></ul>	
	<b>Hong Kong Baptist University</b> Ph.D. in Computer Science Dissertation: Authenticated Query Processing in the Cloud Advisor: Prof. Jianliang Xu	Hong Kong <i>Nov 2014 – May 2019</i>
	<b>Huazhong University of Science and Technology</b> Bachelor of Engineering in Electronics & Information Engineering	Wuhan, China <i>Sep 2009 – Jun 2014</i>
SKILLS	<b>Programming</b> C/C++, Rust, Java, Python, Ruby, Matlab, $\text{\LaTeX}$ , Bash, Javascript <b>Tools</b> Vim, Tmux, Git, macOS, Linux <b>Languages</b> 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. 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*.
2. **C. Xu**<sup>†</sup>, C. Zhang<sup>†</sup>, 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*.
3. Z. Peng, **C. Xu**, H. Wang, J. Huang, J. Xu, and X. Chu, “P<sup>2</sup>B-Trace: Privacy-preserving blockchain-based contact tracing to combat pandemics,” in *Proceedings of the 2021 ACM SIGMOD International Conference on Management of Data (SIGMOD ’21)*, Xi’an, Shaanxi, China, Jun. 2021, pp. 2389–2393, *Short Paper*.
4. C. Zhang<sup>†</sup>, **C. Xu**<sup>†</sup>, H. Wang, J. Xu, and B. Choi, “Authenticated keyword search in scalable hybrid-storage blockchains,” in *Proceedings of the 37th IEEE International Conference on Data Engineering (ICDE ’21)*, Chania, Crete, Greece, Apr. 2021, pp. 996–1007, *Full Paper*.
5. K. Li, Y. Tang, J. Chen, Z. Yuan, **C. Xu**, and J. Xu, “Cost-effective data feeds to blockchains via workload-adaptive data replication,” in *Proceedings of the 21st International Middleware Conference (Middleware ’20)*, Delft, Netherlands, Dec. 2020, pp. 371–385, *Full Paper*.
6. H. Wang, **C. Xu**, C. Zhang, and J. Xu, “vChain: A blockchain system ensuring query integrity,” in *Proceedings of the 2020 ACM SIGMOD International Conference on Management of Data (SIGMOD ’20)*, Portland, OR, USA, Jun. 2020, pp. 2693–2696, *Demo Paper*.
7. **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*.
8. C. Zhang, **C. Xu**, J. Xu, Y. Tang, and B. Choi, “GEM<sup>2</sup>-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*.
9. C. Zhang, **C. Xu**, J. Xu, and B. Choi, “Distributed kNN query authentication,” in *Proceedings of the 19th IEEE International Conference on Mobile Data Management (MDM ’18)*, Aalborg, Denmark, Jun. 2018, pp. 167–176, *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*.
11. **C. Xu**, Q. Chen, H. Hu, J. Xu, and X. Hei, “Authenticating aggregate queries over set-valued data with confidentiality,” *IEEE Transactions on Knowledge and Data Engineering (TKDE)*, vol. 30, no. 4, pp. 630–644, Apr. 2018, *Full Paper*.
12. Q. Zhu, H. Hu, **C. Xu**, J. Xu, and W.-C. Lee, “Geo-social group queries with minimum acquaintance constraints,” *The VLDB Journal (VLDBJ)*, vol. 26, no. 5, pp. 709–727, Jul. 2017, *Full Paper*.

<sup>†</sup>These authors contributed equally.

## 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.
3. When Query Authentication Meets Fine-Grained Access Control: A Zero-Knowledge Approach, *2018 ACM SIGMOD International Conference on Management of Data*, Houston, USA, Jun. 2018.

## AWARDS

- SIGMOD Travel Award, ACM 2018
- Department RPg Performance Award, Hong Kong Baptist University 2018, 2019
- Postgraduate Research Symposium Best Research Performance Award & Best Poster Award, Hong Kong Baptist University 2018
- Yakun Scholarship Scheme for Mainland Postgraduate Students, Hong Kong Baptist University 2018