Qiaori Yao

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EDUCATION

Huazhong University of Science and Technology   Wuhan, China
M.Sc. in Computer System Architecture   *09/2019 – 06/2022*
Advised by Prof. Yuchong Hu

Lanzhou University   Lanzhou, China
B.Eng. in Computer Science and Technology   *09/2015 – 06/2019*
GPA 85/100, Rank 5/70

PUBLICATIONS

[1] **PivotRepair: Fast Pipelined Repair for Erasure-Coded Hot Storage** [pdf]
Qiaori Yao, Yuchong Hu, Xinyuan Tu, Patrick P. C. Lee, Dan Feng, Xia Zhu, Xiaoyang Zhang, Zhen Yao, Wenjia Wei
42nd IEEE International Conference on Distributed Computing Systems, ICDCS 2022

[2] **StripeMerge: Efficient Wide-Stripe Generation for Large-Scale Erasure-Coded Storage** [pdf]
Qiaori Yao, Yuchong Hu, Liangfeng Cheng, Patrick P. C. Lee, Dan Feng, Weichun Wang, Wei Chen
41st IEEE International Conference on Distributed Computing Systems, ICDCS 2021

[3] **Exploiting Combined Locality for Wide-Stripe Erasure Coding in Distributed Storage** [pdf]
Yuchong Hu, Liangfeng Cheng, Qiaori Yao, Patrick P. C. Lee, Weichun Wang, Wei Chen
19th USENIX Conference on File and Storage Technologies, FAST 2021

RESEARCH EXPERIENCE

Data Storage and Application Lab (DSAL), HUST   Wuhan, China
Research Assistant   *09/2019 – 06/2022*
Advisor: Prof. Yuchong Hu; Collaborator: Prof. Patrick P. C. Lee (*CUHK*)

- **PivotRepair**
  * *Problem*: erasure coding is emerging in hot storage that requires fast online recovery to preserve read performance, but existing repair strategies cannot effectively handle frequent and rapidly changing network congestions in hot storage clusters
  * Conducted measurement analysis and observed that available bandwidths of nodes highly fluctuate, and different nodes may experience congestions at different times, while some nodes (pivots) still have abundant downlink and uplink bandwidths
  * Designed a fast greedy algorithm for constructing the optimal pipelined repair tree that exploits pivots to bypass congested links and accelerate the tree's construction

- **StripeMerge**
  * *Problem*: how to efficiently generate wide stripes for erasure-coded storage remains a non-trivial issue, especially since the naive re-encoding method triggers substantial bandwidth overhead
  * Proposed a novel tiered generation approach that carefully selects and merges narrow stripes into wide stripes, and used the bipartite graph model to prove the existence of an optimal scheme that does not incur any network transfer for wide-stripe generation, yet which is computationally expensive
  * Designed two heuristics that can efficiently generate schemes with only limited wide-stripe generation bandwidth overhead

- **ECWide**
  - * *Problem*: wide stripes can extremely suppress the redundancy in erasure coding, but also incur high repair penalties when using existing repair approaches
  - * Engaged in the design of a repair-efficient mechanism for wide stripes as a major contributor, that utilizes the combination of both parity locality and topology locality to mitigate the cross-rack repair bandwidth
  - * Implemented and evaluated the prototype for the cold storage system and augmented it with the efficient multi-node encoding scheme

PROFESSIONAL EXPERIENCE

KV Storage Group, Wechat, Tencent Guangzhou, China

Software Engineer *07/2022 – Present*

- Designed and implemented the full-text index for a distributed table-like database system on top of LevelDB, including stages of index building, index updating, query planning, query executing and record retrieving
- Built a scheduling mechanism to reduce request latency while keeping workload balance for the distributed KV storage system based on dynamic routing
- Contributed to the KV storage system in other respects, including new feature development, bug fixes, performance benchmarks, and technical surveys

Inference Engine Group, Cambricon Beijing, China

Software Engineer Intern *11/2021 – 02/2022*

- Investigated passes in MLIR to explore the feasibility of introducing new dialects from the community to improve the inference engine's performance, including passes within the same dialect and passes between different dialects
- Helped with fixing bugs and testing for the inference engine based on Cambricon's Domain Specific Architecture (DSA) machine learning accelerator

HONORS

- Outstanding Contributor in 2023H2, *Tencent* *01/2024*
- Outstanding Graduate (**Top 10%**), *HUST* *06/2022*
- National Scholarship for Graduate Students (**Top 1%**), *Ministry of Education of China* *12/2021*
- Scholarship of Sangfor, *HUST* *04/2021*

SKILLS

Programming Languages: C/C++, Python, Java, SQL, Bash

Operating Systems: Linux

Tools: Git, GDB, Bazel, Docker, LaTeX