Related Works

Mark Madler

1 Closely Related Works object based / not page-level granularity

1.1 Evaluation of RDMA opportunities in an Object-Oriented DSM

entry paper. Interesting result is that it proves that invalidation protocols are better suited for distributed systems. [12]

1.2 FaRM: Fast Remote Memory

Super similar to the entry paper. A lot of other papers call it DSM so I am not totally sure about this. I think this still caches data at the page level.[2]

1.3 FaRMv2: Fast General Distributed Transactions with Opacity

Just like FaRM but with opacity. Also providing strict serializability.[9]

1.4 Efficient Distributed Memory Management with RDMA and Caching

cache-line granularity.[1]

1.5 Distributed Shared Object Memory

object based granularity, release consistency... too old for RDMA[6]

1.6 Gengar: An RDMA-based Distributed Hybrid Memory Pool

This is object based dsm over rdma but with non-volatile memory as well using Intel Optane. Seems to also use this lease assignment idea like in [4] but is not page based.[3]

1.7 Scalable RDMA performance in PGAS languages

This paper is for PGAS languages. Has an address hash table similar to LOCO for remote lookups.[5]

2 Loosely Related but Evaluated

2.1 CoRM: Compactable Remote Memory over RDMA

page based I think (re-read this)[10]

2.2 LITE Kernel RDMA Support for Datacenter Applications

This is page based DSM using hte kernel. [11]

2.3 MENPS: A Decentralized Distributed Shared Memory Exploiting RDMA

- Page based DSM
- Special Diff merging and page sharing
- Combine write notices and logical leases (what is that?)[4]

2.4 Scaling out NUMA-Aware Applications with RDMA-Based Distributed Shared Memory: MAGI

Page-based DSM again. [7]

2.5 GiantVM: A Novel Distributed Hypervisor for Resource Aggregation with DSM-aware Optimizations

Page-based DSM again but also works over TCP and RDMA[8]

2.6 Argo DSM

Page-based DSM again but directory coherence

3 Evaluated but not Related

3.1 Rcmp: Reconstructing RDMA-Based Memory Disaggregation via CXL

page based and uses CXL, not comparable[13]

References

[1] CAI, Q., GUO, W., ZHANG, H., AGRAWAL, D., CHEN, G., OOI, B. C., TAN, K.-L., TEO, Y. M., AND WANG, S. Efficient distributed memory management with rdma and caching. *Proc. VLDB Endow. 11*, 11 (July 2018), 1604–1617.

[2] DRAGOJEVIĆ, A., NARAYANAN, D., HODSON, O., AND CASTRO, M. Farm: fast remote memory. In *Proceedings of the 11th USENIX Conference on Networked Systems Design and Implementation* (USA, 2014), NSDI'14, USENIX Association, p. 401–414.

[3] DUAN, Z., LIU, H., LU, H., LIAO, X., JIN, H., ZHANG, Y., AND HE, B. Gengar: An rdma-based distributed hybrid memory pool. In *2021 IEEE 41st International Conference on Distributed Computing Systems (ICDCS)* (2021), pp. 92–103.

[4] ENDO, W., SATO, S., AND TAURA, K. Menps: A decentralized distributed shared memory exploiting rdma. In *2020 IEEE/ACM Fourth Annual Workshop on Emerging Parallel and Distributed Runtime Systems and Middleware (IPDRM)* (2020), pp. 9–16.

[5] FARRERAS, M., ALMASI, G., CASCAVAL, C., AND CORTES, T. Scalable rdma performance in pgas languages. pp. 1–12.

[6] GUEDES, P., AND CASTRO, M. Distributed shared object memory. In *Proceedings of IEEE 4th Workshop on Workstation Operating Systems. WWOS-III* (1993), pp. 142–149.

[7] HONG, Y., ZHENG, Y., YANG, F., ZANG, B.-Y., GUAN, H.-B., AND CHEN, H.-B. Scaling out numa-aware applications with rdma-based distributed shared memory. *Journal of Computer Science and Technology 34* (2019), 94–112.

[8] JIA, X., ZHANG, J., YU, B., QIAN, X., QI, Z., AND GUAN, H. Giantvm: A novel distributed hypervisor for resource aggregation with dsm-aware optimizations. *ACM Trans. Archit. Code Optim. 19*, 2 (Mar. 2022).

[9] SHAMIS, A., RENZELMANN, M., NOVAKOVIC, S., CHATZOPOULOS, G., DRAGOJEVIĆ, A., NARAYANAN, D., AND CASTRO, M. Fast general distributed transactions with opacity. In *Proceedings of the 2019 International Conference on Management of Data* (New York, NY, USA, 2019), SIGMOD '19, Association for Computing Machinery, p. 433–448.

[10] Taranov, K., Di Girolamo, S., and Hoefler, T. Corm: Compactable remote memory over rdma. In *Proceedings of the 2021 International Conference on Management of Data* (New York, NY, USA, 2021), SIGMOD '21, Association for Computing Machinery, p. 1811–1824.

[11] Tsai, S.-Y., and Zhang, Y. Lite kernel rdma support for datacenter applications. In *Proceedings of the 26th Symposium on Operating Systems Principles* (New York, NY, USA, 2017), SOSP '17, Association for Computing Machinery, p. 306–324.

[12] Veldema, R., and Philippsen, M. Evaluation of rdma opportunities in an object-oriented dsm. pp. 217–231.

[13] Wang, Z., Guo, Y., Lu, K., Wan, J., Wang, D., Yao, T., and Wu, H. Rcmp: Reconstructing rdma-based memory disaggregation via cxl. *ACM Trans. Archit. Code Optim. 21*, 1 (Jan. 2024).