DALHOUSIE UNIVERSITY

CSCI 5408 – Data Management, Warehousing, Analytics

Assignment 2

Work done by,

Name: Guturu Rama Mohan Vishnu

Banner ID: B00871849

Email: rm286720@dal.ca

DECLARATION

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Problem #1: Reading Material

Summary:

The developing size of present-day record framework has turned into the next big thing since the information continues to stream in every single second. With time, the information which we gather will just increment yet won't diminish. To settle this issue, we as of now have conveyed distributed metadata management schemes which utilizes different metadata servers. However, every development has a disadvantage with it thus for this situation as well. Indeed, even in the wake of having the option to deal with PB or EB-scale stockpiling, the situation we have right currently is noticeably flawed all things considered.

As per the principles, accessing a metadata node in a namespace tree expects to get to all its progenitor nodes till the root. So, in the current calculation we follow, all the while, following the sub-tree segment plot brings about having great locality however winds up having terrible unbalance between the servers. On the other head, drawing closer through the hash-based mapping offers us the chance to get a decent-balanced-responsibility server however will wind up having poor metadata locality.

To clear this issue of maintainability and load balancing, this paper is proposing the use of novel hashing scheme called AngleCut which uses a Novel Locality Preserving Hashing (LPH) to make a ring projection and to hash the metadata namespace tree onto a linear key space. Besides this, they also propose a two-layer metadata cache mechanism to improve the metadata query efficiency, including client side cache and server side cache. Also, they propose a 2PC Protocol based on Message Queue (2PC-MQ). The technique starts with the whole hash space getting organized as a hash ring. Then the AngleCut projects the metadata nodes to multiple chord-like rings by their angle value. Since we have obtained multiple rings as the keyspace, the next step is to allocate metadata nodes uniformly to the metadata servers. In order to achieve that, an important step is to get the distribution of metadata access frequency. Now, to improve the metadata query efficiency, they introduced a two layer metadata cache mechanism which provides the two stage access acceleration. In the next step, Two-Phase Commit Message Queue (2PC-MQ), a distributed transaction scheme which effectively guarantees the data consistency of distributed metadata transactions is being implemented.

The results show that the static subtree partition plays out the most horrendously awful while the dynamic subtree segment is somewhat better, since it embraces dynamic change to make up for load imbalance. Both AngleCut and DROP have much better load adjusting execution and AngleCut performs two times on par with DROP most of the times, at times indeed, even much better. Thus, the hypothetical evidence and broad examinations on Amazon EC2 show the predominance of AngleCut over hashed-based mapping.

In my opinion, to solve the issue of multiple metadata management systems is pretty important and the solution they proposed for that issue is also quite amazing. Building a ring based metadata management algorithm for large scale distributed file systems is not an easy task and the fact that these people addressed this issue in such a clear and right way, made me feel that there couldn't be any better solution as of today than this. Also, the explanation of their techniques, the methods and the way the algorithm is going to process is clear enough to understand by reading the paper. As per my understanding, I have not found any flaws or limitations in this paper.

References:

[1]   Y. Gao, X. Gao, X. Yang, J. Liu and G. Chen, "An Efficient Ring-Based Metadata Management Policy for Large-Scale Distributed File Systems," in *IEEE Transactions on Parallel and Distributed Systems*, vol. 30, no. 9, pp. 1962-1974, 1 Sept. 2019, doi: 10.1109/TPDS.2019.2901883.