SMAV: A solution for multiple-attribute search on DHT-based P2P network

Nguyen H.S., Nguyen T.D., Pham T.H.

College of Technology, Vietnam National University, Hanoi, Viet Nam; Vietnam Railways Cooperation, Hanoi, Viet Nam

Abstract: DHT-based P2P networks such as Chord, CAN, Pastry, etc can achieve exact query with characteristic of scalability, efficiency and fault-tolerate. However, in the case of complex queries such as range query or multiple-attribute query, pure DHT is not efficient since a lot of query messages must be sent. In this paper we focus our intentions on multiple-attribute query on DHT-based P2P network systems. Conventional researches meet a problem arising from the load unbalance among nodes due to the appearance of common attribute/value pairs (AV pairs) in content names (i.e. AV pairs those appear in a lot of content names). We propose a hierarchical key generation approach for storing and querying multiple-attribute contents. The main idea of our proposed system is to limit the number of information contents distributed by one key to a node by the use of sub-keys created from multiple common AV pairs. Sub-keys, by which the total number of information contents in the system are already distributed is not over N_{MAX}, will be used as distribution keys to distribute information contents. Furthermore, our system keeps the mapping between sub-keys created from two common AV pairs and distribution keys created from two more common AV pairs to reduce query cost. Our system can achieve both efficiency and a good degree of load balancing even when the distribution of AV pairs in content names is skewed. Our simulation result shows the efficiency of our solution in respects of lookup time and the degree of load balancing. ©2009 IEEE.

Index Keywords: As distribution; Attribute queries; Complex queries; Information contents; Key generation; Load-Balancing; Lookup time; P2P network; Query costs; Query message; Range query; Simulation result; Sub-keys; Client server computer systems; Cost reduction; Network architecture; Keys (for locks)

Authors with affiliations:

• Nguyen, H.S., College of Technology, Vietnam National University, Hanoi, Viet Nam

• Nguyen, T.D., College of Technology, Vietnam National University, Hanoi, Viet Nam

• Pham, T.H., Vietnam Railways Cooperation, Hanoi, Viet Nam

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