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A Survey on Query Processing in Mobile Database

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Abstract

A mobile computing device connected through wireless network then it is called as mobile database. The main objective of this paper proposes a survey on mobile database requirements, architecture of Mobile database Query processing, and its various challenges. Data-driven application is best method of enabling access to any kind of information retrieval from anywhere at any time. In Database query processing linear search, index based search algorithms are mainly used. This survey shows various existing algorithm used in mobile database query processing like CNFS, Flooding algorithm and their issues.

Keywords: Architecture, CNFS, Database, Data-driven, Query Processing

1. Introduction

In Mobile environment client and server are based on wireless connection. Using Mobile database Technology the user retrieve any type of information. Mobile database support client- server model, Peer-Peer model, Distributed server model etc. In client server model the server can become a single point of failure means that affect entire performance. The problem of data inconsistency (bottleneck) occurred. In Peer – Peer database information are distributed among all the clients. The Major issue in Peer-Peer environment is ensuring about availability of desired information.

Mobile Environment contains the detail of base station, mobile unit, PSTN (Public Switched Telephone Network), MSC (Mobile Switching Centre), HLR (Home Location Register), VLR (Visitor Location Register). Base station communicates the mobile station through the wireless network. HLR contains the details of Mobile user. When the mobile user move from one place to another place then VLR update these information. In this Paper describe the details of Mobile database requirements, architecture of Mobile Query Processing, discuss about Background of Mobile query processing and its issues[1].

2. Mobile Database Requirements and Query Processing

In Mobile Database management mobile user needs small memory for foot print, flash optimized storage system, Data synchronization, security, and Low power consumption etc. Most of the mobile based application uses flat files to store data in the application. Flat file is a one type of file contains collection of record information. The challenges in mobile database are limited resources, power consumption, limited storage, and limited battery[2]. Database Query processing refers to the set of activities in retrieving data from a database. Before processing a query, database system must translate this query into usable form. The translation work is performed by a query Parser. Linear search, index based search algorithms are used in mobile database query processing. Based on these technologies query optimization (Minimize the cost of query) can be evaluated.

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Content- based information retrieval method is used to access all kind of information and services through wireless network. In Mobile database Query processing mobile user first send the query to the database, which is being processed by the database engine and return the result to desired mobile user[2]. Query processing in mobile environment involves join processing among different sites which include static servers and mobile computer to process the information. Conventional Query processing for a distributed database can't be directly applied for mobile computing system. For these purpose CDMA (Code Division Multiple Access), WAP (Wireless Application Protocol) has been developed. Query processing in mobile environment involves server and several mobile computers.

Mobile Database query can be classified into NLRQ (Non Location Related Queries), LDQ (Location Dependent Query), and LAQ (Location Aware Query). An attribute in query based on the non- location then is known as LAQ. Example consider the below queries in SQL to retrieve the restaurant in North India[4].

SELECT name
FROM restaurant
Where Location="North India"

Above query based on non-location. Location Dependent attributed based on the any location. If any one of Attribute is based on the location then it called as LAQ[7]. Implement these queries in database that can be connected to any mobile computing device. Mobile User also selects a group of query to process multiple queries processing simultaneously. Figure 1 shows the complete way of mobile query processing system[8].

Mobile database query processing divided into three components such as Mobile client system, Wireless System, Server System[4]. Mobile client first establish the communication then send the query request to the server. The Wireless network system follows the first come first served method (FCFS). In case of any failure or disconnection occurs wireless manger well inform these kind of information to the server. Server returns the result to the mobile client. The main function of Query processing is first designing algorithm, analyze the given queries and convert into data manipulation operations. Query processor is transferring the relational calculus query or any other high-level query into lower level. Query Optimizer execute query plan to obtain the result. In Mobile communication Environment mobile user Locations change dynamically. It will increase the Paging cost[4].

3. Background of Mobile Database Query Processing

In mobile Environment data is spread over the network through push/pull mechanism[5]. When Mobile host move from one network to another network Registration/ Deregistration Protocol is used to ensure about this kind of information. To Process the efficient query processing some of the existing algorithm like CNFS (Closest Neighbor First Search), Flooding Based, Walk-Based algorithm, random based algorithm, FAR replacement algorithm, RBF-FAR, Dynamic data management, Trajectory based search techniques are used. This paper is survey of these techniques and its various disadvantages. Flooding based or random walk algorithm is one of

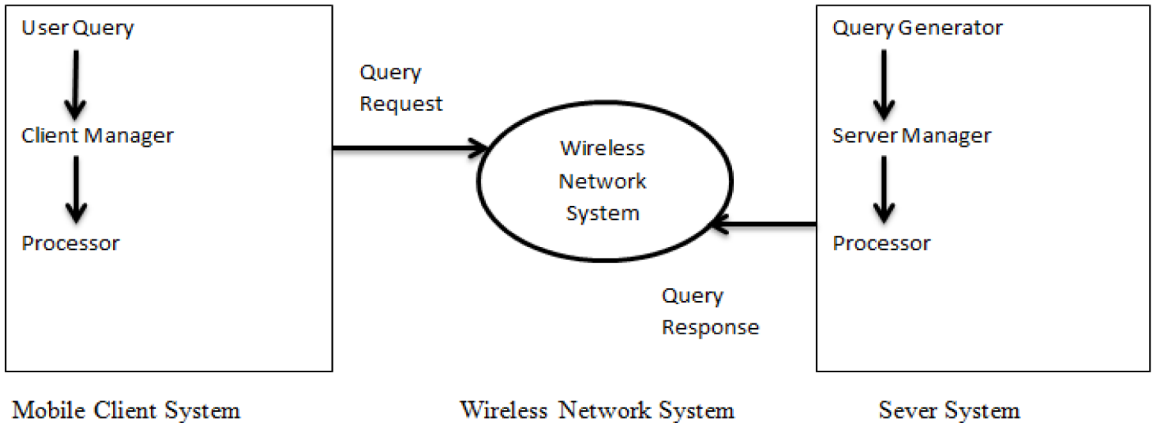

Figure 1. Mobile query processing System.

routing based algorithm. These algorithms are well suitable in mobile wireless sensor networks, mobile ad-hoc networks. Flooding based algorithm returns the query result very quickly, but it will require the extreme number of message then it created the data inconsistency problems.

Random walk algorithm use single message to visit all the network nodes and it reduce the message overhead. But it takes much more time to complete even a single query. In mobile environment have challenges like low-power consumption, low bandwidth, storage. If the mobile user performs any grouping query then there is a no chance for getting better throughput. CNFS algorithm is based on biased searching method. It collects and maintains the routing map on the network during query processing. This algorithm is also suitable for a peer- peer server model. CNFS algorithm use concept of index or hierarchy model. For example consider N number of node, and any one of node like X, initialize the query for a particular Data D. The query processing algorithm like linear, binary, index based techniques find the D and send the query result to the desire node X with in time interval T. CNFS algorithm causes the problem when the mobile user request any join based query method[8].

FAR algorithm is used to improve the performance of mobile database query processing based on replacement techniques. It can be classified into two ways. One is get the movement path data item, out of movement path data item. Next replace the out of movement path data to the desired location. RBF-FAR replacement algorithm is better suitable for location dependent queries[6].

In Mobile Database the user can join or leave at any time. This kind of activity determines the problem associated to the transaction management like energy consumption. Dynamic data management techniques introduced for the location based service. It reduces the service cost, improve the throughput but in these types of techniques create transaction inconsistency problem[3].

In Mobile database Query processing join based query is very difficult because of asymmetric features. Semi-join method was introduces in mobile query processing to support the concept of mobility. All the mobile location based services identify by the GPS3. Location based scheme, the mobile user get the all updated messages which consume power most. To solve this kind of problem SMM (State based Mobility Model), SLUP (State based Location Update Protocol) are used but these techniques causes the problem like increase the Page Cost[3]. Location based service is well suitable for the application like traffic control, e-marketing, etc.

4. Conclusion

This survey represents the requirements, steps involved in mobile query processing, and various algorithm used in mobile query processing. The mobile database query processing system, technologies used in mobile application system that are completely difference in Database Management system. This paper highlighted the various algorithms like trajectory based, FAR, Flooding Based, Walk-Based algorithm, Dynamic data management techniques and its issues. To overcome the issues in mobile database query processing system a secure online mobile database has been introduce.

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