

# Comparative Study of Query Processing Architectures in Mobile Environment

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**Abstract**—Query processing deals with designing architecture that analyze queries and convert them into series of data manipulation operation. Query processing in a mobile environment is to form a high level query on different architectures, which is seen as a single query by to different environments into an efficient execution strategy and finding the execution of such architecture. In mobile environment, the various query processing architectures such as mobile environment architecture, distributed architecture, data broadcast architecture, mobile database environment architecture etc. The parameters used such as average power consumption, broadcast effectiveness, query efficiency, client utilization.

This paper focuses on competent architecture for query processing in mobile environment. We propose comparative study of query processing based different architectures for exploring the mobile computing environment and to study various parameters related to different architectures of query processing in the mobile environment.

**Keywords**- Query processing, mobile computing, mobile devices, mobile environment, mobile database.

## 1. INTRODUCTION

Query processing for mobile environment which leads to selecting the best architecture for further implementation. In a mobile computing environment, a mobile user with a power-limited palm computer (or a mobile computer) can access various data via wireless communication. Applications such as stock activities, traffic reports, and weather forecasts have become increasingly popular in recent years. It is noted that mobile computers use small batteries for their operations without directly connecting to any power source and the bandwidth of wireless communication is, in general, limited. As a result, an important design issue in a mobile system is to conserve the energy and communication bandwidth of a mobile unit while allowing mobile users the ability to access information from anywhere at any time [1].

The data processing is totally depends on the architecture which describes the position and the standard protocols for connecting it to central servers. The central servers and adapting

of architectures such query processing will lead to consider the best model as a selection for further implementation [6].

## 2. QUERY PROCESSING

The role of query processing in a mobile environment is to form a high level query on a distributed database, which is seen as a single query by to different environments into an efficient execution strategy and finding the execution of such architecture. An important point of query processing is query optimization. Because many execution strategies are query optimization solution can help in reducing the time required for a query to be processed. Location management is an important issue in query processing in mobile environment. Since the number of user population carrying mobile devices increases linearly with the service demand, the communication traffic for locating users also increases accordingly. This situation requires an efficient strategy for location tracking and management. Location management is a very essential factor for optimization of query processing mobile based environment [2, 3,12].

The more number of data send by the devices, that moves as requests will be served from the centralized server and this will increase the chance of mobile clients to send the request to the server [4]. However, at a certain point the advantage of the broadcast data will be diminished if there is too many data in the broadcast cycle. Consequently, it will severely affect the query response time since mobile users have to wait for considerably long delay before they receive the desired data. Therefore, it is essential to decide what data to be broadcast that serves most of the requests since the query access pattern is changed dynamically [5].

A query may be optimized at different times relative to the actual time of query execution. Optimization can be done statically before executing the query or dynamically as the query is executed. The main advantage of the later method is that the actual sizes of the intermediate relations are available to the query processor, thereby minimizing the probability of a bad choice. The main drawback of the dynamic method is that the query optimization, which is an expensive one, must be repeated for each and every query. So, Hybrid optimization may be better in some situation. Thus architecture is shown for basic query processing in mobile environment. All the

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dependences considered after studying the various architectures and finding one which fulfilled all consideration as a result is described in the paper [13].

### 3. QUERY PROCESSING ARCHITECTURE

In mobile environment query processing architecture plays its important role, it affects the complete performance of the system. The main parameters to be considered for performance measures are query optimization, database size, query response time, location tracking and location management in mobile environment. Query processing in a mobile environment is to form a high level query on different architectures. The query processing architectures are able to give answers of different types of queries by exchanging less number of messages among the various component of the network. Following are the various architectures discussed for query processing in mobile environment.

- 3.1 T.P.Andamuthu et. al.[6] suggested a competent architecture is recommended for query processing in mobile environment. To offer the client with the required information, highest of downstream communication capacity of server are utilized by the proposed architecture with least necessitate for data pull. As they need considerable upstream communications abilities, a Pull-based system is a pitiable match for asymmetric communications environments. An Adaptive Updating Algorithm has been presented subsequently for managing host mobility. Lessening of the client power utilization and rising in the query competence are revealed through extensive simulations by our proposed architecture. An interesting future work is to reduce the load and message processing cost of the servers.
- 3.2 Agustinus Borgy Waluyo et. al.[7] suggested about recent emergence of wireless technology enables people to conduct activities, business, or transactions anywhere and anytime without any attachment to stationary computer like used to be. Mobile database focuses on the query issue that is the dominant operation in mobile computing. Since mobile database is a new dimension of database application, the type of query, query processing strategy, and communication technology that involves in the application are different than what applies in traditional databases. Architecture with respect to is explained in the paper.
- 3.3 Agustinus Borgy Waluyo et. al.[8] explains data broadcast and considerably the most effective mechanism for wireless digital content delivery. This is because of its capability feature. However, the advantage of data broadcast may be significantly diminished when the size of the broadcast data increases. As part of a cyber engineering effort, we have presented a novel structure and access for mobile data broad-cast in a wireless environment. The proposed scheme aims to address the tradeoff for minimizing query-access and tuning times and achieve the better towards.
- 3.4 Sanjay Kumar Madria et. al.[9] suggested an architecture which leads to present a query processing model for a mobile computing environment using concept hierarchies and summary databases to deal with constraints such as disconnectivity, low bandwidth, and limited storage space. Query-processing model provides approximate answers to queries using a combination of summary data and concept hierarchies. Authors have reported various techniques of summarizing the database and have classified summary databases. The answers returned by the query processor using a summary database are approximate which have been further classified depending on their properties. Authors have provided the cost-benefit analysis involving the storage cost, transmission co stand query processing cost. For future work, Authors are building a system to generalize the concept hierarchies using the domain knowledge. Authors are also in the process of implementing various techniques of summarization and query rewriting.
- 3.5 Kian-Lee Tan et. al.[10] express the methodology in which Authors have presented the motivation for incorporating novel capabilities that allow a user query to be evaluated in an incremental manner. Author submit that this functionality is invaluable in the current context whereby decision makers are often confronted with more information than they could use, and where advances in micropayment mechanisms have given rise to new ways of consuming information that favor the retrieval of small chunks of information. Interestingly, there appears to be multiple ways of decomposing a query for which no single rewriting is optimal all the time. Authors have also described heuristics and an enumeration algorithm that generates alternative query rewritings. Our experimental study on Oracle Server showed the effectiveness of the proposed architecture.
- 3.6 SeemaVerma et. al.[11] introduced method and architecture explains recent emergence of wireless technology enables people to conduct activities, business, or transactions anytime and anywhere without any attachment to stationary computer. Nomadic people are now able to access email, news, weather, and query to the central database server using wireless devices. Mobile database focuses on the query issue that is the dominant operation in mobile computing. Since mobile database is a new dimension of database application, the type of query, query processing strategy, and communication technology that involves in the application are different than what applies in traditional databases. In this paper, Author first discussed the issues of query selection, taxonomy and query processing strategies. Authors have defined query taxonomy as well as query processing strategy in mobile databases. Query in mobile databases are categorized into context-

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awareness query and ad-hoc query. Context-awareness query is further classified into location dependent, context dependent, and hybrid query. Query clouds mobile client, on air, and server strategy. Mobile client and on air strategy corresponds to caching strategy and broadcast strategy respectively. This work presented query broadcast management schemes to optimize and minimize the query access time of mobile clients when retrieving broadcast database items.

#### 4. ANALYSIS AND DISCUSSION

We proposed critical analysis and discussion of various architectures for query processing in mobile environment on various parameters that are given as follows:

4.1. T.P.Andamuthu et. al.[6] worked on server push(SP) and client push(CP) strategies with the help of adaptive updating algorithm. It is found out that the downstream communication and upstream communication ability is depends upon various parameters like average power consumption, broadcast effectiveness, query efficiency, client utilization. The simulation result is depends upon average power consumption verses load, when the broadcast size or server load increases the average power consumption for server decreases as less time is spent for transmitting. The average power consumption for clients is universally low, because of the high level of disconnection due to the nodes movement.

4.2 Agustinus Borgy Waluyo et. al.[7] described unique type queries and query processing strategies that are different traditional database. It is observed that mobile environment architecture should consider the parameters like caching, broadcasting and scheduling and also the server strategy which relates to accommodate multiple requests so that the request can be processed as efficiently as possible.

4.3. Agustinus Borgy Waluyo et. al.[8] elaborated how digital ecosystem offer cost effective digital services and benefit the species within them (i.e. human, organization, computers) it minimizes query access and tuning times by specifying new message structure. This architecture results in effectiveness in minimizing low tuning time. The use of data broadcast in mobile computing allows a mobile client to obtain information without the need to transmit a request or query to the server. It is observed that behavior of broadcast-based information is unidirectional.

4.4 Sanjay Kumar Madria et. al.[9] explains the concept of hierarchies to generate summary database from the main database. It is found out that a more optimal use of during periods of disconnection and to enable efficient utilization of low bandwidth and restricted memory size. The model that is able to provide varying levels of approximate answers to queries that at mobile host using summary database stored either locally at mobile host or remotely at mobile service station and some cost benefit

analyses involving storage cost, transmission and query processing cost.

4.5 Kian-Lee Tan et. al.[10] illustrated that to adopt server side caching strategy for answers to query are cached in the server and incrementally delivered to the client as requested. It is observed that redesign traditional query processors to generate plans that can be processed progressively which ultimately help to build a (middleware) layer between clients and server. The main objective of this paper is that to provide middleware service that allows for the progressive evaluation of queries submitted to any legacy database systems connected to the web.

4.6 Seema Verma et. al.[11] implemented the wireless technology which enables the people to conduct activities, business, or transactions anywhere without any attachment to stationary computer. It is observed that the query broadcast management schemes need to optimize and minimize the query access time of mobile clients when retrieving broadcast database item which totally depend on the various parameters like query selection, taxonomy and query processing strategies.

This paper discusses the various different architectures used in mobile computing environment with different methodologies. This comparative study based on these architectures will lead to some final conclusion of best results in designing a new architecture which considered as best for further implementation by considering all the various parameters which really affects the performance of the query processing in mobile environment along with the cost-benefit analysis involving the storage cost, transmission cost and query processing cost.

#### 5 CONCLUSION

In this paper, the comparative study of query processing architectures in mobile environment is appropriate paradigm for mobile computing is analyzed. With these architectures it becomes possible, to have comparative study and functionality between these architecture based on different parameters used in query processing architecture. In mobile environment query processing architecture plays its important role, it affects the complete performance of the system. The main parameters to be considered for performance measures are query optimization, database size, query response time, location tracking and location management in mobile environment along with average power consumption verses load, broadcast effectiveness, query efficiency, optimized use of bandwidth and memory size. Along with these, there is lot of other parameters which really affects the performance of the system. This is very challenging field and more research need in this direction.

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