

# Critical Study of Location Dependent Based Query Processing in Mobile Environment

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**Abstract-** Query processing is the process of selecting the best execution strategies to be used in response of database request. The main aim of query processing is to minimize cost of each query execution. The processing cost may be in the form of time or space complexity. The application of query processing will change the way of user interaction and it also increases working performance for better user workability. This paper focuses on brief description on location based continuous query using static objects and moving object to study of different environment and along with its implementation of query processing in mobile environment. In this paper, query processing techniques such as join methods likely join, semi join, multi join. The three asymmetric features, like 1) Asymmetric feature of computing capability between the server and a mobile computer. 2) Asymmetric feature of energy consumption between message sending and receiving. 3) Asymmetric feature of energy consumption between activeness and idleness of a mobile computer are analyzed.

**Index Terms**— Query processing, mobile computing, location dependent, mobile devices, mobile environment.

## I. INTRODUCTION

The great challenge in mobile computing and positioning technologies, such as GPS, location management has become an active in the field of research. Several research efforts have been made to address the problem of moving objects to support efficient evaluation of continual spatial queries. Our focus in this paper is on moving continual queries over moving objects. Efficient evaluation of MCQs is an important issue in both mobile systems and moving object tracking systems. Research on evaluating range queries over moving object positions has so far focused on static continual range queries. A static continual range query specifies a spatial range together with a time interval and tracks the set of objects that locate within this spatial region over the given time period. The result of the query changes as the objects being queried move over time. Although similar, a moving continual range query exhibits some fundamental differences when compared to a static continual range query. A moving continual range query has an associated moving object, called the focal object of the query; the spatial region of the query moves continuously as the query's focal object moves. Moving continual queries introduce a new challenge in indexing, due mainly to the highly dynamic nature of both queries and objects. MCQs have different applications, such as environmental awareness, object tracking and monitoring, location-based services, virtual environments, and computer games. The following main advantages: 1) It is a general solution for the processing of location-dependent queries in scenarios where not only the users issuing queries, but also other interesting objects can move; 2) It performs an efficient processing of these queries in

a continuous way; 3) It is especially well adapted to environments where location data are distributed in a network and processing tasks can be performed in parallel, allowing a high scalability; and 4) It optimizes wireless communications. We use mobile agents to carry the processing tasks wherever they are needed. Thus, agents are in charge of tracking the location of interesting moving objects and refreshing the answer to a query efficiently.[1,2]

## II. CHALLENGES IN QUERY PROCESSING

The 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. 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. 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.[3]The continuous development and improvement of wireless networks and mobile computing devices, together with their challenging limitations, has motivated an intense research effort in mobile data service. While most of these services are the counterpart of those available in desktop computers, there exist other applications that exploit the dynamic features of the mobile environment to provide the user with context-aware information. In this paper, we focus on continuous location dependent queries, which are still a subject of research mainly due to the lack of a general architecture that is well adapted to process them efficiently. A sample location dependent query is "show me the available taxi cabs within three miles of my current location" which could be very useful, for example, for a user looking for an available taxi cab while walking home in a rainy day. In the following, we introduce the features considered by our approach, first for the location-dependent queries and next for the query processing. [4]

## III. LOCATION QUERIES: FEATURES

The queries are treated as continuous queries since the set of objects that satisfy the conditions specified in a location-dependent query can change very quickly due to the mobility of

the involved objects (its answer depends on the location of such moving objects). For example, if a user asks about the nearest hotel while driving through the downtown of a large city, the expiry time of the returned answer could be very short because with small displacements of the car a different hotel could be the nearest. Thus, the answer to continuous queries must be updated continuously at a certain refreshment frequency (e.g., update the answer every 5 seconds) until they are cancelled by the user, as opposite to the traditional instantaneous queries for which only a single answer is obtained. The answer to a location query can depend on the location of any object in the scenario. This kind of location queries are called moving queries because the geographic areas they are interested in change with the movements of the objects referenced by such queries. By contrast, most commercial solutions only allow queries about static objects (e.g., restaurants, gas stations) around the current location of the user that posed such queries. Therefore, the query processing approach must aim at providing location-aware answers, which also advises the refreshment of the answer with a certain frequency. Location query processing techniques should meet the following two features: 1) To be suitable for a distributed environment and 2) To refresh the answer to continuous queries efficiently. These goals in the following.[5]

#### A) Distributed Query Processing:

While the inherent distribution of the moving objects themselves suggests a distributed approach for the query processing, many existing works reduce the problem to a centralized query processing. In our opinion, for scalability, performance, and feasibility reasons, it is not convenient to assume that there exists a centralized computer which is aware of the locations of all the moving objects of interest in the scenario [6]

#### B) Efficient changing Continuous query :

It is not possible to provide a completely precise the locations of moving objects, due to two reasons: 1) The locations of all the moving objects cannot be measured and obtained at exactly the same time instant and 2) Any existing positioning method incurs some error. However, by considering a query whose answer is continuously updated, special difficulties arise from the need of keeping the answer to continuous queries up to date while optimizing the wireless communications [7].

## IV. QUERY PROCESSING FRAMEWORK

There are various types of queries available for different communication systems. The existence of queries is more convenient in wireless environment than wired environment. This paper is focused on query taxonomy. Some queries exist only in a wireless environment and some in the traditional environment, but some types of queries are seen in both the environment. The queries classified in mobile environment: Traditional queries and Context awareness queries. Context awareness queries are classified into three types namely location dependent queries, context dependent queries and hybrid queries.

*A)Traditional Queries:* Traditional queries are general queries in traditional database management system. Now-a-days, these queries are typical queries that people are dealing with day-to-day basis in a stationary network environment system. This type of query specially mentions the required information in the

query statement and the result of the query is based only on the actual query itself. Examples of such type of queries are: (i) A depositor want to retrieve his account statement of provident fund. (ii) Any person wants to know up gradation of LIC policy after 5 years.

*B)Context Awareness queries:* The word context defines a variety of aspects. Context categorized likely computing context, user context, and physical context. The computing context concerned with computing resources like as network, connectivity, bandwidth, workstation, server, clients. User context relates to user's needs, preferences, roles, profile and alike. Physical context associates with environment, issue which include lightning, noise, traffic, temperature and humidity. In addition "Time context" which implies to time of day, week, month, and year. It defines context as either aspect of physical world or condition and activities in the fictitious world. Context awareness queries always define that context relates to who, when, where, what context awareness generate a new class of application in mobile computing. With the help of context awareness queries, mobile device is expected to perform constantly in wide range of dynamically and continually changing situation. It is prominent for the device to be able to be aware of a situation, environment and tasks that the mobile client is performing as well as, will be performing in the near future. Example: To find motel information in current region. The query will give effect of retrieving information about restaurant as well as fuel based on user preferences and prefacing maps, traffic and weather condition which is likely to be queried.[ 8]

*C)Location Dependent Queries:* Location dependent query is category of queries that are motivated by mobile clients. The location of mobile client is a parameter of the query for location dependent query. The processing of queries fully depends on the user's location. The current route, direction of motion and the speed are necessary to be taken in account for services of queries. Generally, each location updates create two direct cost : (i) Transmission cost, which directs to the cost to inform the server of the fresh location and (ii) Server processing cost, which refers to the cost of updating the system containing the location of the mobile unit. The parameter for location can be in any object like as taxis, trucks and helicopters. This category of query type can be further divided into following three classes: (i) moving user seeking static object (ii) moving user seeking moving object and (iii) static user seeking moving object.[9,10]

#### 1.Moving User seeking Static Object:

Moving User seeking Static Object query generates from a moving user and the searched object is static. Examples of this query is : Request of information by tourist on road to know about motel within distance of 5 kms.

#### 2.Static User seeking Moving Object:

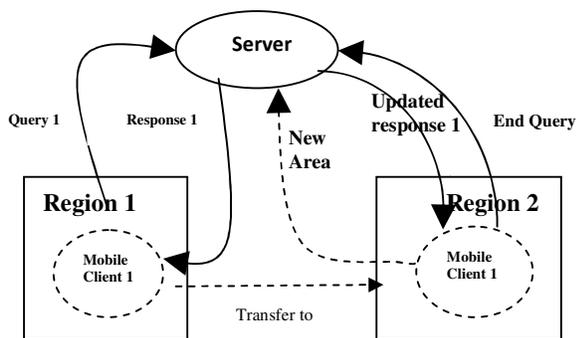
This type of query generates from a stationary user and the searched object is moving. Example of this query is request of information for a particular trains arriving on Badnera junction within one hour.

#### 3.Moving User seeking Moving Object:

This type of query generates from moving user, and the Searched object is also moving. Example of this query is: Request to retrieve information about cruise1 members by Cruise2 members of cruise when both are in different cruise.

Location dependent queries can also be classified depend on the based on query types: (i) Continuous query (ii) Non Continuous query.

**D) Continuous query:** It is such type of query involves real time monitoring of mobile objects. This type of query compared with conventional queries that are based on an instant of the database at some moment in time. The continuous query includes real-time monitoring of mobile objects. Real-time monitoring queries are continuous for monitoring purposes. In a continuous query setting even after the initial query is answered, the query is still kept by the server. Hence, in this case where the user moves into a different location or when new information becomes available, it will be needed to be dispatched to the user. Example: (i) To request information about nearby tourist attractions, hotels, or shopping centre while traveling. With this class of query, clients need to send a query only once and notification of the updated information about nearby tourist attractions, hotels, or shopping centre will be sent automatically as clients move to different regions. (ii) To notify mobile clients whenever they are close to a certain situation such as dangerous zone or traffic jam by providing some form of alerts to them. In this case, the system must be able to provide the accurate query results and update them in real time whenever mobile clients enter or exit the region defined by the query. This class of query can be referred as range-monitoring queries. The range-monitoring queries are removed from the system only when the user explicitly ends the query.[11,12]



**Fig. 1 : Contineous query**

**E) Non-continuous query:**

The non-continuous location-dependent query is different from the continuous query as the system does not manage the query. The mobile client generate query to obtain data from repository at the remote stationary server. Data management strategy is the on-demand mechanism referred to the optimization method used at the server side to serve on-demand request or a request that is sent to the server for processing. Data broadcasting strategy relates to determining a method to disseminate the database item to mobile client so that the response time, tuning time and power utilization of retrieving database items are minimized.[13]

## V. QUERY PROCESSING SYSTEMS

When locating a mobile station that may hold the required data and when selecting information particularly for location dependent information services, the location of mobile units are an important parameter. Query processing for mobile devices are classified generally into on demand, push based, hybrid data dissemination.

**A) On-Demand Query:**

User make is exclusively requests for data in on demand broadcast. If number of clients requests the same data at approximately at the same time, the server may match these requests and only broadcast the data once. In on demand query data dissemination is only user oriented. The location dependent on demand query is different from continuous query. On demand query specified its database management does not manage the query but only the location of each mobile unit in specified areas. In on-demand broadcast, clients make explicit requests for data. If multiple clients request the same data at approximately the same time, the server may match these requests and only broadcast the data once. It provides interactive capability to users for accessing the information through query. Users do not have to search in the wireless information space by tuning several channels. [14,15]

**B) Push-Based :**

In push-based systems, the server appoints point-to-multipoint communication and sends data items in the absence of explicit client requests. In order to achieve that, the server maintains a broadcast schedule, which determines the order and the frequency in which data items are broadcast. The major feature of such systems is capability. Client population does not influence the dissemination process because clients do not issue requests. The additions of new clients do not influence the server's incoming load or the client perceived access time...[16,17]

**C) Hybrid data dissemination:**

The hybrid data dissemination is a combination of on-demand and push based approaches. Data items are classified into hot data item and cold data item. Hot data items are delivered through push-based channels, where as cold data items are disseminated through on-demand channels. The hybrid data dissemination requires proper document classification and bandwidth division for data dissemination. These are interrelated issues, simply because a given bandwidth division determines the performance of a document classification choice and, conversely, a given document classification determines a bandwidth split that optimizes performance.[18,19]

## VI. ANALYSIS AND DISCUSSION

The proposed critical study is location dependent based on query processing in mobile environment. The proposed critical analysis and discussion of various types of queries, query architecture, query processing methods or techniques and its optimization that are given as follows:

**A) Wen-Chih Peng et.al. [1]** Worked on query specially mentions the required information in the query and the result of the query is based only on the actual query itself. The query processing in a mobile environment involves join processing among different sites which include static servers and mobile computers. According to those asymmetric features of a mobile computing system, the three different join methods likely join, semi join, multi join. Query processing procedure that can determine a join sequence and interleave that join sequence. Semi joins provide to reduce both the amount of data transmission and energy consumption for query processing. Multi join queries that involve one server and many mobile computers. The destination mobile computer refers to the mobile computer that issues the query and is expected to receive the query result which refers to the processing of multi join

queries. The performance of these join methods and query methods is comparatively analyzed and sensitivity analysis on several parameters is conducted.

B) Dan Chalmers et. al. [4] worked on context awareness system. The computing context is concerned with computing resources like network, connectivity, bandwidth, workstation, server, clients. User context also found out that user's need, preferences, roles, profile and physical context found out that lightning, noise, traffic, temperature and humidity. The query will give effect of retrieving information about user preferences, prefacing maps, traffic and weather condition which is likely to be query next.

The technology-based QoS characteristics likely categorized with timeliness with parameters delay for time taken for message to be transmitted. The User-based QoS characteristics likely categorized with critically, perceived QoS, cost, security with parameters importance rating, picture detail, picture color, picture color accuracy, video rate, video smoothness, audio quality, video/audio synchronization, per-use cost, per-unit cost, confidentiality, integrity, Non-repudiation of sending or delivery, authentication. The static QoS management function with techniques specification, negotiation, admission control, resource reservation and dynamic QoS management function with techniques monitoring, policing, maintenance, renegotiation, adaptation, synchronization

C) Jiun-long huang et. al. [3] worked on location-dependent systems, the pre fetching technique that deals with the complexity of real system. In this paper, the basic requirements for successful pre fetching scheme for location dependent system. The mechanism pre fetches data related to the user's location as it is the most crucial for local queries. The several users reach the same information at the same time. And profile of each user likely position, direction, and speed. Generally, each location updates and creates two direct costs: firstly transmission cost, which directs to the cost to inform the server of the fresh location and secondly, server processing cost, which refers to the cost of updating the system containing the location.

D) Tobias Farrell et. al. [2] worked on processing on continuous queries. Such type of query involves real time monitoring of mobile objects. This type of query compared conventional queries that are based on an instant of the database. The continuous query includes real time monitoring of mobile objects. The clients who need to send a query only once and notification of the updated information about nearby tourist attraction, hotel, and shopping mall will be sent query automatically as clients move to different regions. And also notify clients whenever they are close to certain situation such as dangerous zone or traffic jam by providing some form of alerts to them. The system must be able to provide the accurate query results and update them in real time whenever mobile clients enter or exit the region defined by the query.

## VII. CONCLUSION

This work shows query broadcast management schemes to optimize and minimize the query access time of mobile clients when retrieving broadcast database items. The performance of join methods and query methods are comparatively analyzed and sensitivity analysis on several parameters is studied. The query will give effect of retrieving information about user

preferences, prefacing maps, traffic and weather condition. The technology-based QoS characteristics, user-based QoS characteristics, the static and dynamic QoS management function with their parameters gives performance monitoring as input to these models to permit adaptation by QoS management. The pre fetching technique that deals with the complexity of real system and the basic requirements for successful pre fetching scheme for location dependent system. The system must be able to provide the accurate query results and update them in real time whenever mobile clients enter or exit the region defined by the query:

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