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Comparative Study of Mobile Devices Based on Query Processing in Mobile Environment

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ABSTRACT

The main objective is to investigate the performance improvement of mobile query processing, focusing on the server and client sides. In server side query processing, we consider single-cell and multi-cell queries, whereby a cell is a service area for a single stationary host to communicate with a static network. A quick response in answer to a mobile query is important, because mobile users invariably move to another location while awaiting the query result. The application of query processing will change the way of user interaction and it also increase working performance for better user workability. This paper is a brief description on comparative study of different devices and Implementation of query processing in their environment. This paper explains and considers various attributes of the devices. The paper also covers suggestions with respect to query processing mechanism for performance improvements within minimum time in mobile computing environment.

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

I. INTRODUCTION

This paper presents a comparative study based on query processing of two different mobile devices in a same mobile computing environment. The paper also presents architecture for similar concept. The comparative study of a Smartphone and Laptop is studied in this paper as both the devices have different hardware specification and software specification. The query processing time taken by the Smartphone and Laptop is tested using same search engine and the time gap is also noted. The paper goes through with various methods for query processing and the implementation on these two devices. The Mobile environments are composed of wireless technologies in which user asked for query to be processed,on demand query processing. The mobile environment is collection of mobile heterogeneous hosts, which are enabled to communicate using “wireless links”. These wireless links may change according to the natures of mobile networks, moreover, nodes in the ad-hoc network have to communicate without any centralized or help. Each mobile node offers limited functionality only. However, as a whole, these devices can handle more complex tasks.

The complex tasks can be resolved by implementing advancements in query processing on these mobile devices. This will save the energy and power consumption by the devices can be saved. The usability for the user will

also change using query processing mechanism Thus, this mechanisms that allows the sharing of functionality among differentdevices in same environment will change the way of user's interaction for searching fast query time in mobile computing environment.

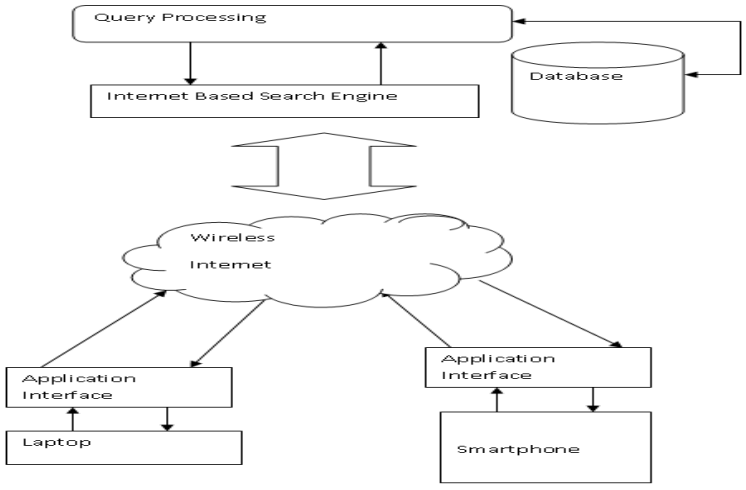
II. CHALLENGES IN QUERY PROCESSING

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 devices by two different users; into an efficient execution strategy and finding the execution time take by the devices. 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.

The more number of data send by the devices, that moves as requests will be served from the centralized server and this will increases 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.

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.

III. QUERY PROCESSING ARCHITECTURE



Query Processing Architecture

The above architecture is based on query processing and about two different devices interacting with the search engine for query processing. This architecture is designed on the basis of taking two devices, one of which is a laptop which is a computing device with a significant hardware and software for running the query through a web browser. The second is devices used for comparative study is a Smartphone which is also have hardware with good specification to run the query through the web browser. The mobile environment considered in the study is an internet connection source through a local WiFi i.e. wireless fidelity in the college campus. The reason behind considering this environment is that both the devices will work on the same environment with the only difference of the attributes of them. The service provider for both the will be common. The explanation of the individual components is as follows:

Database: The database symbol showed in the diagram is about distributed database of the web based search engine. This database is huge collection of information which is served by the websites to the local users.

Query Processing: In query processing section different algorithm and query processing strategies are implemented for maximizing the user performance.

Internet Based Search engine: The internet based search engine is the website used for the experimental work. This web site will act as a front end for the query processing. The website considered will be Google as it is most powerful and high configured search engine.

Wireless Internet connectivity: This section is about wireless internet connectivity which will act as source for consideration and will change the way a normal query processing. The source provides an interface for the two devices to connect to the server and act as mediator between the devices and local internet.

Application Interface: The application interface is a web browser and the platform used by the devices to interact with the wireless internet connectivity sources. The devices will communicate with the mobile environment using the application interface depending on the application interface they asked for the similar query and the processing time taken by them is studied in the related work.

Laptop: The laptop is an end user device which acts as an interface between the users. User fired the query through the laptop and the time taken for the query to be executed is considered.

Smartphone: The smart phone is also an end user device which acts as an interface by the user to process the query. The user fired query from smart phone and it proceed by the server.

IV. QUERY PROCESSING FRAMEWORK

There are various types of queries available for different communication systems. The existence of queries is more than in wireless environment than wired environment. This paper is focus to query taxonomy. Some queries exist only in a wireless environment and some in the traditional environment, but some types of queries in the both 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.

4.1 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 wants to retrieve his account statement of provident fund. (ii) Any person wants to know up gradation of LIC policy after 5 years.

4.2 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 to context, there is another category of context called as "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 aware of 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 next.

4.3 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 querytypes can be further divided into followingthree classes: (i)moving user seeking static object (ii) moving user seeking moving object and (iii) static user seeking moving object.

- **Moving User seeking Static Object:**

Moving User seeking Static Object query generates from amoving userand the searched object is static. An example of thisquery is :Request of information by tourist on road to knowaboutmotel with in distance of 5 kms.

- **Static User seeking Moving Object:**

This type of query generates from a stationary user and thesearched object is moving. An example of this query is:Request of information for a particular trains arriving on badnera junction withinone hour.

- **Moving User seeking Moving Object:**

This type of query generates from moving user and the seeking searched object is also moving. An example of this query is:

Request to retrieve information about Cruise1 members byCruise2 members of cruise when both are in different cruise.

Location dependent queries can also be classified depend on the based on query type. (i) Continuous query and (ii) Non- Continuous query.

4.4 Continuous query:

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 mobileobjects. Real-time monitoring queries are continuous formonitoring purposes. In a continuous query setting even afterthe initial query is answered and the query is still kept by theserver. Hence, in the case where the user moves into a different location or when new information becomes available, it will then need to be dispatched to the user. Example: (i) To request information about nearby tourist attractions, hotels, or shopping center 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 center 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 accuratequery results and update them in real time whenever mobileclients enter or exit the region defined by the query. This classof query can be referred as range-monitoring queries [9]. Therange-monitoring queries are removed from the system onlywhen the user explicitly ends the query.

4.5 Non-continuous query:

The non-continuous location-dependent query is different fromthe continuous query as the system does not manage the query.The mobile client generate query to obtain data from repositoryat the remote stationary server. Data management strategies inthe on-demand mechanism refer to the optimization methodused at the server side to serve an on-demand request or arequest that is sent to the server for processing. Databroadcasting strategy relates to determining a method todisseminate the database item to mobile client so that theresponse time, tuning time and power utilization of retrievingdatabase items are minimized.

V. QUERY PROCESSING FOR MOBILE DEVICE

When locatinga 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 classified generally into on demand, push based, hybrid data dissemination.

5.1 On-Demand Query:

User makes exclusively requests for data in on demand broadcast. If number of clients requests the same data at approximately 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. On-demand data dissemination is only user-oriented. 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. However, this approach has many disadvantages. First of all, it is resource intensive. Users require a separate channel to send requests to the server. The server, after receiving there quest, composes the result and sends it to the user on a backchannel (downstream) known to the user. Thus, every pull needs two channels for completing the process. Moreover, since incoming requests are usually not identical, the server cannot always efficiently group requests in order to exploit the advantages of broadcast. Obviously, this depends on the volume and the context of the incoming workload. To make things worse, client-server architectures are notoriously not scalable. When the number of incoming requests becomes too high, the server fails to keep up.

5.2 Push-Based:

In push-based systems, the server appoints point-to-multipointcommunication and sends dataitems in the absence ofexplicitclient requests. In order to achieve that, the server maintains abroadcast schedule, which determines the order and the frequency in which data items are broadcast.

Let the schedulerhandles three data items (A, B and C), out of which B and C arebroadcast with the same frequency and A twice more frequently,resulting in the transmission schedule: (A, B, A, C, A, B, A, C...). The major feature of such systems is capability. Clientpopulation does not influence the dissemination process because clients do not issue requests. The additions of new clients do notinfluence the server's incoming load or the client perceivedaccess time.In addition to that, clients need few resources such as airindexing enabling clients to efficiently locate data in thebroadcast channel. Moreover, data can be kept properly, sincethe server can simply broadcast any updates. The major problemof push-based systems is their lack of self-organizationandaddictiveness. Since the server does not receive explicit clientrequests, it remains unaware of possible changes in client. This incurs severalproblems. Bandwidth for instance, can be unnecessarily utilizedfor a relatively low number of end clients. Apart from that,thepush service requires more powerful hardware.

5.3 Hybrid data dissemination:

The hybrid data dissemination is a combination of on-demand and push based approaches. Dataitems 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 documentclassification and bandwidth division for data dissemination.

These are interrelated issues, simply because a given bandwidth division determines the performance of a documentclassification choice and, conversely, a given documentclassification determines a bandwidth split that optimizesperformance. In turn, both document classification andbandwidth division depend on the popularity of data itemsbecause download latency is smaller when hot items areassigned to multicast push, cold items to uncast pull, and thebandwidth is divided appropriately between the two channels.

VI. CONCLUSION

Emerging technology of wireless trends enables people to conductactivities,business,and transactions anytime and anywhere without any attachment to stationary computer. Naïve users 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, Ianalyzed the issues of query selection, taxonomy and query processing strategies. We have defined query taxonomy as well as query processing strategy in mobile databases. Query in mobile databases are categorized into context-awareness query and ad-hoc query. Context-awareness query is further classified into location dependent, context dependent, and hybrid query. Query processing in mobile databases includes mobile client, on air, and server strategy. Mobile client and on air strategy corresponds to caching strategy and broadcast strategy respectively. This work is presented query broadcast management schemes to optimize and minimize the query access time of mobile clients when retrieving broadcast database items.

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