

a survey on mobile databases and query processing in mobile databases

Arpita Mishra, S. P. Singh

Abstract- Mobile computing is increasingly becoming more and more popular as people need information even on the move in this rapid changing information world. Mobile Computing is an environment where user is mobile and can change its place while communicating. A mobile database is a database that can be connected to by a mobile computing device over a mobile network. The effects of mobility on query processing require that algorithms employed must be capable of managing frequent loss and appearance of mobile device in the network, and that overhead should be minimized during periods of low connectivity. This paper describes mobile databases and query processing in mobile databases.

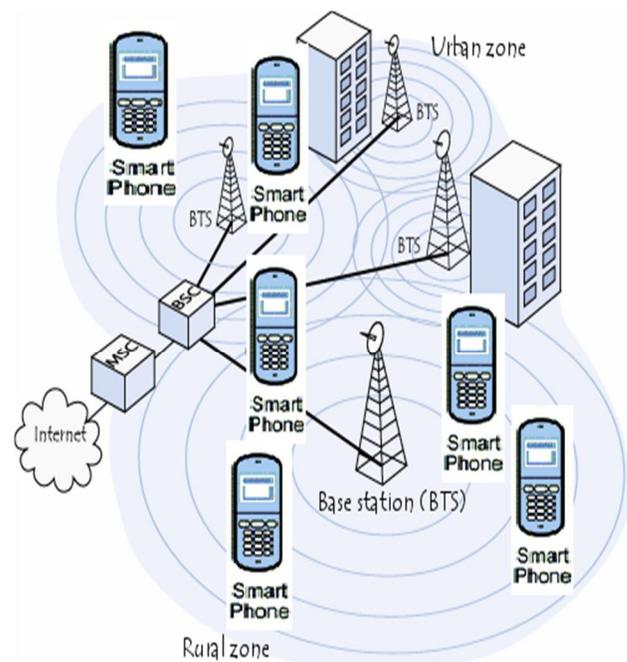
Keywords – Base Station, Mobile Computing, Mobile Database System, Mobile Query Processing, Mobile Unit, Query Processing Databases, Wireless Network System

1. Introduction

The rapid advancement of wireless communications and computer miniaturizing technology has enabled user to access computing resources from anywhere. This type of environment is called mobile environment. In mobile environment users can move from one location to another location with their mobile device or can move to another device at another place and want to access services from that location. For example we can now access internet facility while travelling with airways or trains. Mobile database are the database that allows the development and deployment of database applications for handheld devices, thus, enabling relational database based applications in the hands of mobile workers. Using Mobile Database Technology allows users to download and upload data and collect information. Mobility also effects query processing. The effect of mobility in query processing needs that the algorithm should be capable of managing frequent appearance and disappearance of mobile devices.

2. Mobile Environment

Mobile Environment provides users services while they are moving. Mobile Environment contains base stations which provide services to several mobile stations. A number of mobile stations are connected to wire network only through base stations via wireless channels. Base station provides services to the mobile stations which are in its range.



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Fig.1. Mobile environment containing base stations and mobile units

Figure shows some Base stations containing multiple mobile stations. A mobile station can move from coverage of its base station to coverage of another base station. And they still should be provided all the services which they can get from their base station.

3. Mobile Databases

Mobile database are the database that allows the development and deployment of database applications for handheld devices, thus, enabling relational database based applications in the hands of mobile workers. Using Mobile Database Technology allows users to download and upload data and collect information. These databases work on Palm top and hand held devices providing a local data store for the relational data acquired from enterprise SQL databases. The main constraints for such databases are relating to the size of the Program as the handheld devices have RAM oriented constraints. In mobile environment, elements of the network are volatile and can move very dynamically. Consider a database representing information about moving objects and their position. For example, a mobile user looking for a hotel will obtain different results based on the time and the place he/she issued the query. As the location of other devices changes with respect to other entities and data sources it may not be possible to collect information about available data sources at any given point of time. The following figure shows a mobile environment with databases.

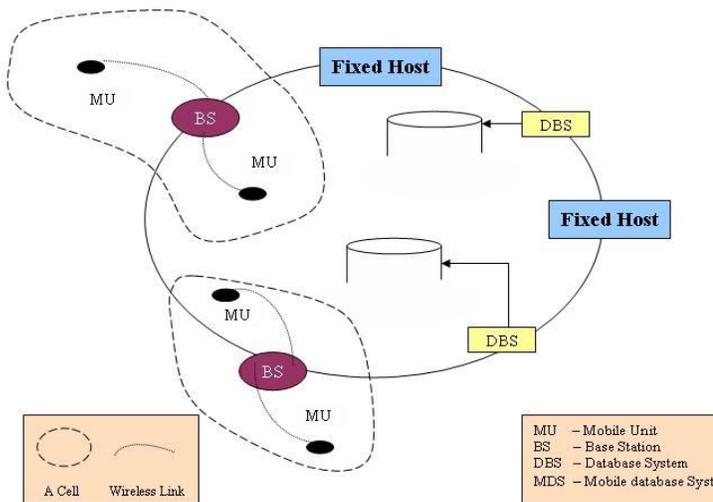


Fig.2. Mobile databases

4. Query Processing in Mobile Databases

The effects of mobility on query processing needs that algorithms developed must be capable of managing frequent disappearance and appearance of mobile device in the network. We can classify queries in Mobile Databases in five categories. These are:-

1. **Non Location Related Query:-** If all the predicates and attributes used in query is non location related then it is called non location related query. For ex. "Select all the hotels in east India speciality".
2. **Location Dependent Query:-** - If query location is dependent on location of query issuer. For ex. "Find me the closest petrol pump in within 10 km of my current position."
3. **Location Aware Query:-** - If a query has at least one location related attribute. For ex. "How is the weather in Mumbai".
4. **Continuous Query:-** This type of query includes when all the queries are issued by mobile terminal and the querying objects are themselves moving. For ex. "Find all the cars within 100 feet of my car".
5. **Ad Hoc Query:-** this type of query explicitly mentions the required information in the query statement, and does not involve any context related information. For ex. "University students wants to retrieve their personal information"

Query processing deals with designing algorithms that analyze queries and convert them into a series of data manipulation operations. The query processor receives a query as input, translates and optimizes this query in several phases into an executable query plan, and executes the plan in order to obtain the results of the query. The traditional query processing architecture can be used for any kind of database system including centralized, distributed, or parallel systems. Not much work has been done and reported on query processing in mobile environment so far. But most of them maintain approximate information about MUs location which increases the paging cost. MUs are able to access locally unavailable files/data from other remote BSs at the cost of huge message exchange.

Query processing databases are divided into three parts: -

- 1). Mobile Client System
- 2). Wireless Network System
- 3). Server System

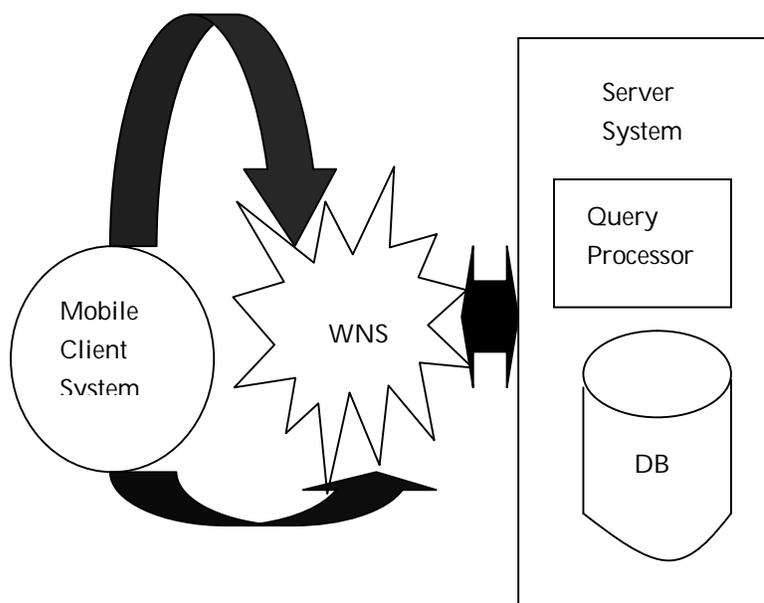


Fig.3. Query Processing Database

Mobile Client System: - Mobile Client is composed of three modules. Resource Manager manages the client CPU for handling the client request. Client manager which processes the query request and process them to server, Models the disconnection operation, and receives and processes the tuples transmitted from the server and a query generator which generates queries. Client queries are submitted from an MH to the server to be processed and a message (messages) containing the tuples that form the answer to the query is (are) transmitted back to the MH. The messages containing the tuples are processed by the MH and the tuples are displayed on the screen of the MH accordingly. Mobile client system defines a number of strategies to maintain cached data items in client's local storage. Caching of frequently accessed data items in a client's local storage becomes important for enhancing the

performance and data availability of data access queries. Another advantage of caching is the ability to handle fault tolerance. In some situation Base Station may not be accessible. However, a query can still be partially processed from caches and some query results are returned to user.

2. Wireless Network System: - Wireless Network System serves all the messages on the first serve and first come basis. When it finds that a mobile host is disconnected then it informs the server so that the transmission of the tuples to the mobile host can be paused until it reconnects to the network. Server also periodically broadcast the frequently accessed data items to the client which it can store on its cache if it is of its interest.

3. Server System: - Mobile client sends queries to the server through wireless network system and server process the query and send the result back to the client. The server system has three subsystems. A resource manager which manages the server CPU time, an update generator which generates the update requests and A server manager which coordinates a query request from the client and update requests from the update generator.

5. CONCLUSION

Recent developments in wireless technology have enabled peoples to access their email, news and weather using their mobile devices. Mobile database is a new dimension of databases, the type of query, query processing these all are different from traditional databases. A secure online mobile database and optimized query processing system needs to be developed.

6. REFERENCES

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