

# Location Based Spatial Query Processing In Wireless System

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## Abstract

Location-based spatial queries (LBSQs) refer to spatial queries whose answers rely on the location of the inquirer. Efficient processing of LBSQs is of critical importance with the ever-increasing deployment and use of mobile technologies. Input of the system will be the radius of the region the center of which is the user current location and the type of entity such as bank, malls etc. Output will consist of the user requested entities ranked in the increasing distance. Our database will consist of all the entities with their type and geographic location. Our algorithm will find out all the locations within the specified region intended by the user. All these points will be used for firing the query along with the entity type to obtain a result set. Real time response due to the mobile nature of the user and the accuracy are considerable issues to be taken care of. Furthermore the air as media presents the issues for the abnormal connection loss and errors

**Keywords:** Spatial query, GPS.

## 1 Introduction

In this paper, we present a project that would provide a java mobile application that is used in GPS supported mobiles phones. Authenticated user login into this application can search information about any place in a given particular range. Places like IT industries, Hospitals, Banks, ATM's, Monument, and Government Offices etc. can be searched by user in this project we are using mobile as a client user interface. Our project is consisted in 3-tier architecture and in MVC-2 format. User interface in mobile is constructed with the LWUIT.

Spatial query is used to retrieve information from database. Authenticated user will enter the range up to which he wants to search the places and according to this query will fire on the database and the response will be obtained.

## 2. Theoretical Background

### 2.1 GPS

GPS is a system for location identifier. This system is being developed by the US DEPARTMENT OF DEFENCE and is free to be used by anyone who has a GPS device. The system uses a collection of 24 satellites. For identifying the location precisely at least the device should be in the range of three satellites. GPS can provide the location accuracy of up to centimeter degree of accuracy.

### 2.2 Spatial query

SPATIAL query processing is becoming an integral part of many new mobile applications. Recently, there has been a growing interest in the use of location-based spatial queries (LBSQs), which represent a set of spatial queries that retrieve information based on mobile users' current locations. User mobility and data exchange through wireless communication give LBSQs some unique characteristics. In our system spatial query will be used for firing the query to the database for the response of the entities in the region of user.

### *Mobile Query Semantics*

In a mobile environment, a typical LBSQ is of the following form: "find the top-three nearest hospitals." The result of the query depends on the location of its requester. The query from the user consists of the coordinates of the user along with the radius of region and the type of entity.

### *High Workload*

The database resides in a centralized server, which typically serves a large mobile user community through wireless communication. Consequently, bandwidth constraints and scalability become the most important design concerns of LBSQ algorithms.

#### *Query Promptness and Accuracy*

Due to users' mobility, answers to an LBSQ will lose their relevancy if there is a long delay in query processing or in communication. For example, answers to the query "find the top-three nearest hospitals" received after five minutes of High-speed driving will become meaningless.

### 2.3 LWUIT

The Lightweight User Interface Toolkit (LWUIT) is a versatile and compact API for creating attractive application user interfaces for mobile devices. LWUIT provides sophisticated Swing-like capabilities without the tremendous power and complexity of Swing. Designed from the ground up as an efficient mobile user interface toolkit, LWUIT provides many useful Swing-like features.

## 3. System Architecture Design

Our project is consisted in MVC-2 format which is efficient than three-tier architecture.

### 3.1 Three-tier architecture

The three-tier model is software architecture and a software design pattern.

Apart from the usual advantages of modular software with well-defined interfaces, the three-tier architecture is intended to allow any of the three tiers to be upgraded or replaced independently as requirements or technology change. For example, a change of operating system in the *presentation tier* would only affect the user interface code.

Three-tier architecture has the following three tiers:

#### a) *Presentation tier*:

This is the topmost level of the application. The presentation tier displays information related to such services as browsing merchandise, purchasing, and shopping cart contents. It communicates with other tiers by outputting results to the browser/client tier and all other tiers in the network.

#### b) *Application tier* (business logic, logic tier, data access tier, or middle tier):

The logic tier is pulled out from the presentation tier and, as its own layer; it controls an application's functionality by performing detailed processing.

#### c) *Data tier*

This tier consists of database servers. Here information is stored and retrieved. This tier keeps data neutral and independent from application servers or business logic. Giving data its own tier also improves scalability and performance.

### 3.2 MVC ARCHITECTURE

Model is business logic.

View is the displaying of the data into pages.

Controller manipulates model & causes view to update.

- MVC1 is traditional approach. It is page centric i.e. view and controller are on the page itself.
- MVC2 is new approach. It is servlet centric i.e. model, view and controller are separated from each other.
- We are using MVC2 ARCHITECTURE because it provides a single point of control for security and logging. Also as our project requires interaction with database a separate controller will definitely be a better choice than crunching the interaction code in the JSP pages as in case of MVC1. MVC2 is more maintainable.

### 3.4 DESIGN AND IMPLEMENTATION CONSTRAINTS

Limitations of our system are

- The position of the user will be uncovered which will not be private

- The speed of the spatial query processing matters. For example the response of the query of “three nearest neighbor” after five minutes for a mobile user has no relevance.

#### 4. System Features

##### FEATURE 1:

###### Accuracy of the system

1. Accuracy in the position & location of the results.
2. Achieved through following techniques
  - Accuracy up to centimeters using GPS.
  - Remedial action is performed during accuracy loss in mathematical processing.

##### FEATURE 2:

###### Real time response

1. Real time response means that the response should be calculated and returned to the user in a time critical manner.
2. The response of the system after the deadline has no meaning.
3. In our system this is achieved through following techniques
  - Simple and normalized (3nf) database schema
  - Simple and light algorithms
  - Less processing of the request
  - Better connection management

#### 5. Block Diagram

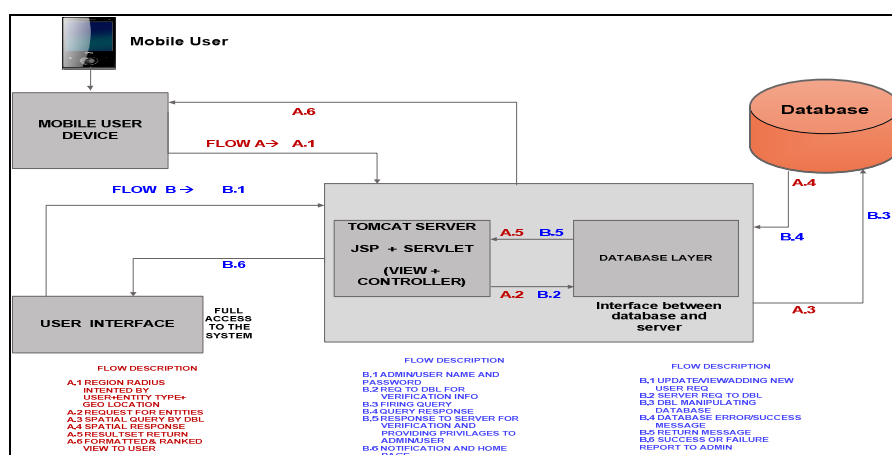


Fig1. Block Diagram

#### 6. Working

Location based spatial query processing in wireless system works in two steps these steps are mentioned as follows.

**Step1:** Firstly the administrator will enter the information about all the places. The administrator will just put his login and password and then he can enter information about the places and stores it in database. Firstly the information will send to the JSP and then JSP will send request to the servlet after that servlet will execute and through database layer it will update the database.

**Step2:** User with java enabled mobile will have to enter the login and password and then the system will check for authorized person if he is not registered the he have to create his account and only then he can access this application. If the person found to be registered then he just have to enter the radius according to radius the range is decided .this input range will fire on servlet then through database layer spatial query will fire on the database and then response will be displayed on the user mobile.

In this above two steps location based spatial query processing in wireless system will work

## 7. Benefits of proposed System

There are many advantage of this system such as

- 1) User can search any places and its information.
- 2) This system will available 24x7 as it is depend on GPS.
- 3) Can work in any java enabled mobile.
- 4) Cost is reduced as it uses only GPS not GPRS.
- 5) In case of emergency such as accident any one can find nearest hospital.
- 6) Can also be put for the advertisements if for example some new mall in an area wants itself to be shown in the search results for that area.
- 7) Can be used to prepare the statistics for the different entities in different areas of a city for proper planning and surveying.

## 8. Drawbacks of the Proposed System

1. One drawback of this system as it uses GPS so there is continuously communication between the mobile and the satellite. so it consumes more battery .This is only drawback of the system but it can be avoided by using GPS when it needed and after that close the GPS such that the connection between the mobile and Satellite will lost and communication will also lost and the battery will not be used.
2. Our software is in the phase of growth as every device is not GPS enabled and many a times we require external hardware support.

## 9. Summaries

We provided application that will allow any user to search any place in particular range. In this fast generation no one has time to ask other person about places. So this project will help people to stay fast and search places like hospital, IT industry, monuments in very fast and cost effective way.

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