INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact factor: 4.295
(Volume3, Issue3)
Available online at www.ijariit.com

Server Initiated Model for Location Aware Web Application Using Binary Search Tree

Shraddha Tiwari
SRMCEM, Lucknow

Dr. Pankaj Kumar
SRMCEM, Lucknow

Dr. Raj Gaurang Tewari
SRMCEM, Lucknow

Abstract: Location-based and Location-aware Services and systems are an integral part of the modern era of smartphones, faster internet, and all time connectivity. The usage of location awareness of a user and to accordingly provide him the necessary services is the core of the services based on mobile and desktop applications. In the push model, subscribers register spatial-textual subscriptions to catch their interests, and publisher's post spatio-textual information or messages. This requires the location aware publishing of relevant notification and messages to the user. Such location aware publish services can be user initiated where the user types certain keywords to search for certain things around his area or can be server-initiated push model, where the messages and notifications are pushed directly by the server based on location and interest of users.
In this research work, a novel searching algorithm based on binary search tree method has been proposed for location-aware server initiated model. To showcase the idea a small web application has been developed which asks users to allow location access and based on that the relevant shopping offers are displayed to the user. This helps the retail shops to regularly update their offers to attract more customers increasing their footfall and sales.

Keywords: Location Based, Location Aware, Server Initiated, Binary search Tree.

I. INTRODUCTION

Location-based services have been widely used in many systems. The Existing works employ a pull model or a user-initiated model, where a user issues a query to the server which replies with the location-aware answers. In the present scenario, everyone has an internet connection or has smartphones by easing their task. Everyone adopt technologies to achieve their task smartly. A Location based system is one of the best technology in the world of internet by which anyone can access facility. By location based system user can acquire anything at any time. For example- if any user visits foreign and doesn't know about that country then the location-based system can ease to acquire, highlighted of that country. To provide users with instant replies to their queries, a push model or server-initiated model is becoming a necessary computing model in the next-generation of the location-based services. A Location Based Service is one of the components of this internet world. In the push model, subscribers register spatio-textual subscriptions to catch their interests, and publisher's post spatio-textual information or messages. These calls for high-performance location-aware publish & subscribe system to deliver publishers' information to the relevant subscribers. The research challenges have been studied that arise in designing a location-aware publish/subscribe system. An R-tree based index is introduced by integrating the textual descriptions into R-tree nodes. An efficient filtering algorithm is introduced and effective pruning techniques to accomplish high performance. This method can support both conjunctive queries and ranking queries.

The availability of location-based information revives the development of location-based messaging services, which spreads interesting messages to the users based on their positions and other information. For the Location-aware publish/subscribe, system results to accomplish a high-performance. This can achieve by using push model or server-initiated model. Location-based services (LBS), thanks to global positioning systems (GPS) wired into smartphones, have recently got significant attention from both industrial and academic communities. Many location-based services such as Foursquare have been widely admitted since they can provide users with location-aware experiences.

In the push model or server-initiated model, the publishers or subscribers register spatio-textual subscription that has region based information [1] and returns the relevant result. The challenges that we have to resolve in a publish/subscribe system is to accomplish high performance. A publish/subscribe system must support hundreds of millions of subscribers and delivers the information to the relevant subscribers in milliseconds. Since the information or messages and subscriptions contain both location

information and textual description, it is generally extent costlier to deliver messages to relevant subscribers. This calls for an efficient filtering method to support location-aware publish/subscribe services.

Till now the location based system is accomplished on the pull model or user initiated model by which user can relate and server retorts according to that concern or keyword [2][3]. But after this facility, we can implement push model or server initiated model in which server automatically can access user's location and provide an information to the user. Actually, push model or server initiated model is adopted for the clamant retorts. Many researchers have used the location based system with RT-tree which is for high performance but we implement push model or server initiated model with the Binary tree. The Binary tree is always searched in an increasing order by which it will also give high speed with high performance. In the location based system property of binary tree apply on pin code of the particular location and sort location and send reports.

II. LITERATURE SURVEY

A number of the LBS applications have client/server architecture and can also be abstracted into three main parts: Client, Server, and Wireless Communication to connect with Client and the Server. A Client is responsible for sending the user's request and the geographical location of the mobile device to the Server, and the Server is responsible for providing the geographical location based services of the mobile device. A Client can make contributions to information acquisition by gathering data in the field. The Server will put the gathered information from the field into the database and will then provide services to all the clients depends on the database. In fact, the key definitions of Server and Client are becoming more and more uncertain. The Server can examine this critical information and put it into the database for future service. Although it is a trend for LBS to gathered information at the Client side, there are still some problems occurred by wireless communication (Liu, 2002). The architecture of LBS is shown in Figure 1

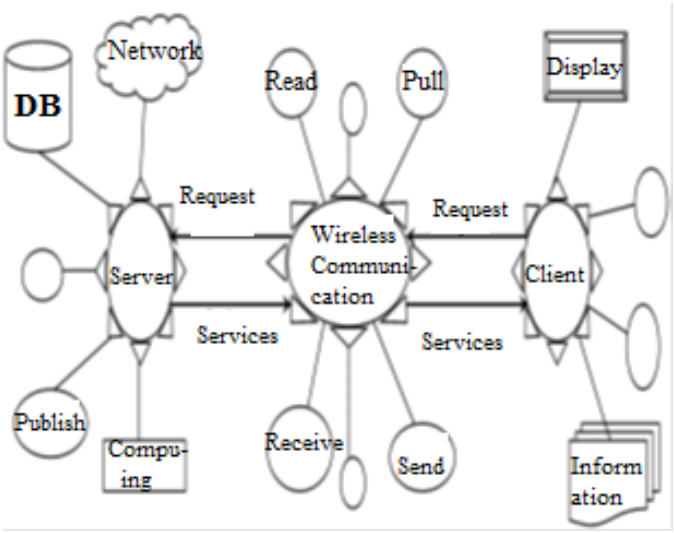

Figure 1: LBS Architecture

The LBS middleware has network technology and bridge protocol with wireless and the Internet technology. Standards that are growing in this domain are the Wireless Access Protocol (WAP) and interoperability standards (OGC, 2005). The LBS middleware is either withdraw within the operator's network or it is hosted by an application service provider. The middleware integrates the network infrastructure, including the location servers, the WAP gateways, subscriber portal services, customer care, accounting systems, customer activation services, billing systems, and the operational systems. The end-to-end system architecture is showed in Figure 2.

The LBS middleware is differ in the kind of services presented to the subscriber, the network operator, and application provider. An Applications are layered on top of the middleware, without so much concern for the lower-level services.

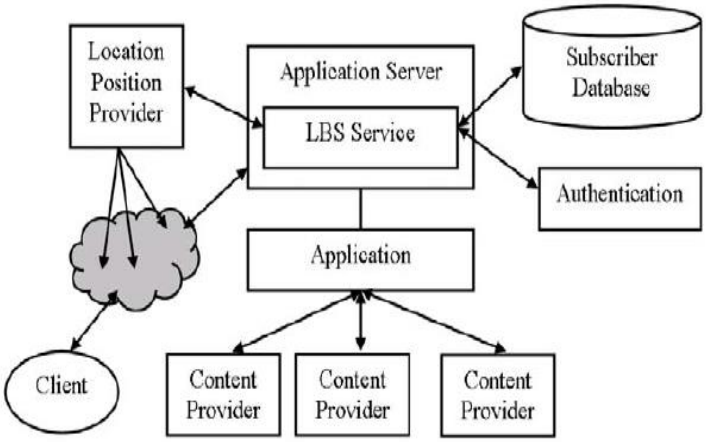

Figure 2: Middleware

The LBSs is an information system that processes the geographical data. The presentation of the general maps in the various forms depends upon the development of the cartographic knowledge on map design. Clarke (2001) and Casademont et al. (2004) have described the technology currently available for use in the wireless GIS systems and its capabilities by reviewing the portable mobile devices that can run mobile cartography and the GIS applications. The Spatial data usually consist of the complex spatial objects (Shekhar et al., 1999), while the LBS spatial index contains a large number of simple spatial objects (points) that can be frequently updated. These "moving object databases" shows new challenges to the spatial data management (Prasad Sistla et al., 1997; Wolfson et al., 1998; Pfoser and Jensen, 2001). There are several important aspects of the GIS system, which is to be analyzed when trying to enhance the advanced LBS with the GIS features, such as the geographical data collection, management, conversion, analysis and presentation (Longley et al., 2001). The power of LBSs shows in delivering GIS functionality and the location-based information across fixed and the mobile Internet-based networks, to be applied by anyone, anywhere, at any time and on any type of device.

The Location-awareness means that an application is aware of the current location and can apply this information to present, recover or filter the information appropriate to this position. For example, the restaurants that are within range of 500 meters could be shown and once the user has chosen one of those, then the device can guide him or her to reach there. Hence, some of the information in the world is more related to a person at a moment in space than other information [7]. The Location-awareness is the one part of a more general concept called context-awareness. Dey & Abowd [8] defines the context-awareness as 'any information that can be applied to characterize the situation of an entity, where an entity can be a person, place, or physical or computational object'. They also describe the context-awareness or context-aware computing as 'the use of the context to provide task related information and /or services to the user, wherever they may be'.

The Location-awareness can either be relative or absolute. An Absolute location-awareness means that the original or actual location is known, for example, the coordinates of the location relating to a building or city [8]. There are many technologies such as GPS that can provide an absolute location fix. The Relative location-awareness determines what located objects are nearby.

Four basic operations are provided by the interface of the publish/subscribe model [17]. When a producer decides to publish a notification, the required attributes are encapsulated in a form of a notification message and the Publish (event) operation is called then. A consumer registers his interest in events by calling Subscribe (sub) where the sub-parameter determines what notifications are of interest to the consumer. Accordingly, the notification service stores this subscription and prepares it for later matching with published notification. Similarly, a consumer can terminate an existing subscription by calling Unsubscribe (sub) operation. Upon matching published notifications with registered subscriptions, Notify (event) operation is performed by the notification service as a call back function in order to propagate notifications among consumers whose subscriptions are met. Additionally, a fifth operation, Advertise (ad), might be exhibited by which producers can advertise their notifications data structure that will be published in the future. The advertisement operation would serve the notification service to improve the delivery and the matching processes utilizing the expected flows of notifications. Furthermore, this operation can be used to inform subscriber clients about the data structure and content format of future publications. Figure 3 shows a high-level design of the publish/subscribe model.

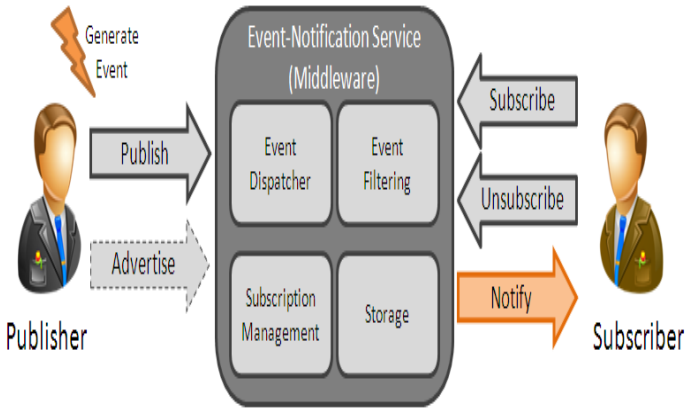

Figure 3: Subscribe /Publish Model

III.SYSTEM IMPLEMENTATION

A novel usage of location-based services based on the geo-location of devices has been envisaged in this research work. The idea is to develop a web application specifically for the shops in a certain area. The shop owners who are registered on the Web application can update their latest offers and notifications if any time to time. The consumers or the general public which uses the web application can simply turn on their location and based on their location the web application will show notifications from the nearby shops. For example, in Lucknow Saharaganj Mall, there are many retail shops which deal into clothing. Now suppose a customer enters the Saharganj mall for shopping and is interested in buying clothes. There are shops like Indian terrain, Big Bazar, Pentaloons, Peter England etc. Now out of which Indian terrain and Peter England are registered on our Web Application,"Offeriya Mart", as has been named. They keep on updating their latest offers like discounts, one plus one offer etc. to attract customers. Now, as soon as the customer enters the Saharaganj mall, and taps on the application, the application will detect his/her location to be around Saharaganj mall and as such will push all the latest offers to form Peter England and Indian Terrain(which are registered on the Application) to the users. Now, it is a general human mentality that it is attracted by discounts and offers. So, the customer is bound to visit the shops which are offering discount and sale offers as a first preference. Thus the idea is to increase customer footfall and sales for the registered shops in a particular location or area.

The Binary Tree algorithm has been used to filter out the location of the devices. The Google Location based services have been used to test generate the location of the user. The location obtained is parsed into a string array from which the PINCODE is obtained. A binary search algorithm is then used to obtain the matching offers according to PINCODE of the user location.

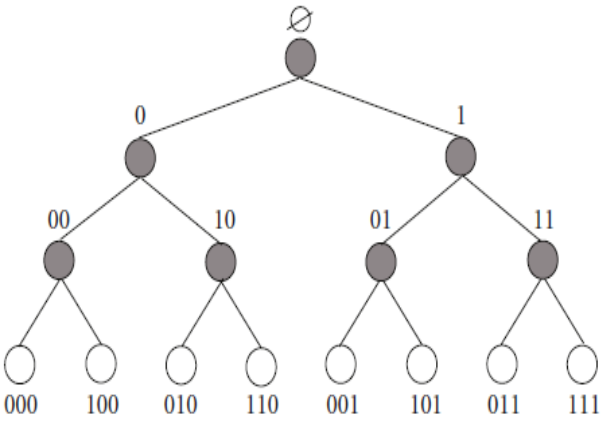

Figure 4: A Binary search tree

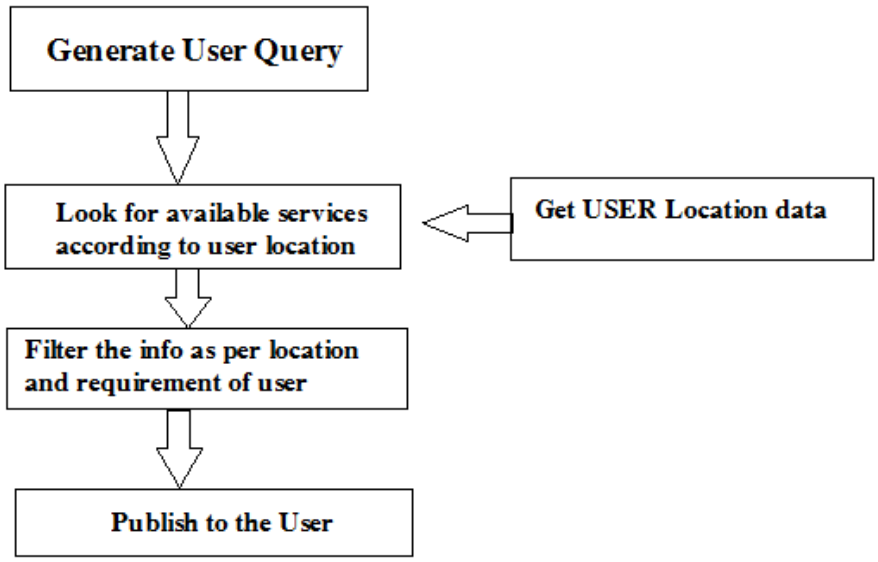

Figure 5: System Process Flowchart

The algorithm for search is as given below:

Get String containing Location Data
Split the String to Obtain PINCODE
Set PINCODE as root
If root is NULL then create root node
return
If root exists then
compare the data with node.data
while until insertion position is located
If data is greater than node.data
goto right subtree
else
goto left subtree
and while
insert data
end If

Based on the above algorithm, the relevant offers in the particular user location is displayed to the user. Some of the screen shots of the application are shown in below figures.

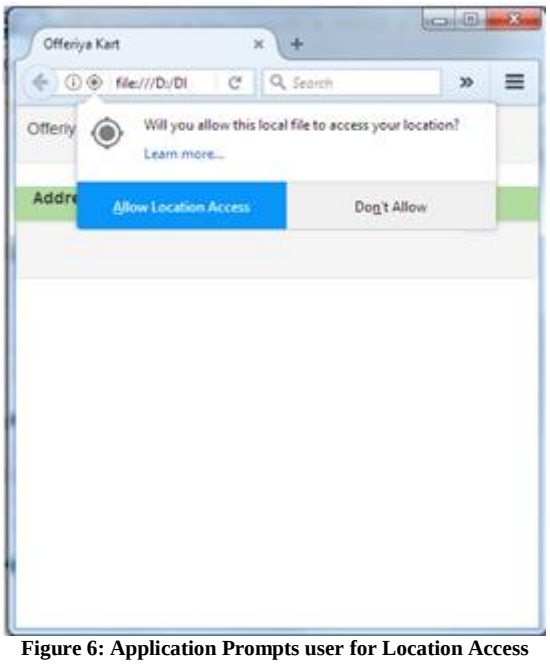

Figure 6: Application Prompts user for Location Access

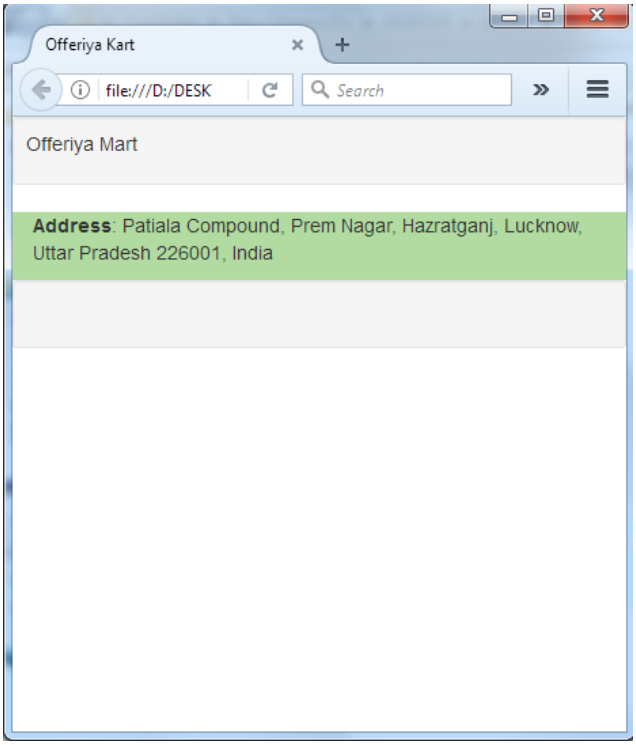

Figure 7: Location is obtained

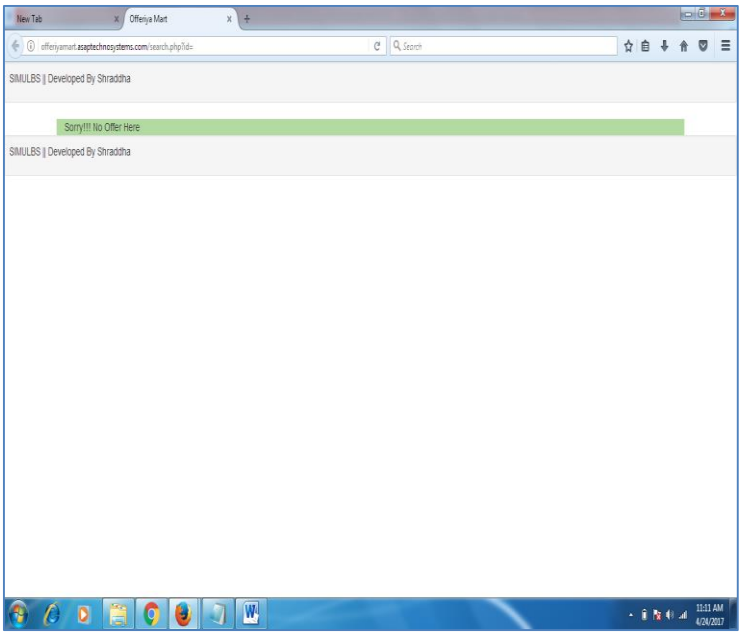

Figure 8: Offer Notification

CONCLUSION

Location Aware publishing is an essential part of web applications built nowadays, so to attract customers and users based on offers and notifications based on their location. In this paper, a binary search tree based algorithm has been described to filter out the information relevant to a particular user based on their location. To test the proposed algorithm a dedicated Web Application has been developed using the latest Web Application platform and the users of server-initiated push model. The application is relatively simple but a novice in ideology in the manner which eases the shopping experience for any consumer at the same time giving the shop owners the facility to easily retain their customers as well as increase the footfalls to their retail store increasing their sales.

REFERENCES

[1] Banavar, G., Chandra, T., Mukherjee, B., Nagarajarao, J., Strom, R. E. and Sturman, D. C. (1999) An Efficient Multicast Protocol for Content-Based Publish-Subscribe Systems, translated by Austin, TX, USA: IEEE Computer Society Washington, DC, USA, 262 - 272.
[2] Banavar, G., Kaplan, M., Shaw, K., Strom, R. E., Sturman, D. C. and Wei, T. (1999) Information Flow Based Event Distribution Middleware, translated by Austin, TX, USA: IEEE Computer Society Washington, DC, USA, 114 - 121.
[3] Bauer, M. and Rothermel, K. (2002) Towards the Observation of Spatial Events in Distributed Location-Aware Systems, translated by Vienna, Austria: IEEE Computer Society Washington, DC, USA, 581 - 582.
[4] Belokosztolszki, A., Eyers, D. M., Pietzuch, P. R., Bacon, J. and Moody, K.(2003) Role-based access control for publish/subscribe middleware architectures, translated by San Diego, California: ACM New York, NY, USA, 1 - 8.
[5] Berg, M. d., Cheong, O., Kreveld, M. v. and Overmars, M. (2008) Computational Geometry: Algorithms and Applications, Springer.
[6] Neuman, W.L. (2003). Social Research Methods: Qualitative and Quantitative Approaches. Published by Pearson.
[7] Ricci, F., Rokach, L., Shapira, B. & Kantor, P. 2011. Recommender Systems Handbook. Published by Springer.
[8] Schiller, J. &Voisard, A. 2004. Location-Based Services. Published by Morgan Kaufmann Publishers.
[9] Schmitt, S. & Bergmann, R. 1999. Applying Cased-Based Reasoning Technology for Product Selection and Customization in Electronic Commerce Environments. 12th Bled Electronic Commerce Conference, Slovenia.
[10] Smyth, B. And Cotter, P. 2000. A Personalized TV Listings Service for the Digital TV Age. Published by Elsevier.
[11] Strout, A. & Schneider, M. 2011. Location-Based Marketing for Dummies. Published by John Wiley & Sons, Inc.
[12] Tatli, E. Stigemann, D. & Lucks, S. 2005. Security Challenges of Location-Aware Mobile Business. Published by IEEE Computer Society.
[13] US Department of Defense. 2001. Global Positioning System: Standard Positioning. Published by the US Department of Defense.
[14] Barnes, R., Lepinski, M., Cooper, A., Morris, J., & Schulzrinne, H. 2010. An architecture for location and location privacy in internet applications. [Referenced 28 February 2015].
[15] Mansouri-Samani, M. and Sloman, M. (1997) 'GEM: a generalized event monitoring language for distributed systems', IEE/IOP/BCS Distributed Systems Engineering Journal, 4, 96-108.
[16] Muhl, G. (2001) Generic Constraints for Content-Based Publish/Subscribe, translated by Trento, Italy: Springer-Verlag, London, UK, 211 - 225.
[17] Kale, S., Hazan, E., Cao, F. and Singh, J. P. (2005) Analysis and Algorithms for Content-Based Event Matching, translated by Columbus, Ohio, USA: IEEE Computer Society Washington, DC, USA, 363 - 369.
[18] Fabret, F., Jacobsen, H.-A., Llirbat, F., Pereira, J., Ross, K. and Shasha, D. (2001) 'Filtering Algorithms and Implementation for Very Fast Publish/Subscribe Systems', in ACM SIGMOD, Santa Barbara, California, USA
[19] Belokosztolszki, A., Eyers, D. M., Pietzuch, P. R., Bacon, J. and Moody, K. (2003) Role-based access control for publishing/subscribe middleware architectures, translated by San Diego, California: ACM New York, NY, USA, 1 - 8.
[20] Wang, C., Carzaniga, A., Evans, D. and Wolf, A. L. (2002) Security Issues and Requirements for Internet-Scale Publish-Subscribe Systems, translated by the Island of Hawaii: IEEE Computer Society Washington, DC, USA, 303.
[21]Jaeger, M.A. (2005) Self-organizing publish/subscribe, translated by Grenoble, France: ACM New York, NY, USA, 1 - 5.
[22] Pallickara, S., Bulut, H. and Fox, G. (2007) 'Fault-Tolerant Reliable Delivery of Messages in Distributed Publish/Subscribe Systems', in Fourth International Conference on Autonomic Computing (ICAC'07), Jacksonville, Florida, USA, IEEE Computer Society, 19 - 19.
[23] Oki, B., Pfluegl, M., Siegel, A. and Skeen, D. (1994) The Information Bus - An Architecture for Extensible Distributed Systems, translated by Asheville, North Carolina, United States: ACM New York, USA, 58 - 68.
[24] Holloway, S. (2008) 'Are you ready for M3O - Vitria's new BPM offering?',
[25] Eugster, P. T., Felber, P. A., Guerraoui, R. and Kermarrec, A.-M. (2003) 'The Many Faces of Publish/Subscribe', ACM Computing Surveys (CSUR), 35(2), 114 – 131.
[26] Graham, S., Niblett, P., Chappell, D., Lewis, A., Nagaratnam, N., Parikh, J., Patil, S., Samdarshi, S., Sedukhin, I., Snelling, D., Tuecke, S., Vambenepe, W. and Weihl, B. (2004) Publish-Subscribe Notification for Web Services.
[27] Yan, T. W., and Garcia-Molina, H. (1994) 'Index Structures for Selective Dissemination of Information under the Boolean Model', ACM Transactions on Database Systems (TODS), 19(2), 332 - 364.
[28] Ashayer, G., Leung, H. K. Y. and Jacobsen, H.-A. (2002) Predicate Matching and Subscription Matching in Publish/Subscribe Systems, translated by Vienna, Austria: IEEE Computer Society Washington, DC, USA, 539 - 548.
[29] Wilson, D. C., Smyth, B., O'Sullivan, D. 2003. Sparsity Reduction in Collaborative Recommendation: A Case-Based Approach. International Journal of Pattern Recognition and Artificial Intelligence. [Referenced 8 March 2015]
[30] Ward, Jones & Hopper, A. 1997.A New Location Technique for the Active Office. [Referenced 9 March 2015]

