International Journal of Engineering Research and Development
e-ISSN: 2278-067X, p-ISSN: 2278-800X, www.ijerd.com
Volume 10, Issue 4 (April 2014), PP.01-06

Data Dissemination to Mobile Users

Nitin Saxena, Naveenprakash
[1]*Department of Computer Science & Engineering, School of Engineering & Technology, IFTM University, Moradabad India*
[2]*Department of Computer Science & Engineering, School of Engineering & Technology, IFTM University, Moradabad India*

Abstract:- we present the dynamic channel model, the information push model for data dissemination to mobile users. This is a set of extensions for the conceptual models developed for information channels that capture mobility-specific requirements. Dynamic channels are used for filtering and setting update order priorities for the information that user's decide to monitor, which depends on their location and changes as they roam. The dynamic channel model was implemented in Ubidata; it is a software framework for the construction of systems for information dissemination to mobile users. Here we also present the architecture of Update, an adaptable framework for information dissemination to mobile systems. We introduce our development process for the class of mobile computing applications operating under the information dissemination metaphor. In the mobile information dissemination network mobile users, equipped with wireless devices, exchange information in a spontaneous manner whenever they come into the communication range. Users have to specify what kind of information they are looking for and what type of information they can offer. The adaptive data dissemination model and the associated on-line scheduling algorithms improve the functionality and performance of bidirectional broadcast models, maximizing the total number of satisfied users in asymmetric communication environments with dynamic client profiles and time requirements (e.g., mobile systems).on-line scheduling algorithm can be executed in O(n) time, where n is the number of data items in the database. Performance evaluation shows on-line scheduling algorithm produces optimal channel allocation which significantly improves the system performance under various parameter settings.

Keywords:- mobile computing applications, information dissemination, geosensor networks, peer-to-peer communications, location-aware systems, scheduling, time-critical data, asymmetric communication, push-based technique

I. INTRODUCTION

In the mobile computing environments the mobility requirement brings, in many instances and this is the need for applications with limited user interaction and the capability to operate with intermittent connectivity. Like interactivity and connectivity are poor, applications must be smart about the information needs of users as they roam, bringing the relevant information with the minimum user intervention. In some cases, the users require the information by a certain time, and that's why information should be provided with deadline constraints associated with the requests of the data. In a mobile information dissemination network, all the users share information like they come into communication range to each other. Their devices match information they want to share and the information they are looking for. Here we introduce extensions of the conceptual models developed for information channels, capturing mobility-related attributes, like receivers location for filtering the information they intend to monitor. We also present our development methodology, which we can be applied to a class of mobile computing applications that is operating under an information dissemination metaphor. In China, the mobile communications companies face more challenges and difficulties after the market held by only one state-owned company that was broken down. Consequently, distinguishing different customers, finding top customers by customer ranking and adopting different sales promotion strategies are quite important and useful for mobile communications companies to gain the competence advantage.

II. ISSUES AND CONSIDERATIONS

Now we begin with explicitly stating the characteristics that the information server should include in order to perform effectively in time-critical asymmetric communication environments:

- **High bandwidth efficiency**. Due to the inherent bandwidth limitations in the asymmetric communication environments, the server must use the available bandwidth in order to satisfy as many users as possible with maximum efficiency.

- **High scalability**. Like a client population may grow without limitations, we need a server model that is capable of satisfying an extremely large number of users simultaneously without significant performance penalties.
- **Adaptation to changing user profiles**. The client access the Pattern that will change with the time in most situations. This means that the server should be able to adapt itself to diverse client demands.
- **Awareness of deadline requirements.** There are many applications in which time-sensitive data is being broadcast and before a certain deadline in order to be useful the information must reach the user. The server must incorporate with the appropriate mechanisms to take into account these timing constraints.

III. WIRELESS DATA DISSEMINATION NODES

Here, we briefly introduce the mobile computing model used in this study and the issues that are related to data dissemination in mobile computing systems, like efficiency and broadcast scheduling strategies and the channel allocation methods, data access methods.

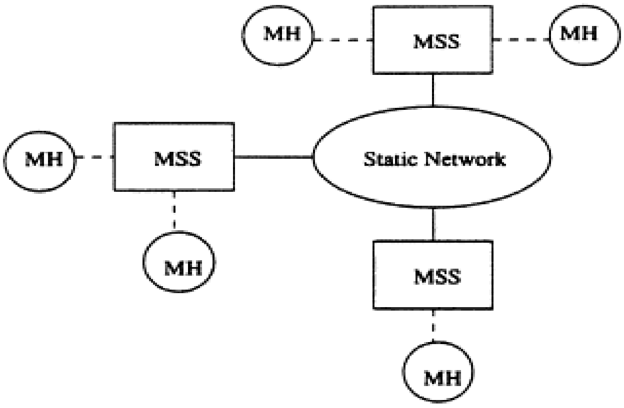

Figure 1– Nodes of Mobile computing system.

a) Mobile computing model

A mobile computing system consists of a set of stationary hosts and mobile computers that are connected by a fixed network. The mobile computers communicate with other computers via the wireless communication, while the stationary hosts communicate with each other by the wired network. The geographical area covered by the system is divided into cells in order to support wireless communication for mobile computers. The wireless communication in a cell is supported by a mobile support station also called MSS, on the fixed network that is one of the stationary computers. In a cell MSS controls the wireless communication channels. In this paper, we assume that the basic fixed channel assignment strategy is applied to the system, such as, there is a fixed set of channels that are permanently assigned to each cell and a service request can only be served through the unoccupied channels at a cell site otherwise, the request is blocked. In addition to supporting communication, the MSS can provide various services for the mobile users. As a result, the MSS can be considered like a database server that is responsible for disseminating and providing data in the cell to its mobile clients.

a) Channel allocation for data dissemination

In a mobile computing system, the communication load between the MSS and mobile computers varies over time and space because of the mobile computers mobility .in a cell with the limited and fixed bandwidth available, it is necessary to adjust the channels allocation for broadcast and on-demand purposes in order to improve the overall performance of communication in a cell. Following, we define four channel allocation methods classes:

- **Exclusive On-demand**: All the channels that are in on demand mode, data requests and results are delivered via point-to-point connections when the number of queries is small compared to the number of channels available and when energy efficiency is not an issue for the mobile computer to transmit uplink requests this method is desirable.
- **Exclusive Broadcast**: in the exclusive on demand method, all of the channels are in broadcast mode and data items are broadcast in broadcast channels periodically. This method is desirable when a small number of data items are interested in the large group of users.
- **Hybrid Allocation** : In this method we mixes the broadcast and on-demand channels in order to utilize more efficiently the system bandwidth and the main idea is to make on-demand channels and broadcast complement each other.

- **Dynamic Allocation:** This method dynamically allocates the on-demand channels and broadcast to achieve the performance of optimal data access. In the hybrid method, the dynamic method allocates channels at the MSS that are based on different workloads. When the load is heavy, the broadcast channels can significantly relieve the load by taking care of frequent accesses to hot data items on on-demand channel and when the load is light, on-demand channels can take over for providing instantaneous access to data.

b) Data access methods

With no prior knowledge on how the data item that's requested provided by the MSS, a mobile computer has to send a 1 This method cannot be feasible with diversified user access pattern to a large database for applications. It is included here for the dynamic channel allocation method for facilitating our development of cost formulae.

c) Broadcast scheduling

In a channel a complete broadcast of all of the data items is called a *broadcast cycle*. In order to reduce the length of broadcast cycle, in a multiple broadcast channel system, the data items may be distributed to different channels. Logically, increment in the broadcast channels is the same as increscent in the bandwidth of a broadcast channel. For broadcast MSS has to schedule the data in the allocated broadcast channels. Here, we choose data items to broadcast in sequence. An important characteristic of this strategy is that the access time for any broadcast data item is bounded always and the issue of broadcast scheduling is out of the scope of this paper.

d) Data access efficiency

1 here our goal is to pursue data access efficiency.2

The criteria used to evaluate data access efficiency of wireless channels is access time.3 A criteria frequently used in evaluating the methods of wireless data access is tune-in time, which represents the period of time that a mobile computer spent on monitoring the wireless channels. The tune-in time, can period from the time a mobile computer requests for the data item until the data received. The on-demand channels and broadcast channels introduce the different access overhead for the mobile users. For the broadcast channels, the main overhead is due to probe time that is defined like the duration between the time when the requested data item is located and the time the user starts to monitor the channels. On the other hand, the overhead for accessing data through the on-demand channels is the waiting time, which takes longer when the service load of the system is high for connecting to the MSS.

IV. UBIDATA

Here, we present the design objectives of our framework and a high level architectural overview of Ubi data. Our goal is to build a general framework for mobile computing information dissemination systems. Ubidata can serve like the basis for development of information systems that have the some common characteristics, likes the distribution of information sources to a potentially large set of users. The associated environment consists of three entities like publisher, network and subscriber and provides three Basic functionalities that are:

- Notification of changes to subscribed data.
- Definition of individual schedules for each of the subscribed items.
- Information dissemination to reachable subscribers.

Architecture

The architecture of Ubidata follows the scheme that is common to information systems called three-tiered scheme. The Presentation Layer, which includes the graphical interface that enables the user to see the data sent by the publisher. The Application Logic Layer which encloses the objects representing domain concepts that fulfil some application requirements (Domain Objects) and the supporting services (Service Objects). The Storage Layer which encloses the databases or files that contain the information to be received by subscribers and disseminated by the publisher. Figure 1 shows the Ubidata's general architecture. Transmitter and Tuner that are the fundamental domain objects. The framework also includes a set of service objects: Event Listener and Event Manager, Positioning System Manager, Web Server, Replication Manager. The Transmitter is responsible for keeping the definitions of the channels that are disseminated by the publisher. The Tuner is responsible for the channel items according to the settings of the associated subscriptions. The Positioning Service is responsible for supplying geographic position of the subscriber for the Tuner. The Replication Manager, that is an object of the Tuner, uses positioning data for discriminating the items covering the current position, establishing an update priority for the remaining.

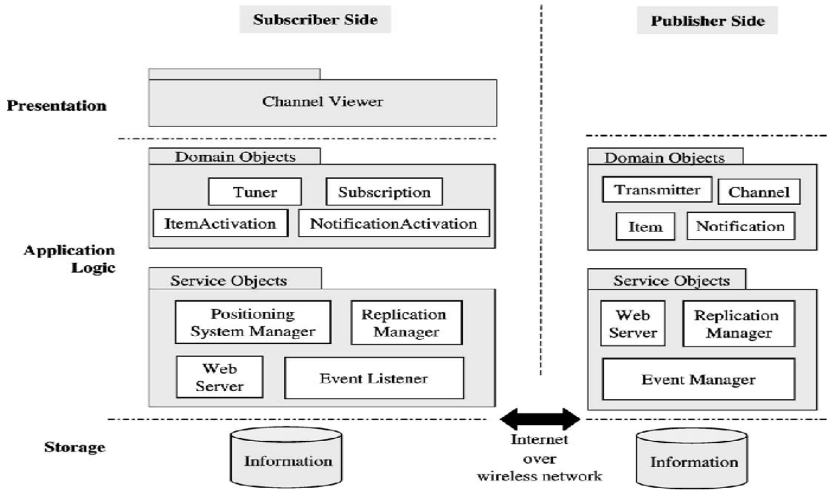

Figure 2 – Architecture of Ubidata

V. DYNAMIC CHANNEL MODEL

Our conceptual model is inspired on the notions that is introduced by D. Cheri ton. An shortly channel, information channel is defined as an abstraction of communication and system resources that are necessary for distributing information to a set of users. Our application implements the model of publisher/subscriber, in which information received by the user is called the subscriber and the information send by the user, is called the publisher. Publishers use channels to disseminate the information to a potentially large group of subscribers. A channel may have its set of subscribers that are changing dynamically over time. The contents carried by a channel are grouped into atomic and logical units that are called items. In the case of a database source of information an item may be a source file or a database object, represented as a SQL statement. Before starting receiving data on that channel when a subscriber adds a channel to his reception list and he must select and configure the items he is interested on. We assume that the network supports a hybrid scheme of data delivery that combines periodic pull and a periodic push for optimizing application requirements. The subscriber uses polling for obtaining data from publishers, defining individual schedules for each of the items that subscribed. This scheme is useful because network unavailability and subscribers disconnection can occur frequently. In these environments, the key mechanisms for supporting these characteristics include prefetch and replication of information .We use periodic push to broadcast information from the publisher to reachable subscribers. Publishers can associate notifications for the items. Push delivery is event-driven – a subscriber of an item with a notification receives an attention message that is triggered by an event like a modification in the item contents. To provide real-time access to information sources, a frequent requirement of mobile application this approach isuseful.In some mobile environments, channels aware of the geographic position of the subscribers which are especially useful. This enables adaptation of the items' visualization behaviour that is based on both of the user and the data being produced, geographic constraint. We coined the term dynamic channel to designate a channel with the basic adaptation properties that we have only introduced. This concept represents a new perspective to the notion of dynamic views that is introduced by Wolfson et al.They see the information dissemination system like set of materialized views updated like the mobile users move. In our model, information dissemination is a filtering process of those items that are selected by the subscribers which is meaningful to their current geographic position. We also have the notion of a view changing continuously in time, but our notion is more general as we support filtering of any information. The main classes of a channel are: transmitter and tuner. The former encloses what items and channels are to be disseminated, and the conditions to inform the subscribers about new data available – notifications. The later encloses which items are activated, which notifications the subscriber uses and which channels are subscribed.

VI. THE ICLOUDS PROJECT

Here we present key concepts, system components and characteristics of the iclouds' Project.iClouds allows mobile users to form a spontaneous network by using mobile devices with the capabilities of short range communication (our prototype uses 802.11b Wi-Fi (Adhoc-Mode) enabled PDAs). We do not assume any relation between users before. With iClouds, users are able to share information with others in a peer-to-peer manner, such as subscribe to information interests and users publish information. Using a kind of user profile, we call it *iWish*- and *iHave*-list, devices match information they want to share and they are looking for. If there is a match between user's iWish-listand another user's iHave-list, without any further user interaction information is passed. By this we mimic the way information spreads through word-of-mouth between humans.

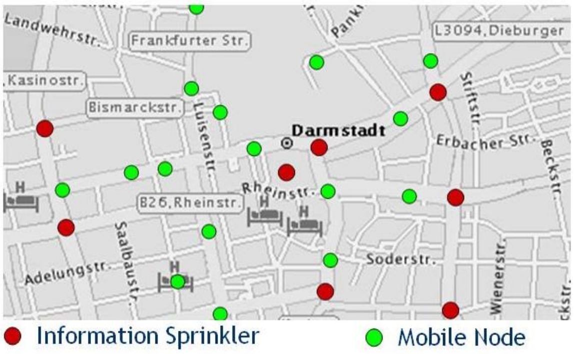

Figure 3- iClouds System Components - City Setup

VII. METHODOLOGY

Here we present the essential stages and steps of our development methodology for information dissemination applications. Analysis and design consists in populating a data structure that implements the model of dynamic channel through new interactive software tool, called GIL. From this data structure, we generate all the parameterizations that is required to configure the software components of Ubidata for any given data dissemination application. To create a new application, we start with the characterization and identification of the information to the data dissemination. This information is partitioned into items. The model of dynamic channel presented above defines the attributes for each of the information items. These attributes provide the policy specification for the items information gathering from their sources and replicating it to registered subscribers. The process of information partitioning into items and channels is driven by the requirements of each application. In general there are multiple strategies that can be followed, corresponding to different modelling styles. In some cases, we associate the same contents to multiple items with different, database query parameters, notification conditions and/or coverage areas, so that subscribers may switch dynamically between various alternative options for the same information receiving. Each new data dissemination application defines objects of the transmitter related classes and their relationships. The related objects are created as new subscribers that enter the system and these are parameterized during run-time execution. GIL, our dynamic channels specification tool, outputs these definitions as configuration files. We call these dynamic channel description files also known as the D-CDF files. The format of the D-CDF file is an extension Microsoft's CDF. Our extensions provide additional XML elements that capture mobility-related information, like location, a more complex scheme and notifications for describing replicated information, including support for passing database views. In Ubidata, both the publisher and subscriber sides take the D-CDF as input. Publishers load the D-CDF files to know how to make it available, what information to disseminate, and when to notify subscribers about changes to the information. Subscribers load the D-CDF for getting information about the channel items available, their relevance to the current position, and customize the publisher polling schedules and notification.GIL is implemented as a Java applet that manipulates model of the dynamic channel data structures, which we maintain in a relational database. We used an XML library of Java classes, to process the conversion between the relational data structures and the XML-based D-CDF file format.

VIII. APPLICATION

We have applied the concepts that we presented above to the development of a prototype mobile information system for fire-fighters of the National Civil Protection Service. This organization collects information from all civil protection units in the country, and it is responsible for dispatching groups of fire brigades to change the reported fires. These brigades need to be informed on the field about the existing conditions and available resources like the fires evolve.Firefighters is not expert user of the computer and they have limited time to spend in interactive sessions. For this reason, when the system is installed and customized, it works with no human interaction, such as the screen is updated continuously with information about the fire at the current location. Nevertheless, it is still possible at any time to make changes in the system configuration.Firefighters want to a quire the real-time information about the nearest fires. When in presence of a fire, they want to access a variety of information that is available to help them with their task. This includes the number ofbrigadesthat is involved in the fire fights, the resources available, the fire progress history, weather measures, water access points and data about vegetation. Here the first analysis step for developing this application was the identification of the information sources. We have a database table named "fires" with active fires information, and another table,"air_resources," with the data describing resources, such like planes, helicopters and airports. Weather conditions are not provided in a database format, but as a file instead.nowiIn the next step, we mapped information sources into channel items. We identified the following main items:

"active fires," "resources" and "weather conditions." The identification of the items is introduced using the set of forms of our editing tool, generating the D-CDF definition.

IX. CONCLUSION

Mobile computing has received a lot of attention from the academia and industry in the past few years. Due to the limited wireless communication bandwidth that is allocated for the mobile computing, researchers are seeking techniques to make bandwidth for efficient use. Wireless broadcast is an important technique for mobile users to disseminating data, because it scales up to an arbitrary number of users. Thus, broadcast channels are often used for broadcasting commonly requested data items to complement the traditional approach of data access by on-demand channels. The issue of wireless channel allocation used for data dissemination is to monitor the user access pattern and on-demand services and dynamically assign channels for broadcast to achieve optimal system performance. The scheduling strategy that we proposed for data dissemination on the broadcast channels is different from the strategies that we proposed in the literature in that we choose to broadcast every hot data item with equal frequency in order to unpopular data items are provided by on-demand channels only and to prevent unlimited access delay for less popular items. For the future work, we will study the global channels management issues for neighbouring cells, in this channel borrowing is allowed. The use of the broadcast channels like shared cache for the mobile users is an interesting idea. A coherent approach for the caching, invalidation and maintenance of data items through the on-demand channels and combination of the broadcast needs further research.

REFERENCES

[1] "A Public Key Cryptosystem and a Signature Scheme based on Discrete Logarithms," in Advances in Cryptology - CRYPTO'84, Proceedings, ser. Lecture Notes in Computer Science, G. R. Blakley and D. Chaum, Eds.

[2] vol. 196. Springer, 1985, pp. 10–18.] B. R. Waters, E. W. Felten, and A. Sahai, "Receiver Anonymity via Incomparable Public Keys," in Proceedings of the 10th ACM conference on Computer and communication security.

[3] ACM Press, 2003, pp. 112–121. D. Chaum and E. van Heyst, "Group Signatures," in EUROCRYPT'91, Proceedings, ser. Lecture Notes in Computer Science, vol. 547. Springer, 1991, pp. 257–265. J. Camenisch, Group Signature Schemes and Payment Systems Based on the Discrete Logarithm Problem.

[4] Hartung-Gorre Verlag, 1998. A. Heinemann, "The iClouds Project. Tu-darmstadt.de A. Heinemann, J. Kangasharju, F. Lyardet, and M. M¨uhlh¨auser, "I Clouds – Peer-to-Peer Information Sharing in Mobile Environments," in Euro-Par 2003. Parallel Processing, 9th International Euro-Par

[5] Conference, ser. Lecture Notes in Computer Science,H. Kosch, L. B¨osz¨orm´enyi, and H. Hellwagner, Eds.,vol. 2790. Klagenfurt, Austria: Springer, 2003, pp. 1038–1045. A. Heinemann, J. Kangasharju, F. Lyardet, and M. M¨uhlh¨auser, "Ad Hoc Collaboration and Information Services Using Information Clouds," in Proceedings of the 3rd Workshop on Applications and Services in Wireless Networks, (ASWN 2003), T. Braun,N. Golmie, and J. Schiller, Eds. Bern, Switzerland: