Available Online at www.ijcsmc.com

International Journal of Computer Science and Mobile Computing

A Monthly Journal of Computer Science and Information Technology

ISSN 2320–088X

IJCSMC, Vol. 2, Issue. 12, December 2013, pg.338 – 343

RESEARCH ARTICLE

A Context Aware Framework at Transport Layer to Improve QoS in Mobile Applications

Sanjeev Shrivastava[1], D S Bhilare[2]

[1]SCS & DAVV, Indore, India

[2]SCS & DAVV, Indore, India

[1] sanjeev_shrivastava@live.com; [2] bhilare@hotmail.com

Abstract—*New mobile devices and mobile Internet applications are transforming the traditional concept of computing and user's experience. Applications which even initially do not required Internet connectivity now using Internet to provide update, new features, advertisements and add-on in an application. Context-aware computing is a mobile computing paradigm which makes mobile devices and applications smarter in which applications can discover, interpret the surrounding environment and take advantage of contextual information by using it proactively and intelligently. In this paper a context aware framework is proposed at transport layer. This framework provides information to the mobile applications which improves user's experience and open new dimensions to provide new features to it. Frame work improve the QoS of the system by incorporating adaptation engine at application layer and transport layer context system at transport layer for an individual's changing context.*

Keywords— context awareness; mobile application; QoS; transport layer context system

I. INTRODUCTION

Past few years have witnessed tremendous revolution in the field of mobile computing and other enabling technologies viz. embedded sensor technologies, wired and wireless protocols, various computing paradigms, etc. The widely emerging computing paradigm called context-awareness is fully responsible for the development of modern ubiquitous and mobile systems. It refers to particular class of mobile systems that senses the physical environment and adapts its behaviour accordingly. [1, 2] It is a specific property of mobile devices that gathers and performs timely delivery of information relevant to the service level apart from making system aware of the situations of interest. A great deal of work has been done in context-aware computing as it reduces obtrusiveness, automates system as well as customizes and personalizes applications however these computing applications are not available to everyday users.

The prime ubiquitous tools that use context awareness computing are mobile devices and this is the reason why it is also known as mobile computing paradigms comprising of applications to detect user location, physical device location, user preferences and time constraints. As compared to past fifteen years, mobile phones (smart phones) and PDAs are providing multifarious applications and services. These applications adapt

as per the user's situation still a major issue must be addressed to efficaciously select services for adaption according to the user's current context [3, 2, 4].

Due to regular introduction of new mobile devices, [5, 6, 7] new problems frequently arise thereby demanding new paradigms for computing. Also, the complex usage of mobile devices supplemented by limited resources for display and processing, demands understanding of "context of user" as it influences the computational capabilities of the devices which are in it. Systems used for mobile applications must be aware of the context in which they are being used. Also the development and deployment of context-aware mobile artifacts are still at its initial stage which has forced researchers across the world to continuously work for the discovery and development of new computing models and technologies i.e. to the development of effective context-aware mobile application [8]. Architectures designed for mobile devices with a view to support for context-aware applications must be capable of representing contextual information as well as handling it. [9]

II. RELATED WORK

The evolution of smarter and always connected applications over the Internet has raised the demand for a new dimension in the mobile application area. A. Soylu, P.D. Causmaecker, and P. Desmet **[10]** have proposed an extensive review of the literature of context-aware pervasive computing while integrating theory and practice from various disciplines in order to construct a theoretical grounding and technical follow-up path.Bachir Chihani, Emmanuel Bertin, and Noel Crespi [11] have proposed a new approach, based on their study of previous work, for context-aware communication systems. Relying on this approach, they designed a comprehensive framework based on a distributed service broker for the development of such systems.

Yaser Mowafi and Dongsong Zhang [8] have proposed a user-centered approach, supports context awareness for mobile computing, for obtaining and parsing context driven by users' context of interest thereby offering more interactive and construed context to users. The developed Context-Aware System, based on the framework could reduce the complexity of the traditional context acquisition and interpretation approach, mainly based on the sensor-based infrastructure, by leveraging users' natural dialogue with mobile computing embedded mobile computing value-added services currently available on most mobile devices, such as GPS and messaging services, in enriching the context-acquisition and context-awareness patterns.

Bill N. Schilit, Norman Adams, and Roy Want [12] have proposed software that could promote and intercede people's interactions with devices, computers and other people by examining and reacting to an individual's changing context. They defined a context-aware computing having four categories of applications, viz. proximate selection, automatic contextual reconfiguration, contextual information and commands and context-triggered actions, prototyped on PARCTAB- a wireless palm sized computer.Thyagaraju GS, and Umakant P Kulkarni [1] have proposed an intelligent context-aware service recommendation model which effectively selects services for adaption according to the user's current context. Use of artificial intelligence techniques like Bayesian Network to classify incoming calls, Fuzzy Logic to define context situations and rules based reasoning for adopting the policies of implementing the service were used for formulating the service process by them.

Supriyo Chakraborty, Kasturi Rangan Raghavan, Matthew P. Johnson, Mani B. Srivastava [13] have proposed an approach to maintain privacy of sensor data on mobile system, usually defined in multi-user settings, based on anonymisation to prevent such sensitive behaviours from being traced back to the user - a strategy which does not apply if user identity is already known. Changheng Shao [14] has proposed a solution that controls and manages device in Internet of things using IMS as a core network to implement location perception and management according location. His work strongly affirmed to catering better solution as compared to various existing ones as it is not only conductive to green initiative but also can control and manage home appliances by location flexibility and intelligently.

Guanling Chen and David Kotz [3] have proposed context awareness as a key factor for new applications in the area of ubiquitous computing. They looked in depth at the different types of context used and models of context information, at systems that support collecting and disseminating context, and at applications that adapt to the changing context. They regarded context-awareness as an old but rich area for research. Dan Chalmers, Morris Sloman [7] have rendered an overview of a system model designed to enable applications aware adaption to both context variation and dynamic resource characteristics, found in mobile applications. In their work, the management of Quality of Service is been integrated with context management so as to enable improved resource and requirements management. They considered it to be necessary to enable effective application adaption and resource management for heterogeneous systems and varying user requirements, particularly where mobile devices are being used.

III. PROPOSED WORK

Now- a- days mobile processors are very powerful and have very good processing capabilities. Various reports explain that most of the time processor is in idle state hence utilization of CPU idle time will be possible without affecting much existing work load on CPU. Traditional applications are also tuned to use Internet to update themselves, adding new features, continuously taking feedbacks, showing advertisements, interlinking with other application programs. To utilise this new features of changing application, an added advantage of context support is presented in this paper. There are two noble things presented in this paper first is adaptation engine and second is transport layer context system. Application program enhance the Quality of Service (QoS) by using these systems. Application programs independently interact with the adaptation engine and because of interference, security intact.

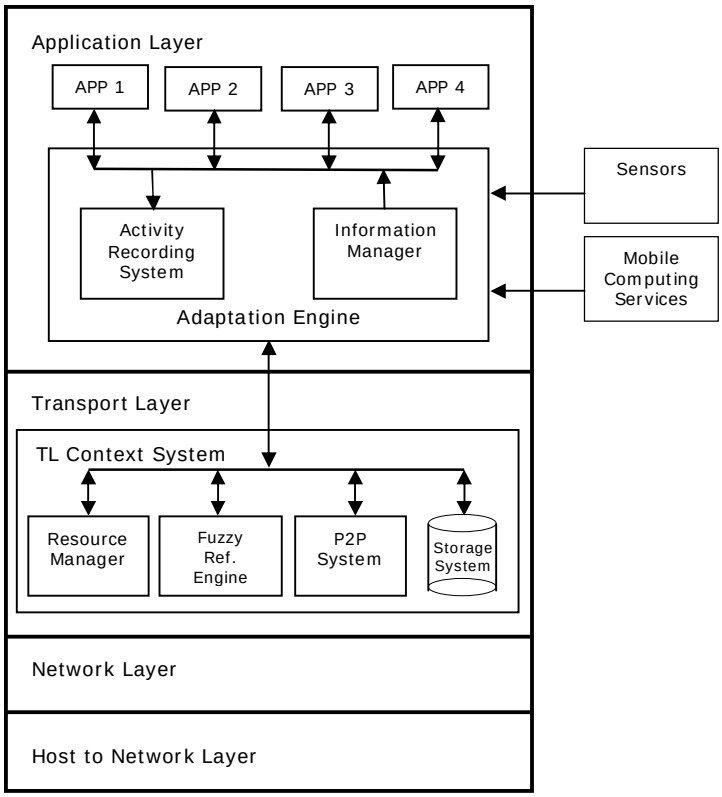

Fig 1 Frame work diagram consisting of Transport layer context system and adaptation engine

In TCP/IP reference model, there is modification as displayed in fig 1 in which application layers, application programs interacting with the adaptation engine. This adaptation engine contains activity recording system and information manager. Information manager may provide active and passive services to the applications. It could prefetch the information required by the user based on users past history and habits. The QoS improves because of dynamic prefetching in response to the fast changing moving patterns. This adaptation engine will take data from mobile computing embedded service and mobile system sensors. Sensors input are given to adaptation engine from mobile system. These sensors include accelerometers, gravity sensors, gyroscopes, rotational vector sensors, magnetometers, orientation sensors, light sensors, proximity sensors(face, people, vehicle, building, jurisdiction etc), pressure sensors, humidity sensors temperature, wind, Infrared, audio, gas, Wi-Fi, location GPS, and so on. Adaptation engine is connected with transport layer context system in two way fashion. Transport layer context system is having four components viz., components resource manager, fuzzy reference engine, peer to peer system and storage. The storage present in transport layer context system stores the user's input locally and may store this data remotely at various context servers. User's input may be time spent on various applications such as websites, social networking sites, messenger systems, installed apps, input provided by various sensors and mobile computing embedded services. In peer to peer system information among various users can be shared just like in real world various persons interact with each other as described in fig 2. Peer to Peer system has information required list and information known list. Information required list

contains the information needed by the user and this could be fulfilled by peer mobile systems or from the context server if they have desired information. Information known list is available to peer mobile systems and may also store by context server which can be utilized by other mobile systems.

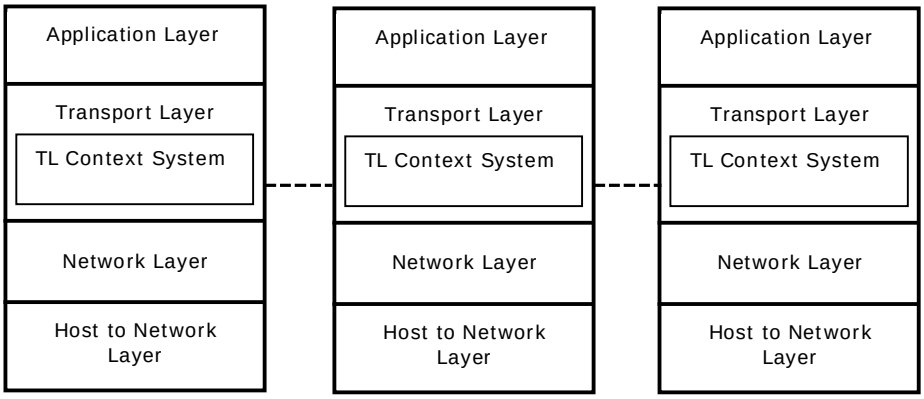

Fig 2 Peer to Peer mobile systems interaction through Transport Layer Context System

Peer to Peer System working

In peer to peer system, mobile systems interact with other nearby systems. The information of interaction is stored at transport layer system as well as it store in context service provider servers if desired by user. In proposed system mobile system is identified by mobile machine ID. Peer systems would send message to nearby systems and that would be registered by peer system present in transport layer context system at transport layer. This peer system creates and works with information provided by surroundings mobile systems and context servers. A mobile system creates a list of mobile systems which interact with it and store their identity known or unknown. "Identity known" mobile systems are acquainted and trusted mobile systems as described in table I. Each mobile system also maintains information required list and information known list which shows mobile machine Id of mobile system which has provided the information as described in table II and III. This list also declare various information by user who would like to share his personal or professional information, like "I am a doctor/cop/any profession" or "My profile is so n so", along with information that people give in social networking sites. Creditability of mobile systems which have interacted by a mobile system is analysed by Peer to Peer system and by user's input and store as described in table IV with maximum value of 1. This factor is important to rely on various information and used by application programs.

Mobile Machine ID	**Identity**
Number 1	Known
Number 2	Unknown
Number 3	Known

TABLE I – Identity known and unknown list

Mobile Machine ID	**Information Required List**
Local Machine Number	Item 1
Local Machine Number	Item 2
Local Machine Number	Item 3

TABLE II – Information required list by mobile

Mobile Machine ID	Information Known List
Number 1	Item 1
Number	Item 2
Number	Item 3

TABLE III - Information required list by mobile

Mobile Machine ID	Creditability (Max 1)
Number 1	0.58
Number 2	0.44
Number 3	0.79

TABLE IV – Mobile user's creditability listing

This Peer to Peer system also useful to carry out poll/query from nearby mobile systems, also it is useful to ask information like "is this place is near by", "is this correct place to buy so n so item". A mobile system is getting query/poll information from peer system then on the basis of creditability, unknown or unknown mobile systems Id and maximum mobile systems agreed on certain fact, fuzzy reference engine present in transport layer context system decide the result and final decision would be taken by user and store the result in database as described in table V.

Mobile Machine ID	Creditability	Unknown	Known	Fuzzy decision	decision of Local Mobile Machine
Number 1					
Number 2					
Number 3					

TABLE V – List contain decision carry out poll/query

IV CONCLUSIONS

In this paper a user centric approach used that supports context awareness for mobile systems. The work related to context awareness for mobile systems are still demand a lot of focus of precisely discovering context, efficiently distributing contextual information, and making use of the available contextual information. A novel framework is developed which practices the context information, driven by users' context of interest. This frame work uses sensors, peer information and users' working profile effectively to facilitate various applications by using acquired information.

REFERENCES

[1] Thyagaraju GS, and Umakant P Kulkarni, "Design and Implementation of User Context aware Recommendation Engine for Mobile using Bayesian Network, Fuzzy Logic and Rule Base", International Journal of Computer Applications, 2012, vol. 40.

[2] Paolo Bellavista, Antonio Corradi, Mario Fanelli, Luca Foschini, "A survey of context data distribution for mobile ubiquitous systems", Journal- ACM Computing Surveys (CSUR), 2012, vol 44.

[3] Guanling Chen and David Kotz, "A Survey of Context-Aware Mobile Computing Research", Technical Report TR2000-381, Dartmouth Computer Science, 2000.

[4] Ram Ramjee, "Context-Aware Mobile Information Access", Infovision 2009 conference.

[5] Paolo Coppola, Vincenzo Della Mea, Luca Di Gaspero, Stefano Mizzaro, Ivan Scagnetto, Andrea Selva, Luca Vassena, Paolo Zandegiacomo Riziò, "MoBe: A Framework for Context-Aware Mobile Applications", Workshop on Context Awareness for Proactive Systems, CAPS 2005.

[6] Russell Beale, Peter Lonsdale', "Mobile Context Aware Systems: The Intelligence to Support Tasks and Effectively Utilise Resources", Mobile HCI, 2004, pp 240-251.

[7] Dan Chalmers, Morris Sloman, "QoS and Context Awareness for Mobile Computing", Handheld and Ubiquitous Computing, First International Symposium, 1999.

[8] Yaser Mowafi and Dongsong Zhang, "A User-centered Approach to Context-awareness in Mobile Computing", Fourth Annual International Conference on Mobile and Ubiquitous Systems: Networking & Services (MobiQuitous), USA, 2007.

[9] Christos Anagnostopoulos, Athanasios Tsounis, Stathes Hadjiefthymiades, "Context Awareness in Mobile Computing Environments", Wireless Personal Communications, 2007, vol. 42, pp 445-464.
[10] A. Soylu, P.D. Causmaecker, and P. Desmet, "Context and Adaptivity in Pervasive Computing Environments: Links with Software Engineering and Ontological Engineering", Journal of Software, 2009, vol. 4, pp 992 - 1013.
[11] Bachir Chihani, Emmanuel Bertin, Noel Crespi, "A comprehensive framework for context-aware communication services", ICIN Conference(Intelligence in Next generation Network), Germany, 2011.
[12] Bill N. Schilit, Norman Adams, and Roy Want "Context-Aware Computing Applications", IEEE Computer Society, Workshop on Mobile Computing Systems and Applications, 1994, pp 85-90.
[13] Supriyo Chakraborty, Kasturi Rangan Raghavan, Matthew P. Johnson, Mani B. Srivastava, "A frameworkfor context-aware privacy of sensor data on mobile systems", 14th International Workshop on Mobile Computing Systems and Applications (ACM HotMobile 2013), 2013.
[14] Changheng Shao, "An Internet of Things Application with Location Perception Based on IMS", International Conference on Multimedia Information Networking and security, 2011, pp 163-166.

