International Journal of Enhanced Research in Science Technology & Engineering, ISSN: 2319-7463
Vol. 3 Issue 3, March-2014, pp: (164-167), Impact Factor: 1.252, Available online at: www.erpublications.com

Mobile Computing

Aakriti Malhotra, Prof. Sukhwinder Singh
E & EC department, PEC University of Technology, Chandigarh, India

Abstract: Advances in wireless networking have prompted a new concept of computing, called mobile computing in which users carrying portable devices have access to a shared infrastructure, independent of their physical location. This provides flexible communication between people and continuous access to networked services. Mobile computing is revolutionizing the way computers are used and in the coming years this will become even more perceptible although many of the devices themselves will become smaller or even invisible (such as sensors) to users. This paper attempts to give an insight into mobile computing, in particular, software design issues (models, algorithms and in particular middleware) are considered. Such issues arise from the need for wireless networking, the ability to change location and the need for unencumbered portability as well insuring security standards comparable to that found is distributed systems or central systems.

I. Introduction

In the last 10 years, the advent of mobile phones as well as laptops has dramatically increased the availability of mobile devices to businesses and home users. More recently, smaller portable devices such as PDAs and especially embedded devices (e.g. washing machines, sensors) have slowly changed the way humans live and think of computers. Computing is drifting away from just being concentrated on computers and relates more and more towards society, its people and its infrastructures. This is particular true where sensors are being developed to be so minute that they are literally embedded in clothing and even humans. Mobile computing is a form of human–computer interaction by which a computer is expected to be transported during normal usage. Mobile computing has three aspects: mobile communication, mobile hardware, and mobile software. The first aspect addresses communication issues in ad-hoc and infrastructure networks as well as communication properties, protocols, data formats and concrete technologies. The second aspect is on the hardware, e.g., mobile devices or device components. The third aspect deals with the Mobile computing is taking a computer and all necessary files and software out into the field. Mobile computing: being able to use a computing device even when being mobile and therefore changing location. Portability is one aspect of mobile computing. Mobile computing is the ability to use computing capability without a pre-defined location and/or connection to a network to publish and/or subscribe to information .Mobile Computing is a variety of wireless devices that has the mobility to allow people to connect to the internet, providing wireless transmission to access data and information from where ever location they may be.

II. Types of Mobile Systems

Many types of mobile computers have been introduced since the 1990s including the computer, Personal digital assistant, smartphone, tablet computer, ultramobile PC, wearable computer.[1] In many ways, mobile computing has several characteristics reminiscent of distributed systems. In order to understand mobile systems, one must first understand where the similarities and the differences of distributed and mobile systems lie.
The various types of Distributed systems are :

a. Traditional Distributed System
b. Nomadic Distributed System
c. Ad-Hoc Mobile Distributed System

A. Traditional Distributed Systems

Traditional distributed systems consist of a collection of fixed hosts that are themselves attached to a network– if hosts are disconnected from the network this is considered to be abnormal whereas in a mobile system this is quite the norm. These hosts are fixed and are usually very powerful machines with fast processors and large amount of memory. The bandwidth in traditional systems is very high too.

B. Nomadic Distributed Systems

This kind of system is composed of a set of mobile devices and a core infrastructure with fixed and wired nodes. Mobile devices move from location to location, while maintaining a connection to the fixed network. There are

problems that arise from such shifts in location. The mobile host has a home IP address and thus any packets sent to the mobile host will be delivered to the home network and not the foreign network where the mobile host is currently located.

C. AD-HOC Distributed Systems

Ad-hoc systems do not have any fixed infrastructure which differs them both from traditional and nomadic distributed systems. In fact, ad-hoc networks may come together as needed, not necessarily with any assistance from the existing (e.g.Internet) infrastructure. When nodes are detached from the fixed/mobile network they may evolve independently and groups of hosts opportunistically form "clusters" of mini-networks. The speed and ease of deployment make ad-hoc networks highly desirable.

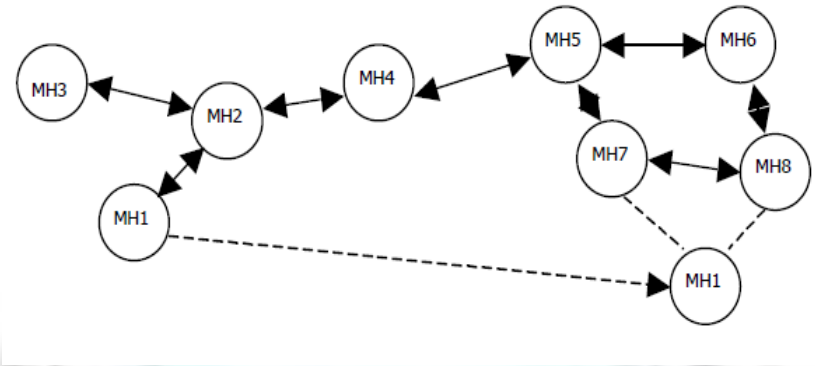

Fig 1: Ad Hoc network of mobile nodes – these are able to move relative to each other. MH1 moves away from MH2 and establishes new links with MH7 and MH8. Most algorithms also allow for the appearance of new mobile nodes and the disappearance of previously available nodes.

III. Theory in Mobile Computing

Models Theory

Models permit the precise description of existing languages and system semantics. In fact, they enable the formal reasoning about the correctness of such semantics. Models are very much used to emphasize parallels and distinctions among various forms of mobility (logical and physical) and are concerned with the formulation of appropriate abstractions useful in specification and evaluation of such mobile systems. Models are mainly concerned with the characteristics of mobile units such as the unit of mobility (who is allowed to move), its location (where a mobile unit is positioned in space) and its context (determined by the current location of mobile units).

Algorithms

The current algorithms applied reflect the assumptions that are made about the underlying systm. Unfortunately, many of these assumptions are not suited for current algorithms for mobile systems. Mobile algorithms are obliged to treat in much detail space and coordination of mobile systems. In particular, algorithms have to carefully take into consideration location changes, the frequency of disconnection, power limitations and the dynamic changes in the connectivity pattern of mobile systems. This field of theory is in fact spread among a vast spectrum of research due to the large diversity of mobile systems.

Limitations

-Insufficient Bandwidth [2]: Mobile Internet access is generally slower than direct cable connection. Higher speed wireless LANs are inexpensive but have very limited range

-Security standards: When working mobile, one is dependent on public networks, requiring careful use of VPN. Security[3] is a major concern while concerning the mobile computing standards on the fleet. One can easily attack the VPN through a huge number of networks interconnected through the line.

-Power consumption: When a power outlet or portable generator is not available, mobile computers must rely entirely on battery power. Combined with the compact size of many mobile devices, this often means unusually expensive batteries must be used to obtain the necessary battery life.

-Potential health hazards: People who use mobile devices while driving are often distracted from driving and are thus assumed more likely to be involved in traffic accidents. (While this may seem obvious, there is considerable discussion about whether banning mobile device use while driving reduces accidents or not.) Cell phones may interfere with sensitive medical devices. There are allegations that cell phone signals may cause health problems.

-Human interface with device: Screens and keyboards tend to be small, which may make them hard to use. Alternate input methods such as speech or handwriting recognition require training.[4]

IV. Advantages

-Improved decision making: Mobile Computing lets you conduct business at the point of activity. The ability to collect, access and evaluate critical business information quickly and accurately means better decision making that can have a far-reaching effect on company's ability to compete successfully.

-Increased productivity[5] and reduced costs: Mobile computing can lead to increased individual productivity, increased sales per sales person, more service calls per repair person, less time spent by professionals on administrative work, and much more--all of which ultimately translates into higher sales at lower cost. And, on-the-spot invoice production in service vehicles can lead to shorter payment cycles and better cash flow.

-Portability: The main benefit of mobile computers is that you do not have to bind yourself to a certain place. It is possible to do work while sitting in a car or a train& communicate with other people while sitting anywhere in the world. Chat online with friends and family members, office work while sitting anywhere.

- Economy: When people can do their work while sitting anywhere they will do more work. This will play an important role in the economy of the country and the world.

V. Security issues involved in Mobile Computing

-Mobile security or mobile phone security has become increasingly important in mobile computing. It is of particular concern as it relates to the security of personal information now stored on the smart phone. More and more users and businesses use smart phones as communication tools but also as a means of planning and organizing their work and private life. Within companies, these technologies are causing profound changes in the organization of information systems and therefore they have become the source of new risks. Indeed, smart phones collect and compile an increasing amount of sensitive information to which access must be controlled to protect the privacy of the user and the intellectual property of the company.

-All smart phones, as computers, are preferred targets of attacks. These attacks exploit weaknesses related to smart phones that can come from means of communication likes SMS, MMS, WIFI NETWORKS. There are also attacks that exploit software vulnerabilities from both the web browser and operating system.

-Different security counter-measures are being developed and applied to smart phones, from security in different layers of software to the dissemination of information to end users. There are good practices to be observed at all levels, from design to use, through the development of operating systems, software layers, and downloadable apps.

Acknowledgment

I would gratefully acknowledge the contributions of Prof. Sukhwinder Singh, E&EC Department, PEC university of Technology for his work and encouragement in the making of this research paper.

Conclusion

With developments of latest technologies [6] mobile computing still requires many other technologies to be collaborated for fulfilling the changing needs of users worldwide, Mobile computing promises to provide any kind of functionality for challenging requirements but it has to resolve & enhance in various disciplines to convert promise into real things. There is little doubt that mobile computing will enhance many aspects of the lives of humans. One must wonder though whether or not everyone will want to have such an “invading” technology, especially when it comes to ubiquitous computing. Some people may be scared with regards to health issues as well as privacy ones (a chip inserted

into someone's arm could be made as a tracking .This has raised the issue of security in wireless networks and has allowed people to freely enjoy "surfing").

However, these worries are more "ethical" and "social" than actual technological. There is little doubt that mobile computing offers a potential large economic market in networks. This promising field of research is still at an early stage but advances are made to improve the quality and the availability of mobile systems. Consumers will be affected more and more by the emancipation in the availability of mobile devices thanks to a reduction of price in manufacturing as well as a reduction in the size of such devices.

References

[1]. Computer organization-Hamachar, jaky &varensic.
[2]. Computer networks-Tanenbaum.
[3]. Paper by Bedre Heeramani, B.Nagaraj: Volume 2, Issue 4, April 2012 ISSN: 2277 128X,International Journal of Advanced Research inComputer Science and Software EngineeringResearch Paper:"Research Issues of Interactive Multimedia for AdvancedComputing &Communication for Challenging Applications".
[4]. Paper by Bedre Heeramani, B.Nagaraj: Volume 3, Issue 3, April 2013 ISSN: 2277 128X,International Journal of Advanced Research inComputer Science and Software EngineeringResearch Paper:"Emerging technological trends of 2012-2013 data flow supercomputer design issues for challenging applications".
[5]. Computer system architecture by Morris Mano.
[6]. Digital Systems- Morris Mano
[7]. Mobile Communications", Jochen Schiller, Addison-Wesley, 2000.
[8]. "Ad hoc Networking", Charles Perkins, Ed., Addison-Wesley, 2000.
[9]. "Mobile Ad hoc Networking", Basagni, Conti, Giordano and Stojmenovic, Eds., IEEE/Wiley Press .
[10]. "Computer Networking: A Top-Down Approach Featuring the Internet", Kurose and Ross, Addison-Wesley, 2002.
[11]. Mobile Computing - Alissa Scherchen.
[12]. Information security issues in mobile computing-Thomas Hardjono.
[13]. Fundamental Challenges in Mobile Computing- M. Satyanarayanan.
[14]. Research Dimensions of Advanced Mobile Computing Technology Security Issues for the Complex Applications-Bedre Heeramani1, B.Nagaraj2.