MOBILE COMPUTING

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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. Mobile computing has fast become a crucial fresh prototype in nowadays world of networked computing systems. 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 to users. This paper explicate different types of mobile system that are used in distributed environment. It also explains mobility service architecture, technology, application and demerits of mobile computing. Finally, this paper explains the future direction of mobile computing.

1. INTRODUCTION

Mobile Computing is a technology that allows transmission of data, voice and video via a computer or any other wireless enabled device without having to be connected to a fixed physical link. The main concept involves −

- Mobile communication
- Mobile hardware
- Mobile software

1.1 MOBILE COMMUNICATION

The mobile communication in this case, refers to the infrastructure put in place to ensure that seamless and reliable communication goes on. These would include devices such as protocols, services, bandwidth, and portals necessary to facilitate and support the stated services. The data format is also defined at this stage. This ensures that there is no collision with other existing systems which offer the same service.

Since the media is unguided/unbounded, the overlaying infrastructure is basically radio wave-oriented. That is, the signals are carried over the air to intended devices that are capable of receiving and sending similar kinds of signals.

1.2 MOBILE HARDWARE

Mobile hardware includes mobile devices or device components that receive or access the service of mobility. They would range from portable laptops, smartphones, tablet Pc's, Personal Digital Assistants.

These devices will have a receptor medium that is capable of sending and receiving signals. These devices are configured to operate in full- duplex, whereby they are capable of sending and receiving signals at the same time. They don't have to wait until one device has finished communicating for the other device to initiate communications.

Above mentioned devices use an existing and established network to operate on. In most cases, it would be a wireless network.

1.3 MOBILE SOFTWARE

Mobile software is the actual program that runs on the mobile hardware. It deals with the characteristics and requirements of mobile applications. This is the engine of the mobile device. In other terms, it is the operating system of the appliance. It's the essential component that operates the mobile device.

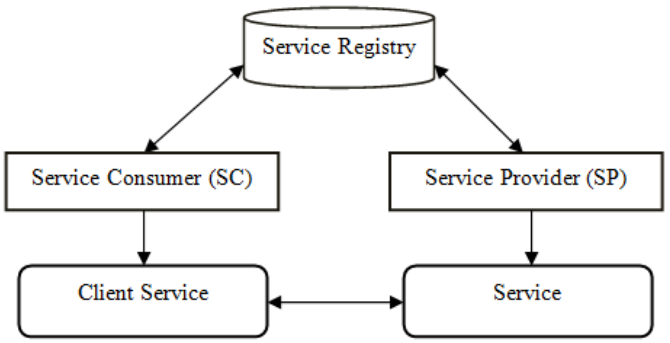
Since portability is the main factor, this type of computing ensures that users are not tied or pinned to a single physical location, but are able to operate from anywhere. It incorporates all aspects of wireless communications.

2. MOBILITY SERVICES

Mobility continues to be one of the most disruptive technologies in its impact and reach. Enterprises are constantly challenged to keep pace with accelerated proliferation of devices with multiple form factors on different platforms. Enterprises are finding it difficult to maximize the potential of mobility opportunities for consumer engagement, workplace solutions and partner engagement.

Mind tree with its integrated suite of service offerings defines, architects, implements and maintains mobility solutions.

We understand the importance of customer experience for any mobile solution and our team of user experience designers ensures our solutions deliver compelling and engaging experiences. Our solutions enable mobile users to efficiently create, share or consume relevant information on the move.



3. MOBILE TECHNOLOGY

Mobile technology is a form of technology that is mostly used in cellular communication and other related aspects. It uses a form of platform where by many transmitters have the ability to send data at the same time on a single channel. This platform is called Code-division multiple access (CDMA). This platform allows many users to make use of single frequencies because it restricts the likelihood of interference of frequencies from two or more sources. This channel has evolved over the years. The mobile technology is rapidly evolving; over the years, its uses are becoming diverse and is gradually replacing some similar sources in the market that are also used for communication e.g. post office and land lines. The mobile technology has improved from a simple device used for phone call and messaging into a multi-tasking device used for GPS navigation, internet browsing, gaming, instant messaging tool etc. Professionals argue with the trend that the future of computer technology is rest on wireless networking and mobile computing. Mobile technology through tablet and portable computers are becoming more and more popular.

Mobile technology was a mystery two decades ago but now, it has become something of necessity to both the rural and the urban areas. The mobile technology started as a remarkable achievement in the world of technology but now, it is transforming into user comfort technology due to its present diverse functionality. When the mobile was first introduced, it used to be basically for SMS, Calls and games. But it has presently transformed into a digital world and has made life and business much easier; marketers now have the ability to sell their products with ease through mobiles technology. The mobile has made it possible for users to transfer files and other files through Bluetooth and wifi. The mobile is also equipped

with internet connectivity, making it easy for the user to gain information and also to download files from the internet. Video call conferencing is another achievement that has come to reality through mobile technology. Business men and clients now have the channel to communicate even without seeing in person. With the use of mobile technology, it is now easy to catch up with every form of entertainment from the comfort of your home. It has also made it possible for one to easily locate places on the globe using the Global positioning system (GPS). Especially in the business world, the importance of mobile technology cannot be overemphasized; bankers depend solely on mobile technology on managing finances and stocks. Many business firms uses the mobile technology to increase their earnings through providing customers easiness to patronize their product through apps and websites. For example, the Cinema may create an app for ticket booking; railway travel tickets can be purchased from the internet without having to queue up to purchase it. The evolvement of mobile technology has made our life easier and also saves us time and resources.

4. MOBILE COMPUTING – CLASSIFICATION

Mobile computing is not only limited to mobile phones, but there are various gadgets available in the markets that are built on a platform to support mobile computing. They are usually classified in the following categories –

4.1 Personal Digital Assistant (PDA):

The main purpose of this device is to act as an electronic organizer or day planner that is portable, easy to use and capable of sharing information with your computer systems.

PDA is an extension of the PC, not a replacement. These systems are capable of sharing information with a computer system through a process or service known as synchronization. Both devices will access each other to check for changes or updates in the individual devices. The use of infrared and Bluetooth connections enables these devices to always be synchronized.

With PDA devices, a user can browse the internet, listen to audio clips, watch video clips, edit and modify office documents, and many more services.

The device has a stylus and a touch sensitive screen for input and output purposes.

4.2 Smartphones:

This kind of phone combines the features of a PDA with that of a mobile phone or camera phone. It has a superior edge over other kinds of mobile phones.

Smartphones have the capability to run multiple programs concurrently. These phones include high-resolution touch screens, web browsers that can access and properly display standard web pages rather than just mobile-optimized sites, and high-speed data access via Wi-Fi and high speed cellular broadband.

The most common mobile Operating Systems (OS) used by modern smartphones include Google's Android, Apple's iOS, Nokia's Symbian, RIM's BlackBerry OS, Samsung's Bada, Microsoft's Windows Phone, and embedded Linux distributions such as Maemo and MeeGo. Such operating systems can be installed on different phone models, and typically each device can receive multiple OS software updates over its lifetime.

4.3 Tablet PC and iPads:

This mobile device is larger than a mobile phone or a PDA and integrates into a touch screen and is operated using touch sensitive motions on the screen. They are often controlled by a pen or by the touch of a finger. They are usually in slate form and are light in weight. Examples would include ipads, Galaxy Tabs, Blackberry Playbooks etc.

They offer the same functionality as portable computers. They support mobile computing in a far superior way and have enormous processing horsepower. Users can edit and modify document files, access high speed internet, stream video and audio data, receive and send e-mails, attend/give lectures and presentations among its very many other functions. They have excellent screen resolution and clarity.

5. ADVANTAGES

Mobile computing has changed the complete landscape of our day-to-day life. Following are the major advantages of Mobile Computing –

5.1 Location Flexibility

This has enabled users to work from anywhere as long as there is a connection established. A user can work without being in a fixed position. Their mobility ensures that they are able to carry out numerous tasks at the same time and perform their stated jobs.

5.2 Saves Time

The time consumed or wasted while travelling from different locations or to the office and back, has been slashed. One can now access all the important documents and files over a secure channel or portal and work as if they were on their computer. It has enhanced telecommuting in many companies. It has also reduced unnecessary incurred expenses.

5.3 Enhanced Productivity

Users can work efficiently and effectively from whichever location they find comfortable. This in turn enhances their productivity level.

5.4 Ease of Research

Research has been made easier, since users earlier were required to go to the field and search for facts and feed them back into the system. It has also made it easier for field officers and researchers to collect and feed data from wherever they are without making unnecessary trips to and from the office to the field.

5.5 Entertainment

Video and audio recordings can now be streamed on-the-go using mobile computing. It's easy to access a wide variety of movies, educational and informative material. With the improvement and availability of high speed data connections at considerable cost, one is able to get all the entertainment they want as they browse the internet for streamed data. One is able to watch news, movies, and documentaries among other entertainment offers over the internet. This was not possible before mobile computing dawned on the computing world.

5.6 Streamlining of Business Processes

Business processes are now easily available through secured connections. Looking into security issues, adequate measures have been put in place to ensure authentication and authorization of the user accessing the services. Some business functions can be run over secure links and sharing of information between business partners can also take place. Meetings, seminars and other informative services can be conducted using video and voice conferencing. Travel time and expenditure is also considerably reduced.

6. SECURITY ISSUES

Mobile computing has its fair share of security concerns as any other technology. Due to its nomadic nature, it's not easy to monitor the proper usage. Users might have different intentions on how to utiAlize this privilege. Improper and unethical practices such as hacking, industrial espionage, pirating, online fraud and malicious destruction are some but few of the problems experienced by mobile computing.

Another big problem plaguing mobile computing is credential verification. As other users share username and passwords, it poses as a major threat to security. This being a very sensitive issue, most companies are very reluctant to implement mobile computing to the dangers of misrepresentation.

The problem of identity theft is very difficult to contain or eradicate. Issues with unauthorized access to data and information by hackers, is also an enormous problem. Outsiders gain access to steal vital data from companies, which is a major hindrance in rolling out mobile computing services.

No company wants to lay open their secrets to hackers and other intruders, who will in turn sell the valuable information to their competitors. It's also important to take the necessary precautions to minimize these threats from taking place. Some of those measures include –

- Hiring qualified personnel.
- Installing security hardware and software
- Educating the users on proper mobile computing ethics
- Auditing and developing sound, effective policies to govern mobile computing
- Enforcing proper access rights and permissions

These are just but a few ways to help deter possible threats to any company planning to offer mobile computing. Since information is vital, all possible measures should be evaluated and implemented for safeguard purposes.

In the absence of such measures, it's possible for exploits and other unknown threats to infiltrate and cause irrefutable harm. These may be in terms of reputation or financial penalties. In such cases, it's very easy to be misused in different unethical practices.

If these factors aren't properly worked on, it might be an avenue for constant threat. Various threats still exist in implementing this kind of technology.

7. CURRENT TRENDS

This chapter lists down the current mobile technologies starting from 3G technologies which is the hottest mobile technology available in the market.

7.1 3G

3G or third generation mobile telecommunications is a generation of standards for mobile phones and mobile telecommunication services fulfilling the International Mobile Telecommunications-2000 (IMT-2000) specifications by the International Telecommunication Union. Application services include wide-area wireless voice telephone, mobile Internet access, video calls and mobile TV, all in a mobile environment.

7.2 Global Positioning System (GPS)

The Global Positioning System (GPS) is a space-based satellite navigation system that provides location and time information in all weather, anywhere on or near the Earth, where there is an unobstructed line of sight to four or more GPS satellites. The GPS program provides critical capabilities to military, civil and commercial users around the world. In addition, GPS is the backbone for modernizing the global air traffic system, weather, and location services.

7.3 Long Term Evolution (LTE)

LTE is a standard for wireless communication of high-speed data for mobile phones and data terminals. It is based on the GSM/EDGE and UMTS/HSPA network technologies, increasing the capacity and speed using new modulation techniques. It is related with the implementation of fourth Generation (4G) technology.

7.4 WiMAX

WiMAX (Worldwide Interoperability for Microwave Access) is a wireless communications standard designed to provide 30 to 40 megabit-per-second data rates, with the latest update providing up to 1 Gbit/s for fixed stations. It is a part of a fourth generation or 4G wireless-communication technology. WiMAX far surpasses the 30-metre wireless range of a conventional Wi-Fi Local Area Network (LAN), offering a metropolitan area network with a signal radius of about 50 km. WiMAX offers data transfer rates that can be superior to conventional cable-modem and DSL connections, however, the bandwidth must be shared among

multiple users and thus yields lower speed in practice.

7.5 Near Field Communication

Near Field Communication (NFC) is a set of standards for smartphones and similar devices to establish radio communication with each other by touching them together or bringing them into close proximity, usually no more than a few centimeters. Present and anticipated applications include contactless transactions, data exchange, and simplified setup of more complex communications such as Wi-Fi. Communication is also possible between an NFC device and an unpowered NFC chip, called a "tag".

8. DISADVANTAGES

8.1 Quality of connectivity

As one of the disadvantages, mobile devices will need either WiFi connectivity or mobile network connectivity such as GPRS, 3G and in some countries even 4G connectivity that is why this is a disadvantage because if you are not near any of these connections your access to the internet is very limited.

8.2 Security concerns

Mobile VPNs are unsafe to connect to, and also syncing devices might also lead to security concerns. Accessing a WiFi network can also be risky because WPA and WEP security can be bypassed easily.

8.3 Power Consumption

Due to the use of batteries in these devices, these do not tend to last long, if in a situation where there is no source of power for charging then that will certainly be a letdown.

9. CONCLUSION

Today's computing has rapidly grown from being confined to a single location. With mobile computing, people can work from the comfort of any location they wish to as long as the connection and the security concerns are properly factored. In the same light, the presence of high speed connections has also promoted the use of mobile computing.

Being an ever growing and emerging technology, mobile computing will continue to be a core service in computing, and Information and Communications Technology.

10. RREFERENCE LINKS

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