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A Survey on Overview of Mobile Computing

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ABSTRACT: Mobile computing can be defined as "taking a computer and all necessary files and software to another level". It is the ability to use technology that is not connected to any static network. Mobile computing is human computer interaction which basically involves the following concepts; mobile communication, mobile hardware, and mobile software. It is a technology that allows transmission of data, voice and video using a computer without having to be connected to a fixed physical link, or any other wireless enabled device will work.

KEYWORDS: System Security, Health Hazards, Personal Digital Assistants, Mobile Computing Devices, Mobile Communication, Software and Hardware.

I. INTRODUCTION

Mobile cellular networks have been evolving over the decades significantly from the 1st generation (1G) voice only systems to current 4th (4G) generation networks, that are all IP based LTE-Advanced. The rapidly growing numbers of mobile devices and multimedia applications demand for direct connectivity means between users to unlade the infrastructure of a network operator, which is possible over a range of wireless technologies. The standard data rate and the system capacity have also been improved over the period of time and technology advancements in physical layer such as cloud radio access network (C-RAN) and HetNet. Besides, mobile data traffic keeps increasing as mobile devices are getting smarter in their computing and system capabilities, and new machine type devices appear such as wearable devices and sensors in addition to human type devices, which leads to massive M2M connections in the coming generation mobile networks.

II. RELATED WORK

A. What is Mobile Computing?

Any technology that enables people to access network services from anywhere, at anytime, in anyplace, is termed as Mobile Computing, that is, the user is free from the need to work at a specific location, in a specified time.

With Mobile computing, the need to be confined within one physical location at given time has been eradicated. For example, telecommuting, by which a person is able to work from home or the field but at the same time access resources as if he/she is in the office.

Mobile Computing=Mobile (moving) + Computing (using computer)

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B. Mobile Communication:

Mobile communication refers to communication using mobile phones and portable computing devices. A thorough infrastructure is laid out, to ensure that seamless and reliable communication goes on. Devices such as protocols, services, bandwidth, and portals necessary to facilitate and support the stated services are included. The data format can also be defined in this stage. The infrastructure is basically radio-wave-oriented, since the media is unguided or unbounded. Radio-wave-oriented implies the signals are carried over the air to intended devices, which are capable of receiving and sending similar signals.

C. Principles of Mobile Computing:

1. Connectivity- In mobile connectivity, the availability of network is expected at high level with minimum amount of downtime or lag. Because of this the mobility of the connected node will not be affected.

2. Portability- The mobile computing system should facilitate mobility for the device and nodes. Generally, these devices work on less power supply and less device capabilities, but it should have the ability to operate in movable environment by having sufficient processing capability and physical portability.

3. Individuality- The mobile network connected with portable devices is often denoted as an individual. The mobile computing system should be able to adapt the technology to suit individual needs and obtain contextual information of each mobile nodes.

4. Social individuality- The nodes which belongs to mobile computing system are connected with each other to communicate and collaborate through transaction of data. This communication is done within the same environment.

Fig. 1: Mobile Communication

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D. Mobile Hardware:

Hardware refers to a collection of physical components that constitute a system. Mobile hardware includes devices that sends, receives or accesses the service of mobility. There are various gadgets available in the market, other than just mobile phone, that is built on a platform to support mobile computing. Some of them are portable laptops, smart phones, tablet Pc's & iPods, Personal Digital Assistants. These devices use an obtainable and established network to operate on. The network can be agitated or wireless. These devices operate in full-duplex mode, by which they are capable of sending and receiving signals at the same time.

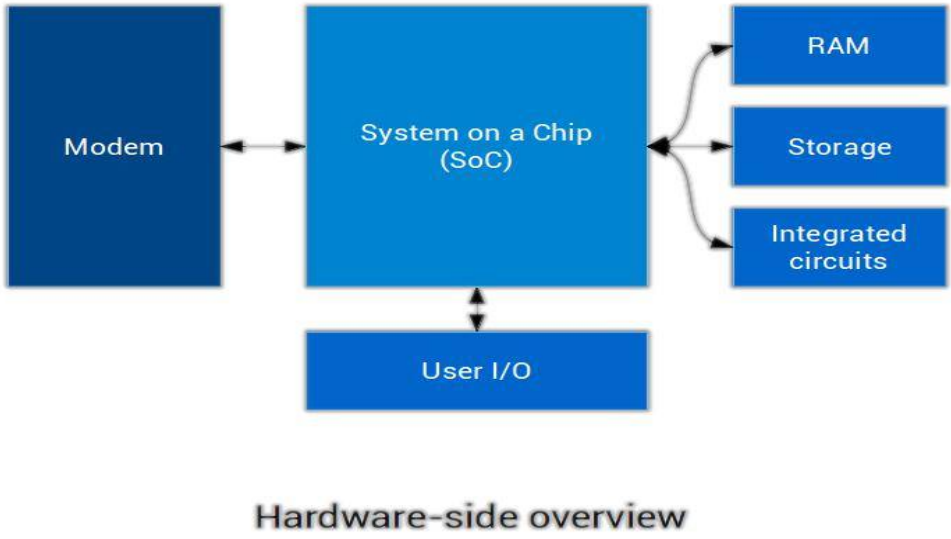

Fig.2: Hardwar-side overview of mobile hardware.

E. Mobile Software:

Software refers to a compilation of instructions that enable the user to interact with the system, or perform tasks. Mobile software is the authentic program that runs on the mobile hardware.

It is the engine of the mobile device. Without software, mobile computing cannot take place. In other words, it is the operating system of the appliance that operates the mobile device. An Operating System such as Android, iOS, Windows etc. works as an interface between the system and the user. The interface which is used here is Graphical User Interface (GUI).

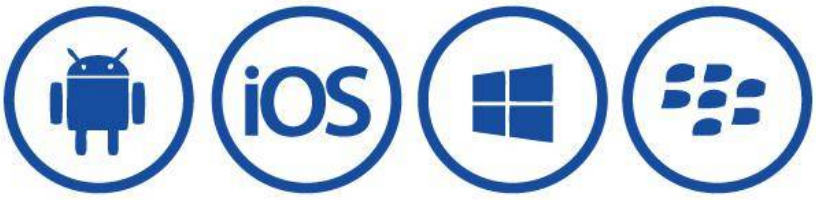

Fig.3: Operating systems (OS) of mobile computing devices.

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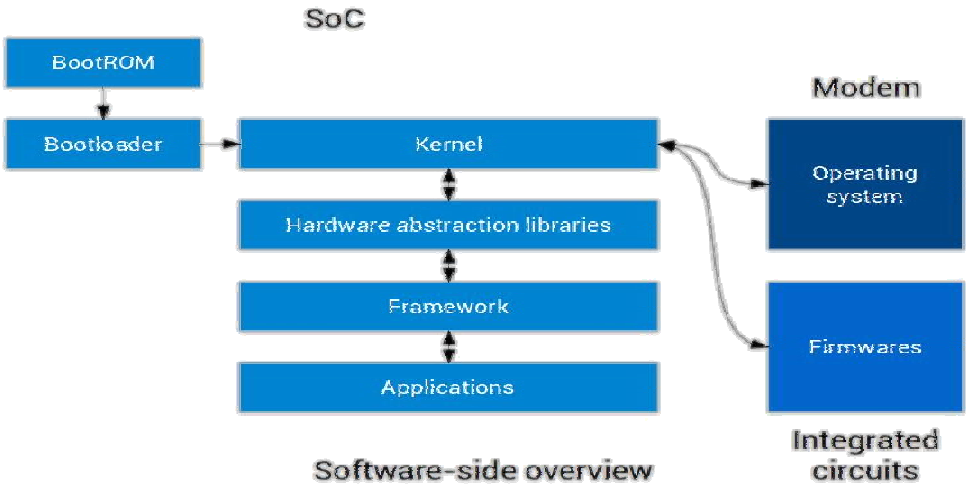

Fig.4: Software-sideoverview of mobile software.

F. Evolution of Mobile Computing:

In this current era of computer world, different kinds of technologies have come through and have grown enormously. These technologies support the existing computer networks all over the world. Mobile computing is basically all about portability and small computers, which also includes PDAs (Personal Digital Assistants) like mobile phones, laptops etc. Now to have a good mobile internet access, laptops and personal digital assistants (PDA) all have wireless cards and Bluetooth interfaces built into them. Mobile computing has evolved from two-way radios that had large antennas for communication to three inch personal computers that has the capability to do almost everything a regular computer does. This type of communication is a very powerful tool for personal use as well as business use. The technology has changed computing world tremendously from huge machines that were not efficient enough to do much more than word processing to tiny hand held devices that could do almost anything. It offers outstanding access to a greater wealth of knowledge and information and connects to people in any part of the world to share the knowledge and experiences. Some of the characteristics of mobile computing are as follows:

- Wireless devices.
- Enables calling facility to have conversations.
- Devices are easy to carry and work with even when you're on the move.
- Provides features like wireless LAN to access Internet from around the world.
- Provides voice and data transmission.
- Enables Video Calling.
- They have attractive user interface.

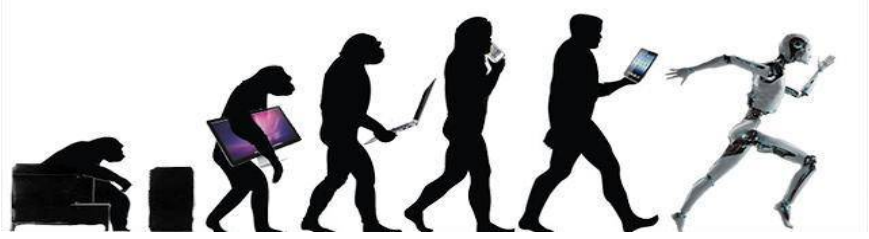

Fig.5: Mobile Computing Evolution.

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G. Mobile Computing Devices (MCD):

Mobile computing devices are generally modern-day handheld devices that have the hardware and software required to execute typical desktop and Web applications. Mobile computing devices have similar hardware and software components as those used in personal computers, such as processors, random memory and storage, Wi-Fi, and a base operating system. However, they differ from PCS in that they are built specifically for mobile architecture and to enable portability.

Among the common examples of mobile computing devices is a tablet PC, which has a built-in processor, memory and operating system (OS), and executes most applications built for a comparable PC.

Fig.6: Mobile computing devices.

H. Advantages of Mobile Computing:

- Portability & Flexibility: You are not restricted to one location in order for you to get jobs done or even access email on the go. 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.

- 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.

- Entertainment: Video and audio recordings can now be streamed on-the-go using mobile computing. 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.

- 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.

- Enhanced productivity: Users can work efficiently and effectively from whichever location they find comfortable. The mobile devices can be used out in the field of various companies, therefore reducing the time and cost for clients and themselves. This in turn enhances their productivity level.

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I. Limitations of Mobile Computing:

- Health hazards: People who use mobile devices while driving is often distracted from driving and are thus assumed more likely to be involved in traffic accidents. Cell phones may interfere with sensitive medical devices. Questions concerning mobile phone radiation and health have been raised.

- Quality of connectivity: It deals with Range and bandwidth: Mobile devices will need either Wi-Fi connectivity or mobile network connectivity such as GPRS and EDGE, and more recently HSDPA, HSUPA, 3G, 4G networks and also the upcoming 5G network. If you are not near any of these connections, your access of internet is very limited. Mobile Internet access is generally slower than direct cable connections.

- Security concerns: Security is a major concern while concerning the mobile computing standards. When working mobile, one is dependent on public networks, requiring careful use of VPN. Mobile VPNs are unsafe to connect to. One can easily attack the VPN through a huge number of networks interconnected through the line. Accessing a Wi-Fi network can also be risky because WPA and WEP security can be bypassed easily.

- Transmission interferences: Weather, terrain, and the range from the nearest signal point can all interfere with signal reception. Reception in tunnels, some buildings, and rural areas is often poor. It leads to bad or poor connectivity. This in turn limits the Mobile computing.

- Power consumption: Due to the use of batteries in these devices, these do not tend to last long. When there is no source of power available for charging, 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; otherwise it will certainly be a letdown.

J. Security Issues Related to Mobile Computing:

- Mobile security is very important as it involves personnel information stored in its memory.

- People use smart phones as communication tools but also as a means of planning and organizing their work.
- Sensitive information is stored in phones. Access should be controlled to protect the privacy of a user.

- All smart phones as computer are preferred targets of attacks. These attacks exploit weakness related to Smartphone that comes from data communication like SMS, MMS, Wi-Fi etc

- These are attacks which exploit software.
- Malicious software.

III. CONCLUSION

Mobile computing is an active area of research. Most applications available to users today are targeted at teenagers and are mostly infotainment applications, for example, music downloads, friend locators, news updates, online gaming, video conferences, social websites like facebook, instagram etc, which uses mobile computing technology. 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. The presence of high speed connections has promoted the use of mobile computing. Mobile computing is apt for everyone, especially for those people who do not want to spend their working day at a desk, and/or those who do not want to spend their leisure time slaved to a desktop PC. As seekers, consumers, processors, hoarders and communicators of information, every human being is already a form of mobile computer. Being

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

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