Lesson Proper for Week 8

Wireless and Mobile Computing

Today's rapidly expanding globe necessitates speedier communication. Technology advances at a breakneck pace and simplifies many tasks. The original ideas that sprang from the fertile minds of young scientists resulted in the growth of numerous methodologies, one of which is our current topic, 'MOBILE COMPUTING.'

"MOBILE COMPUTING" and "COMMUNICATIONS" constitute a significant portion of wireless communication technology. Mobile computing is defined as computing performed by users who are sporadically connected and have access to network resources. It necessitates the use of a wireless medium, such as cellular radio, radio networks, or low-orbit satellites. It features wireless adapters that connect portable computers to the cabled network via cellular telephone technology.

Mobile voice communication is widespread throughout the world and has seen a dramatic increase in the number of customers to various cellular networks in recent years. The capability to send and receive data across these cellular networks is an extension of this technology. This is the mobile computing principle.

Mobile data communication has developed into a critical and fast-expanding technology because it enables users to transport data between remote or permanent sites. This demonstrates to be the solution to the primary issue confronting business professionals on the move-mobility. The purpose of this work is to define the Mobility Services Architecture, which is a middleware stub that supports applications. Mobile computing has evolved over the last few years in response to decreasing portable devices and expanding wireless networks. It increases the usability of computers but introduces new difficulties.

The article discusses the approach, the wireless industry's challenges, and how J2SE is applied in this technology. The article finishes with a discussion of the advantages and disadvantages of mobile computing and its future.

Introduction

The smartphone is the most recognizable aspect of mobile computer technology. A little more than two decades ago, a handphone was large and utilized only for voice communication. It was just an extension of fixed-line telephony that enabled users to communicate with one another. The smartphone is now utilized for more than just voice communication; it may also be used to transmit text and multimedia communications. Not only will future mobile devices provide Internet access, but they will also support high-speed data services.

Apart from the smartphone, numerous other mobile gadgets such as personal digital assistants (PDAs) and pocket personal computers are now accessible (PCs). Mobile devices enable road warriors to obtain current information from the corporate database. A police officer on the scene of a crime may submit a fingerprint collected there to a central database for matching, resulting in faster identification and arrest of potential offenders. GPS is utilized in search and rescue missions, animal monitoring and conservation, and vehicle theft prevention. While many of us are oblivious of when we utilize mobile computer technology, it has invaded every part of our life.

What is the definition of mobile computing? Simply put, it is the utilization of wireless network infrastructure to provide communications and information access from any location, at any time. There are numerous facets to mobile computing, and they are sometimes referred to by different terms. This chapter discusses the benefits of mobile computing and how it enhances our quality of life. The subsequent chapters examine the wireless networks and technology that enable mobile computing applications.

Evolution of Wireless Networks and Services

The first generation (1G) wireless network was analog. The first in North America was the advanced mobile phone system (AMPS), which was based on frequency division multiple access. A total of 1664 channels were available in the 824 to 849 MHz and 869 to 894 MHz band, providing 832 downlinks (DL) and 832 uplinks (UL) channels. AMPS, widely used in North America, supports frequency reuse. The underlying network is a cellular network where a geographical region is divided into cells. A base station (BS) at the center of the cell transmits signals to and from users within the cell.

The second-generation (2G) systems onward are digital. Digital systems make possible an array of new services such as caller ID. The Global System for Mobile Communications (GSM) is a popular 2G system. GSM offers a data rate of 9.6 to 14.4 kbps. It supports international roaming, which means users may have access to wireless services even when traveling abroad. The most popular service offered by GSM is the Short Message Service (SMS), which allows users to send text messages up to 160 characters long.

2.5G systems support more than just voice communications. In addition to text messaging, 2.5G systems offer a data rate on the order of 100 kbps to support various data technologies, such as Internet access. Most 2.5G systems implement packet switching. The 2.5G systems help provide seamless transition technology between 2G and third-generation (3G) systems. The following are 2.5G systems:

High-Speed Circuit-Switched Data (HSCSD): Even though most 2.5G systems implement packet switching, HSCSD continues support for circuit-switched data. It offers a data rate of 115 kbps and is designed to enhance GSM networks. The access technology used is time division multiple access (TDMA). It provides support for Web browsing and file transfers.

General Packet Radio Service (GPRS): GPRS offers a data rate of 168 kbps. It enhances the performance and transmission speeds of GSM. GPRS provides always-on connectivity, which means users do not have to reconnect to the network for each transmission. Because there is a maximum of eight slots to transmit calls on one device, it allows more than one transmission at one time; for example, a voice call and an incoming text message can be handled simultaneously.

Enhanced Data Rates for GSM Evolution (EDGE): EDGE works in conjunction with GPRS and TDMA over GSM networks. Its offered data rate is 384 kbps. EDGE supports data communications while voice communications are supported using the technology on existing networks.

Third-generation (3G) wireless systems are designed to support high-bit rate telecommunications. 3G systems are designed to meet the requirements of multimedia applications and Internet services. The bit rate offered ranges from 144 kbps for full mobility applications, 384 kbps for limited mobility applications in macro-and microcellular environments, and 2 Mbps for low-mobility applications in micro-and Pico cellular environments. A very useful service provided by 3G systems is an emergency service with the ability to identify a user's location within 125 m 67% of the time. Figure 1.1 shows the evolution of wireless standards.