

普通高等教育
软件工程

“十二五”规划教材



工业和信息化普通高等教育
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12th Five-Year Plan Textbooks
of Software Engineering

软件工程 专业英语

郭晓红 谢红薇 ◎ 主编

宋晓涛 崔素花 金艳文 ◎ 副主编

*Software Engineering
Essentials*



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内 容 提 要

本书以计算机技术发展的新热点为主要内容,介绍了移动计算机、软件工程及其再工程、主存数据库、网络与安全、人工智能、大数据、移动互联网、物联网等知识。本书力求使读者在学习计算机专业英语的同时也能学到计算机发展的前沿知识,使读者的英语水平和专业知识水平共同得到提高,为今后的计算机职业生涯打下良好的基础。

本书既注重计算机基本概念的英文表述,又深入细致地讲解了计算机发展的新动向和新知识。每章内容循序渐进、难易适度,适合计算机与软件工程等相关专业的学生使用。

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前 言

在过去的 5 年里, 计算机领域发展最快的是广泛使用的移动计算技术。计算机技术以其极高的发展速度、强劲的渗透能力给人类的生活带来了前所未有的变化。计算机领域的专业人员需要不断更新自己的专业知识, 以适应计算机技术的高速发展。为了快速掌握最新技术, 计算机专业技术人员的英语水平必须不断提高。可以这么说: 英语水平的高低是决定计算机专业技术人员成就大小的因素之一。

本书旨在提高高等院校计算机与软件工程等相关专业大学生的专业英语能力, 让同学们在掌握专业英语的同时也接触到计算机发展的前沿新知识, 使同学们在语言和知识上双丰收。全书共 8 章, 每章由以下几部分组成。

(1) 能力要求——在每章的开始给出了本章的学习要求, 为读者提出了学习本章的目的和应该掌握的内容。

(2) 正文——本书所选内容主要是计算机发展的新技术, 每章都比较完整地讲解了当前计算机领域的一个议题, 具体内容有: 移动计算机、软件再工程、主存数据库、网络与安全、人工智能、大数据、移动互联网、物联网。

(3) 概念——每章都将涉及的一些基本概念以提问的方式一一列出。

(4) 术语——每章都将涉及的主要专业术语一一列出, 不仅有中文对应的术语, 而且有完整的英文定义。

(5) 补充阅读材料——每章都有 2~3 篇与本章主题相呼应的阅读材料, 目的是帮助读者进一步扩展知识面。

(6) 习题——题型包括选择题、判断题、填空题。

本书由多年从事计算机专业英语、软件工程专业外语和专门从事大学英语教学的教师共同编写。郭晓红、谢红薇担任本书的主编, 宋晓涛、崔素花、金艳文担任本书的副主编, 参与编写的还有强彦、马建芬、姚姗姗。其中, 第 1 章由郭晓红编写; 第 2 章和第 3 章由宋晓涛编写; 第 4 章由马建芬编写; 第 5 章和第 8 章由谢红薇编写; 第 6 章由姚姗姗编写; 第 7 章由强彦编写; 全书由郭晓红、谢红薇策划统

稿,由崔素花和金艳文进行英文的语法检查、译文在人民邮电出版社教育服务与资源网上可查。本书在编写过程中,得到了牛保宁老师等专家以及廖晓磊、赵鑫、麻书琴、张晓宇、管姝、张骞予、杨帆、孟欣等各位研究生的帮助和支持,在此表示衷心的感谢。

由于编者水平有限,书中难免存在错误和不妥之处,敬请各位读者提出宝贵的意见和建议,我们将不胜感激。

编者

2015年12月

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Chapter 1

Mobile Computers

Competencies

After reading this chapter, you should be able to:

1. Describe the types and the features of mobile computers.
2. Distinguish between mobile operating systems and mobile Apps.
3. Explain the two types of smartphones.
4. Describe ARM architecture and Android architecture.
5. Identify the four layers of Android architecture.
6. Describe the different types of mobile operating systems.
7. Discuss Android App Store: Google Play.

The most dramatic change in computer technology in the past five years has been the widespread use of mobile computers, such as tablets and smartphones. Many experts predict that the application of these mobile computers has just begun. Mobile computers are expected to greatly affect the way we communicate and use computer technology.

In this chapter, we present an overview of mobile computers, including their types, features, CPU architectures, operating systems, and Apps. It is essential to understand these basic concepts. Also, we describe smartphones, the most popular mobile computing devices in detail, like iPhone and Android phones. Lastly, we discuss the most widely used mobile operating system, Android OS, including its origin, architecture, and App store.

1.1 An Overview of Mobile Computers

A **mobile computer**, also known as a **mobile computing device**, is described as a small, lightweight, portable computer containing wireless Internet access. A mobile device without Internet access is not generally referred to as a mobile computing device.

1.1.1 Types of Mobile Computers

There are several types of mobile computing devices: notebook computers, tablet computers, hand-held computers, smartphones, phablets and application-specific mobile computers. For just a few of these devices, see Figure 1-1. Devices that are portable, but used while stationary, such as notebooks, are sometimes removed from the group of mobile computing devices as they cannot be used while in motion.



Figure1-1 Mobile computing devices

- **Notebook computers**, also called **laptops** or shortening **notebooks**, are small personal computers designed for portability. Usually, all of the hardware and interfaces

needed to operate one notebook, such as the graphics card, audio devices and USB ports, are built into a single unit. In the interests of saving power, weight and space, a laptop graphics card is in many cases integrated into the CPU or chipset and use system RAM, resulting in reduced graphics performance when compared to an equivalent **desktop computer**.

- A **tablet** is a type of portable PCs that de-emphasizes the use of traditional input devices, such as a mouse or a keyboard, by using a touchscreen display, which can be controlled by either a stylus pen or fingers. Some tablets may use a “hybrid” or “convertible” design, offering a keyboard that can either be removed as an attachment, or a screen that can be rotated and folded directly over top of the keyboard.

- **Handheld computers** also known as palm computers, are designed as very small devices to fit into the palm of one hand, which typically combine pen input, writing recognition, personal organizational tools, and communications capabilities. **Personal Digital Assistants (PDAs)** are the most widely used handheld computers. PDAs run the Microsoft Windows Mobile operating system and an alternative operating system like Linux.

- A **smartphone** is a mobile phone with an advanced mobile operating system which combines features of a personal computer operating system with other features useful for mobile and handheld uses. It typically combines the features of a cell phone with those of other popular mobile devices, such as a personal digital assistant (PDA), a media player and a GPS navigation unit.

- A **phablet** is a type of mobile devices designed to combine or straddle the form of a smartphone and a tablet. A phablet has a screen that measures diagonally 5.3-6.99 inches (135-178 mm), a size that complements screen-intensive activities such as mobile web browsing and multimedia viewing. In 2014, noting that phablets had overtaken laptops and desktops in global sales, The New York Times said “Phablets could become the dominant computing device of the future — the most popular kind of phone on the market, and perhaps the only computer many of us need.”

- **Application-specific mobile computers** include Portable Data Terminals, Wearable computers, and Carputers. **Portable Data Terminals**, or shortly PDTs, are electronic devices that are used to enter or retrieve data via wireless transmission (WLAN or WWAN). They can also serve as barcode readers in large stores, or be used in warehouses, hospitals, or in the field to access a database from a remote location. **Wearable computers**, also known

as body-borne computers or wearables, are miniature electronic devices that are worn by the bearer under, with or on top of clothing. If one is asked to give a simple, yet modern example for wearable technology, that will be the Nike system which allows you to track your time, distance, pace and calories via a sensor in the shoe. Another example can be the Google Glass which combine innovative displays with some novel gestural movements for interaction. **Carputers** or carPCs are tablet computers designed or modified specifically to be installed and run in cars. which include useful technologies like GPS and Bluetooth.

1.1.2 Features of Mobile Computers

Portability, small size, wireless communication, and touch interface are basic features of mobile computers.

- **Portability:** Mobile devices are defined by their ability to be moved frequently. Any mobile device should function and operate consistently while on the move, regardless of proximity to a power source or physical Internet connection. To aid in portability, mobile devices typically contain rechargeable batteries that allow several hours or more of operation without access to an external charger or power source.

- **Small Size:** Mobile devices are also known as handhelds and palmtops due to their roughly phone-like dimensions. A typical mobile device will fit in the average adult's hand or pocket. Some mobile devices may fold or slide from a compact, portable mode to a slightly larger size, revealing built-in keyboards or larger screens. Mobile devices make use of touch screens and small keypads to receive input, maintaining their small size and independence from external interface devices. The standard form of a mobile device allows the user to operate it with one hand, holding the device in the palm or fingers while executing its functions with the thumb.

- **Wireless Communication:** Mobile devices are typically capable of communication with other similar devices, with stationary computers and systems, with networks and portable phones. The devices are capable of accessing the Internet through Bluetooth or Wi-Fi networks. Since 2005, mobile computing devices have largely been manufactured with embedded wireless networking chips, allowing Internet access wherever a wireless Internet connection is available. Cellular telephones not equipped with wireless Internet access are not defined as mobile computing devices.

- **Touch Interface:** A key component among mobile devices is touch input. This allows the user to navigate easily and type with a virtual keyboard on the screen. The system must respond to touches rather than clicks of a keyboard or a mouse, which allows integrated hand-eye operation, a natural use of the somatosensory system. This is even more true of the recent multi-touch interface, which often emulate the way objects behave.

1.1.3 CPU Architectures of Mobile Computers

Two major CPU architectures that dominate the mobile computers market are ARM Holdings' ARM architecture and Intel's x86 architecture. Figure 1-2 shows a Samsung 1 GHz ARM CORTEX-A8 processor and an Intel x86 processor.

Intel's x86 architecture, including x86-64, has powered the IBM and its compatible PCs since 1981 and Apple's Macintosh computers since 2006. The CPU architecture has been incorporated into tablet PCs over the years and generally offers greater performance along with the ability to run full versions of Microsoft Windows, including Windows desktop and enterprise applications. Intel announced plans to enter the tablet market with its Atom in 2010. In October 2013, Intel's foundry operation announced plans to build FPGA-based quad cores for ARM and x86 processors.

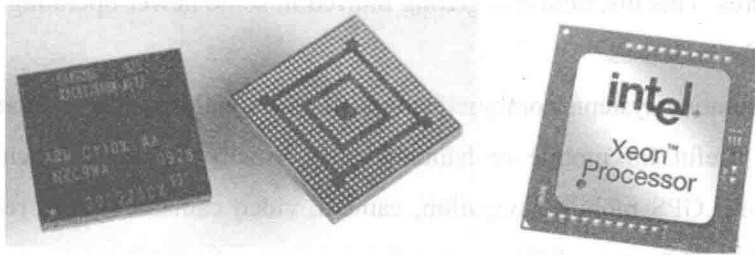


Figure 1-2 Samsung 1GHz ARM CORTEX-A8 processor and Intel x86 processor

ARM has been chosen as the CPU architecture by manufacturers of smartphones (95% ARM), PDAs, digital cameras (80% ARM), set-top boxes, DSL routers, smart televisions (70% ARM), and tablet computers (95% ARM). This dominance began with the release of the mobile-focused and comparatively power-efficient 32-bit ARM6 10 processor originally designed for the Apple Newton (Apple's PDA) and Acorn A4

(a laptop computer called A4 is introduced by Acorn) in 1993. The chip was adopted by Psion, Palm and Nokia for PDAs and later smartphones, camera phones, cameras, etc. ARM's licensing model supported this success by allowing device manufacturers to license, alter and fabricate custom SoC (System on a Chip) derivatives tailored to their own products. This has helped manufacturers extend battery life and shrink component count along with the size of devices.

The multiple licensees ensured that multiple fabricators could supply near-identical products, while encouraging price competition. This forced unit prices down. The ARM architecture has historically had limited support from Microsoft, with only Windows CE available, but with the 2012 release of Windows 8, Microsoft announced additional support for the architecture, shipping their own ARM-based tablet computer, branded the Microsoft Surface, as well as an x86-64 Intel Core i5 variant branded as Microsoft Surface Pro.

1.1.4 Mobile Operating Systems

A mobile operating system is an operating system (OS) for smartphones, tablets, PDAs, or other mobile devices. While computers such as the typical laptop are mobile, the operating systems usually used on them are not considered mobile ones as they were originally designed for bigger stationary desktop computers that historically did not have or need specific "mobile" features. This distinction is getting blurred in some newer operating systems that are hybrids made for both uses.

Mobile operating systems combine features of a personal computer operating system with other features useful for mobile or handheld use, usually including touchscreen, cellular, Bluetooth, Wi-Fi, GPS mobile navigation, camera, video camera, speech recognition, voice recorder, music player, near field communication and infrared blaster, most of which are considered essential in modern mobile systems.

1. Android OS

Android is a mobile operating system (OS) currently developed by Google, based on the Linux kernel and designed primarily for touch screen mobile devices such as smartphones and tablets. There are many worldwide companies that use Android OS for their mobile devices, for example, Samsung's Galaxy products in South Korea, Huawei and

Xiaomi's in China and many more other brands in the world. We will describe Android OS in detail later in this chapter. In fact, Android OS is the most popular operating system for mobile computers, and shares more than 50% worldwide market, while Android is currently not popular for regular PCs. Android is free and open-source software, and a large amount of proprietary software is bundled with it, such as Google Play Store, Google Search, Google Play Services, Google Music, and so on.

Android's releases prior to 2.0 (1.0, 1.5, 1.6) were used exclusively on mobile phones. Android 2.x releases were mostly used for mobile phones but also for some tablets. Android 3.0 was a tablet-oriented release and does not officially run on mobile phones. The current Android version is 5.0.

2. iOS

iOS is from Apple Inc. and has the second largest installed base worldwide on smartphones, but the largest profits, due to aggressive price competition between Android-based manufacturers. It is closed source and proprietary and built on open source Darwin core OS. The Apple iPhone, iPod Touch, iPad and second-generation of Apple TV all use iOS, which is derived from Apple's desktop PC's OS X.

Native third party applications were not officially supported until the release of iOS 2.0 in 2008. Before this, "jailbreaking" allowed third party applications to be installed, and this method is still available. Currently all iOS devices are developed by Apple and manufactured by Foxconn or another of Apple's partners. By the end of 2014, iOS global market share was 14.8%. iOS has many powerful features. For example, we can use Safari to browse the web, and use the iTunes Store to add music, movies, TV shows, etc. to iPhone or iPad. Also we can use the App Store to browse, purchase, and download apps, or we can get books from the iBooks Store. Current iOS's version is iOS 9.2.

3. Windows Phone

Windows Phone (WP) is a family of mobile operating systems developed by Microsoft for smartphones as the replacement successor to Windows Mobile. Windows Phone features a new user interface derived from Metro design language. Unlike Windows Mobile, it is primarily aimed at the consumer market rather than the enterprise market. Windows Phone is closed source and proprietary, and it has third largest installed base on smartphones behind Android and iOS. Windows Phone devices are made primarily by Nokia, along

with HTC, and Samsung.

4. BlackBerry

BlackBerry 10 is a mobile operating system from BlackBerry. It is closed source and proprietary. It is used mostly by government employees. All phones and tablets are manufactured by BlackBerry itself. Once one of the dominant platforms in the world, its global market share had been reduced to 0.4% by the end of 2014.

1.1.5 Mobile Apps

The term “app” is a shortening of the term “application software” and now it has become very popular. In 2009, technology columnist David Pogue said that newer smartphones could be nicknamed “app phones” to distinguish them from earlier less-sophisticated smartphones. In 2010 the term “app” was listed as “Word of the Year” by the American Dialect Society.

A mobile app is a computer program designed to run on mobile devices such as smartphones and tablet computers. Most mobile devices are sold with several apps included as pre-installed software, such as a web browser, e-mail client, calendar, mapping program, and an app for buying music or other media or more apps. Some pre-installed apps can be removed by an ordinary uninstall process, thus leaving more storage space for desired ones. When the software does not allow this, some devices can be rooted to eliminate the undesired apps.

Apps that are not pre-installed are usually available through application distribution platforms, which began appearing in 2008 and are typically operated by the owner of the mobile operating system, such as the Apple App Store, Google Play, Windows Phone Store, and BlackBerry App World. Some apps are free, while others must be bought. Usually, they are downloaded from the platform to a target device, but sometimes they can be downloaded to laptops or desktop computers. For apps with a price, generally a percentage, 20-30%, goes to the distribution provider (such as iTunes), and the rest goes to the producer of the app. The same app can therefore cost the average smartphone user a different price depending on whether they use iPhone, Android, or BlackBerry 10 devices.