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Mobile Linux

This chapter introduces mobile computing in the context of the evolution of different computer types. More important, it presents reasons why developing mobile applications with Linux and Ubuntu makes economic and technical good sense.

More than three-quarters of the expert respondents (77%) agreed . . . that the mobile computing device — with more significant computing power in 2020 — will be the primary Internet communications platform for a majority of people across the world.

Pew Internet & American Life Project, The Future of the Internet III,
December 14, 2008

Going Mobile

Since the first computers were created, there has been a constant push for smaller, faster, cheaper systems that provide more personal power. In December 2008, quarterly laptop sales outnumbered desktop computer sales for the first time ever. Netbook computers — smaller than laptops, with a price performance profile that took the market by storm — were the unexpected hit of 2008. Consider the following statistics: International Data Corp (IDC) estimates 20.6 million netbooks will ship in 2009 (compared to 137 million full-sized laptops). ABI Research says that number could reach 35 million in 2009 and 139 million in 2013. Ultra Mobile PCs (UMPCs) seem to be trickling along at one or two million. Mobile Internet Devices (MIDs) are projected to see a healthy jump in sales, with some estimates placing sales at nearly 6 million in 2009 and triple that in 2010 — not yet the runaway success of netbooks, but still substantial in comparison to smartphones.As demand for mobile solutions has grown, Linux and Ubuntu have improved. Today's mobile markets — for both end-users, and vendors who look to bundle an operating system with their hardware — align well with Linux and Ubuntu.

Let's take a quick look at how these markets and technologies evolved, and why Linux and Ubuntu are primed to deliver mobile solutions.

A Short History: From Big Iron to Mighty Mouse

The Harvard Mark I computer that's shown in Figure 1-1 was 51 feet long and 8 feet high. It first booted up in 1944 in order to multiply, divide, do logarithms, and process trigonometric functions. This system was widely viewed as the beginning of the modern computer era. Imagine, a computer that could do only five multiplication problems and two division problems a minute! Logarithmic processing was a good time to go out for a coffee break.
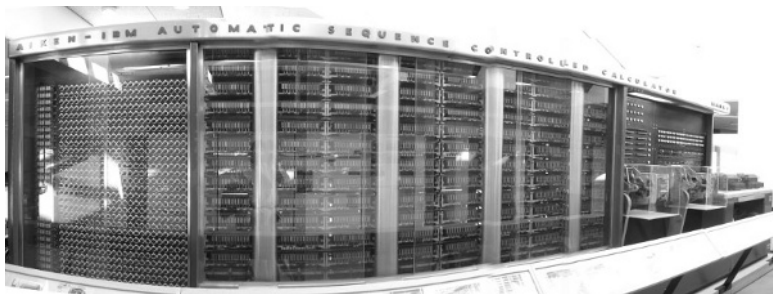
Figure 1-1

Since that time, there has been an incredible evolution of computing technology following the steady path of Moore's Law, which is shown in Figure 1-2.
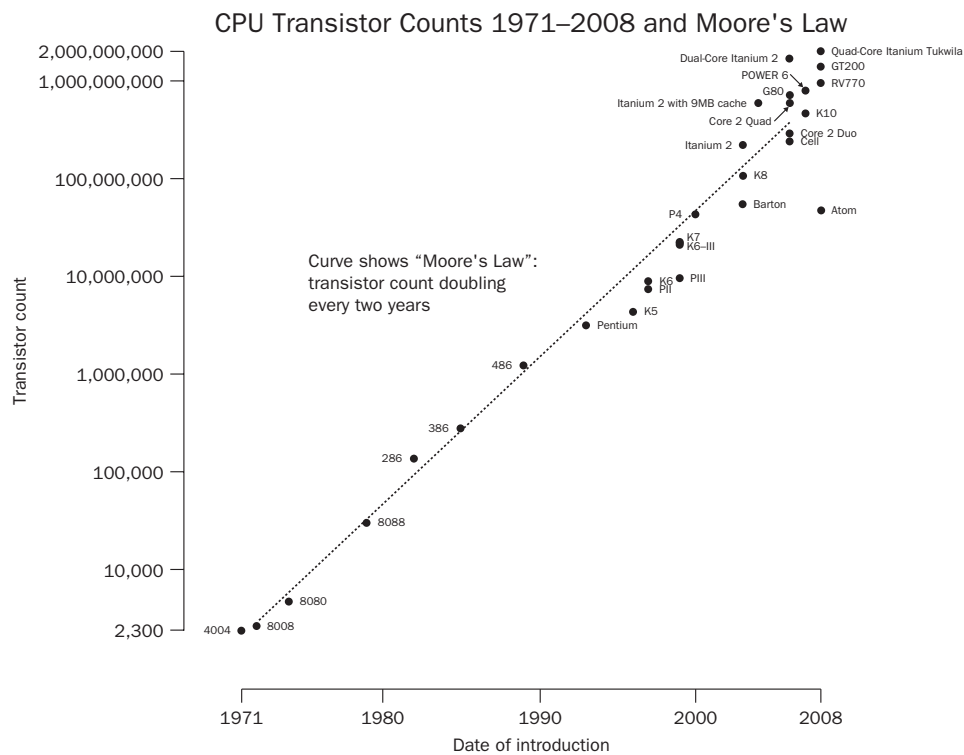
Figure 1-2

The major eras in computer technology can be classified as follows:

> **1960s —** Mainframes ("Big Iron") and minicomputers (multiuser, interactive)
>
> **1970s —** Personal/desktop computer: microprocessor-driven, installable applications
>
> **1980s —** Luggables: moveable computers, weighing 15–30 pounds
>
> **1990s —** Laptops followed by slimmed down notebooks: 14-inch screen or larger
>
> **2000s —** Subnotebooks: 12–13-inch screen, Portable Media Players (for example, iPod)
>
> **2007–2010 —** Netbooks: 7–10.2-inch screen; Mobile Internet Devices (MIDs): 4–7-inch screen

The year 2000 marked the beginning of the cell phone and smart device era. The Nokia 9210 Communicator and RIM Blackberry hit the market with compact offerings that were phones but also much more. They weren't general purpose computers, but you might have gotten the sense that that's what they wanted to be when they grew up.

Changing Focus

Two of the defining characteristics in the evolution of computers have been physical and display size. These defining attributes influence user interactions as well as developer strategies and solutions.

Apple opened the door on the smallest consumer-oriented computing segment with its insanely successful introduction of iPods in October 2001. The first iPod was a computer stick the size of a small pack of gum. Consumer electronics have a tendency to get smarter through the magic of software and soon the iPod line represented complete media devices.

In January 2007, Apple completely blew the roof off this segment by introducing the iPhone. Later in the year, the iPod Touch was introduced. These portable electronic devices had powerful operating systems under the hood — variants of OS X specially made for the hardware. Elegantly packaged, with WiFi, and high-resolution touchscreens, they now ran applications like those on notebook computers. Apple was effectively shipping what would come to be called a Mobile Internet Device (MID).

Loyal Apple customers stood in long lines to snap up the first shipped products. International customers paid huge premiums for early shipments. Enthusiastic developers created thousands of new applications . . . even though it initially seemed as though Apple didn't want them to. An ecosystem of telephone carriers, music providers, and accessory makers helped grow the market.

Apple sold an astounding number of iPods — more than 173 million of these very mobile gadgets by September 2008. You've seen them everywhere — on trains, planes, and buses, and in gyms, schools, office buildings, and sports venues. (Goodness, I have one friend who owns nine of these things!)

When Apple introduced the Macintosh in 1984, they wrote the bible of good human interface design. In releasing the iPhone and iPod Touch, Apple rewrote the book on user interface design for small mobile computers. The iPhone redefined what was possible for small computer packaging. Consider the specs: 3.5-inch diagonal multi-touch display (480×320 pixel resolution at 163 ppi), less than 5 ounces, in slim packaging.

It didn't take long for thousands of developers to build creative, high-quality applications for the iPhone and iPod Touch platform. The 2.0 generation of Apple's software (and SDK) generated tremendous developer excitement. In March 2008, Apple announced a beta program for the iPhone 2.0 SDK — the ease of use of the development platform, and the impressive application results drove 25,000 developers to try and get in on the beta. Apple managed to share all their SDK APIs widely across product lines — the iPhone SDK has great commonality across the OS X kernel. On June 9, 2008, Apple announced a record number of 5,200 developers at their Worldwide Developer Conference — the first sellout in 25 years of the event.

Customers bought and installed software by the millions. In the first six months of operation (from July 11, 2008 to January 18, 2009) the App Store saw 500 million downloads from its catalog of 15,000 applications. Apple created a mobile user interface that broke new ground, offering numerous examples and lessons to Linux and Ubuntu Mobile developers.

Turning Points

The financial crisis that began in September 2008 tripped up economies around the world. Big software companies, leading hardware manufacturers, and dominant component manufacturers were all affected. At the beginning of 2009, the mobile phone business began to slow down. *TechCrunch* reported that the "top five cell phone manufacturers (Nokia, Samsung, LG, Sony Ericsson, and Motorola) dropped 13 percent year-over-year in the fourth quarter of 2008. Unit shipments decelerated from 14 percent growth in the second quarter to 2 percent growth in the third quarter, and then finally went into negative territory in the fourth quarter." The article's author asked, "Are cell phones no longer a growth business?"

Even Apple's idyllic iPhone fell off the selling cliff. Apple sold 6.9 million units in the September 2008 quarter, but that fell by more than 25 percent to 4.4 million in the December quarter. At the same time, RIM made a big-splash introduction — backed by a $100 million marketing campaign — of its highly anticipated BlackBerry Storm. It was judged by many observers to be a relative flop compared to the iPhone introduction: Blackberry sold a half-million units in the first month.

Cell phones and laptops dominated tech talk in the first five years of the twenty-first century, but it could be a very different picture over the course of the next decade. The same day those declines in cell phone sales were being reported, a lead story in *BusinessWeek* rallied excitement around a promising area of growth: "Intel Readies Push into Mobile Internet Devices."

While phones were getting put on hold, notebook (and mobile computer) sales were rising. The December 2008 *Wall Street Journal* reported quarterly sales of notebook computers exceeded that of desktop sales for the first time ever:

> World-wide shipments of notebook computers rose nearly 40% from last year to 38.6 million units as desktop shipments fell 1.3% to 38.5 million units.

Another bright light in the numbers was the brand new category of netbook computers:

> *In the first months of 2008, netbooks were less than two percent of laptop sales. By December, that had shot up to 12 percent of total unit volume — and accounted for almost two-thirds of the sales increase in the entire laptop category.*

The *Financial Times* put some numbers to that early in 2009 when they sized up the market:

> *Netbook sales have grown from about 350,000 units in 2007, when Asustek introduced its first models, to 10m in 2008. The CEA predicts unit sales will rise 80 percent to 18m in 2009, in spite of the global downturn.*

Ubuntu and Linux are right in the middle of a burgeoning mobile marketplace. And there are numerous developer opportunities ahead.

The Generational Divide

If you have any doubt about the promise of Ubuntu as an operating system, or the likelihood that it will gain a significant market presence in the future, you may find this short story of interest.

Sometimes people evaluate a computer's ease of use by asking: "Is it easy enough for your grandmother to use?" A better question is this: "Is it easy enough for a 15-year-old to use?" I love my grandmother dearly, but even if she did have an interest in computers, I doubt big business would be wise in building a five-year business plan around her particular usage scenarios. On the other hand, a 15-year-old typically has the interest and the need, and presents an attractive lifetime value proposition.

My 15-year-old son came to me one evening carrying his Windows-powered notebook. "Hey, Dad, can you take a look at this and help me get WiFi working?" I anticipated what had happened with his sister's notebook — it was time for another Windows reinstallation.

He turned the laptop around to show me the screen and what I saw was shocking: the Ubuntu desktop.

"I installed Ubuntu," he said. "Wow, the browser is super fast when I plug in the Ethernet. Now I remember what the Internet was like." He'd been fighting the gradually degrading performance of his Windows Vista installation for weeks now and finally just decided to fix it.

His notebook was just a year old — with plenty of horsepower and a price tag that pushed it over $1,000. It had all the latest technologies — WiFi card, hard disk, a nice screen. But it had slowed noticeably and inexplicably. My gut reaction was to reinstall Windows for him. I made the offer despite the dread I felt anticipating a multi-day effort to get Windows working again. Chasing down drivers for Windows is no fun.

"What happened?" I asked. "I can reinstall Windows for you."

"No need for Windows," he said. "Ubuntu is fine. It has a word processor. I don't need any of my old files. Vista had gotten so slow I just couldn't use it. Last night I was trying to use Dictionary.com and it never worked. I had to go to the downstairs computer to look up a word. It would have been faster to use a printed dictionary. That was the moment I decided to install Ubuntu. I used the CD you left lying around. No problems."

I was flabbergasted. I'm not sure what shocked me more — that he had installed Ubuntu by himself without assistance, or that he had installed it without letting me know in advance.

He continued, "Vista had gotten so slow it would take like 30 minutes to start up. I had disabled all the Vista applications that run at startup, but that didn't help. I resorted to leaving the system running all the time to avoid the delay in restarting."

Just like that — he'd made the switch. No regrets. No remorse. No difficult separation. He just wanted a better, quicker, more reliable system. And he knew where to find a free alternative.

If Windows Vista were to lose the teenage marketplace, it would certainly be in *real* trouble. On the other hand, if Ubuntu starts winning the 15-year-old customer segment, it will be in really good shape.

Netbooks, Linux, and Ubuntu

The ASUS Eee PC shipped in September 2007. It was in instant hit. Small, light, and inexpensive (under $300), it ran Xandros Linux as well as Windows XP. After Intel's Atom processor was released in 2008, the Eee PC switched to Atom — an energy efficient chip with a well known, powerful instruction set.

An entirely new classification of computer had been born — the netbook. Other vendors soon followed with their own offerings: HP Mini-Note, MSI Win, Acer Aspire One, Dell Inspiron Mini 9, and the Lenovo IdeaPad S10 were offered in varying configurations. The Information Network estimates that "11.4 million netbooks were sold in 2008, up from 400,000 in 2007." For 2009, the firm estimates that netbook sales will grow 189 percent to 21.5 million. Meanwhile, the firm estimates that 145.9 million notebooks were sold in 2008 and projects that number will grow 21.8 percent in 2009 to 177.7 million. Other projections suggest a day when these small form factor computers will outsell notebooks. According to a LinuxDevices report, ABI Research predicted that "35 million netbooks will ship this year, rising to 139 million in 2013.

I watched as the Eee PC became a cult hit through December 2007 and into 2008. Eventually, I bought an Acer Aspire running the new Intel Atom chip. ("By 2010, Atom will be competitive in every aspect of mobile computing," according to Intel's Senior Vice President Pat Gelsinger.)

This little Acer included a solid state drive in a slim, durable, nice looking package. It seemed like a wonderfully mobile computer. In Figure 1-3, you can see the relative size of the Acer Aspire One compared to a T-Mobile smartphone, iPod Touch, and Compal MID — all sitting atop a Dell Inspiron notebook computer.

Figure 1-3

The Aspire One came installed with a customized operating environment built on top of Linux. Since August 1991, when Linus Torvalds uploaded his first few modules for his new operating system to Usenet, Linux has been evolving into a robust, state-of-the-art operating kernel.

> *Most operating system distributions that are based on the Linux kernel are basically modified versions of the GNU operating system.*

In addition to providing a strong software foundation for distributions, Linux is like the Swiss Army Knife of software. (I've used it several times to recover files from computers that were running Windows but had become corrupted and could no longer boot.) It's been ported to a large number of hardware platforms and increasingly, vendors are developing their hardware drivers for open source and Linux.

Thousands of Linux-based distributions are available — but I decided to install Ubuntu. The resulting system provides a full Internet and computing experience.

Why Ubuntu? Quality, reliability, and widespread adoption are a few good reasons. Ubuntu and Debian were the first two distros I began working with in 2005, and I have stuck with them.

Month after month Ubuntu has been at or near the top of the DistroWatch list of Linux distributions. Moreover, there is a great developer community. The healthy (and wealthy) coordination by Canonical provides stability and important direction. Early in 2009, the *New York Times* profiled Canonical's founder and Ubuntu visionary, Mark Shuttleworth:

> *Created just over four years ago, Ubuntu (pronounced oo-BOON-too) has emerged as the fastest-growing and most celebrated version of the Linux operating system, which competes with Windows primarily through its low, low price: $0.*
>
> *More than 10 million people are estimated to run Ubuntu today, and they represent a threat to Microsoft's hegemony in developed countries and perhaps even more so in those regions catching up to the technology revolution.*
>
> *'If we're successful, we would fundamentally change the operating system market,'*
> *Mr. Shuttleworth said during a break at the gathering, the Ubuntu Developer Summit. 'Microsoft would need to adapt, and I don't think that would be unhealthy.'*

It's easy to grab and go with a netbook. And whatever I can do on a desktop PC, I can do on this device — not as fast, but for many things it works just fine. As a result, a netbook running Ubuntu becomes an entirely new platform to develop for, but it is a very familiar platform. Yet the range of application possibilities is vastly greater because of all the different dimensions added by mobility.

So why not start developing for this category of mobile computer, using Linux and Ubuntu? If you do, you'll be in good company. Consider what Linus Torvalds had to say early in 2009:

> *It's a huge job to do a distribution. The reason there are hundreds is it is easy to start your own, but if you want to be a leader and introduce new code, the testing and Q&A involved is enormous. It depends on having enough users that you get coverage and it is unreasonable to expect too many large distributions. Ubuntu grew surprisingly quickly and maybe that can happen again . . . .*
>
> *I was doing kernel development on a netbook and it was not at all horrible. The screen was too small, but we are getting to a stage where you can get a cheap good laptop.*
>
> *A few years ago you could get a small netbook but it would be twice the cost. The netbook market changed the game — they are not seen as an executive toy, but a low-end laptop which is much healthier.*
>
> *With netbooks a lot of the desktops have trouble going to smaller screens. All of a sudden you can't press the okay button because it's outside the screen. As screens go as small as phones, Google's Android could be a contender for netbooks so you may see Android growing up instead of desktops growing down.*
>
> *We are in the first phase of netbooks and there are some teething problems. The dumbed-down interface was a teething problem and the first netbooks were underpowered.*

A Giant's Strength in a Dwarf's Arm

During World War II, one of the greatest scientific innovations involved radar. The British had developed crucial underlying technologies and fundamental understanding of microwave physics, far beyond what scientists in the United States had discovered. One of the British inventions was something called a *cavity*

magnetron. This device led to the successful development of a light, compact, mobile device that was used in an airborne radar system that was 100 times more powerful than anything that had come before it. The British shared that with the United States. When one of the American military officers saw it for the first time, and fully comprehended what it could be used for, he described the device as having "a giant's strength in a dwarf's arm."

This invention had a huge impact on tactics, strategies, and outcomes. This single piece of powerful, yet mobile technology might even have changed the outcome of the war effort.

Small, powerful, energy efficient processors, such as Intel's Atom and now ARM, are being coupled with versatile software environments, such as Ubuntu and Linux, to create unimagined new futures. These highly mobile systems pack a "giant's strength in a dwarf's arm" — and they are now available to millions of users.

Summary

By reading this book, you're at the front lines of exciting new developments along the Mobile Linux frontier. Your development efforts will be creating the future and a new generation of improvements.