Wanted: Programmers for Handheld Devices

Don Kiely

The pace of change in computer technology can be breathtaking. Frequently, this makes it difficult for programmers to maintain skills that are in demand. Nowhere is this more apparent than in one of the newest and most dynamic segments of the computer industry: handheld devices and wireless technology.

The use of handheld devices is growing rapidly, as is the demand for applications that run on smart phones and personal digital assistants.

As Figure 1 shows, IDC, a market research firm, projects that the worldwide annual shipment of intelligent handheld devices will grow from about 20 million in 2001 to about 62 million by 2004.

However, programming for these devices—which have limited processing power and memory, as well as tiny screens—is different than developing applications for PCs or servers. Very few programmers have much experience with these devices, particularly in the US, where handheld technology adoption has been slower than in Europe. This is creating a challenge for vendors looking for developers to write mobile applications.

Companies must work hard and be creative to find programmers who can become productive quickly in the handheld environment. And in some cases, developers are carefully selecting projects to most efficiently allocate their limited programming resources.

This type of problem often occurs with new technologies, said Andy Pineda, vice president of marketing and product strategy at mvion, a wireless-infrastructure software vendor. "I remember when the desktop computer first came out. At that time there were a bunch of Cobol programmers running mainframe data. The desktop systems required a whole new set of skills. It took a while to get people who were really experienced on desktops."

"I see the same thing happening on small devices," he said, "but it's even more complex because there are so many of them. It's going to take a while to meet the demand."

DRIVING DEMAND

The growing number of wireless devices, the increasing and changing functionality of the machines and their applications, and programmers' lack of experience in the new technology are all driving the rapidly rising demand for wireless programmers.

Gary Young, director of technologies for PhoneOnline, a professional-services company that sells a mobile-application framework and engine, said, "The wireless market has slowed down over the last couple of months, [along with] the economy in general. As it starts back up this year, it's going to amplify the shortage."

Currently, most wireless devices are used for their e-mail, messaging, and personal-information-management (calendar and address-book) applications. As devices and wireless networks become more powerful, they will run rich multimedia and graphics applications, said Jim Mann, Compaq Computer's director of engineering for wireless Internet solutions.

In addition, said Kenneth Morse, president and CEO of Ilium Software, wireless devices will give workers access to corporate data previously available only via networked PCs.

Vendors will need programmers to develop these new applications.

Moreover, as organizations increasingly use wireless technology, they want to perform in-house development, adding to the demand for handheld programmers.

Also, said Lisa Hammitt, CEO and cofounder of software vendor Black Pearl, her company needs more handheld programmers to respond to the many customer requests for help in setting up device-server interfaces.

Programming challenges

Programming is considerably different for handheld devices than for PCs, workstations, and servers. Companies thus cannot immediately use experienced desktop programmers for handheld-application development.

Ilium's Morse said, "On desktops, memory is huge, there are huge disk drives, so it's not so critical to squeeze every byte you can out of an application. But most handheld devices have fairly limited memory and no disk-drive storage. Therefore, whatever space your application takes up takes away from your data space."

While desktop machines commonly have from 64 to 128 Mbytes of memory, handheld devices typically have from 4 to 16 Mbytes. Even the largest devices, such as the Compaq iPAQ, have only 32 Mbytes. And some may have just a few Kbytes.

Because of limited memory and screen

size, handhelds also require different user interfaces than PCs. "The presentation has to get your idea across in a very small form factor," said Kristopher Tyra of HiddenMind, which develops back-end systems for wireless communications.

Moreover, users interact differently with handheld devices than with desktop machines.

"You have to pay attention to the input/output," said Compaq's Mann. "Am I going to require the user to type on a keyboard, are they going to have to write with a stylus, or is it a voice recognition system?"

In general, said Kevin Havre, Hewlett-Packard's technical marketing manager for handheld products, "The applications I've seen that work well on these devices are [developed] by people who have a sense for how to make the user experience a simple affair."

However, vendors say, these programmers are not easy to find.

Platform-based shortages

The supply of qualified handheld-programming talent depends somewhat on the target platform.

For example, many experienced Windows based PC programmers can port their skills to Windows-based handheld devices, according to Havre.

Young said PhoneOnline has many Microsoft programmers writing Visual Basic and Visual C++ code for handheld devices.

Havre said developers' transition from Windows for the desktop to Windows CE is relatively easy because, although they must get used to a different user interface, they are already familiar with the programming languages and API.

The transition to the PalmOS is more difficult because the operating system, API, small memory capacity, and other aspects of Palm technology are considerably different than the environments with which most programmers are familiar.

EFFECTS AND CONSEQUENCES

The shortage of handheld programmers is not yet seriously delaying projects, but recruiting good programmers is hard work that never stops, according to Dave Moore, vice president of product development at AvantGo, a provider of mobile-infrastructure software and services.

"My managers were spending at least 50 percent of their time on hiring issues," he said. "So the problem wasn't that we didn't hire people but that we spent so much more time hiring them."

Industry observers say it's the vendors' constant, aggressive, proactive search for programmers that has kept the shortage from delaying projects thus far.

"In the last six months we've seen the supply get better [because of layoffs]," he said, "but we've still not seen [qualified programmers] wanting for offers."

In fact, experienced handheld programmers are such a rare commodity, employers can expect to pay them 20 to 30 percent more than they pay other programmers, said PhoneOnline's Young.

Companies that cannot find experienced handheld programmers may hire programmers with less experience than they originally sought. Others turn to technologies their current developers know, use as much portable code as possible, or try to reduce turnover.

Companies also frequently hire and retrain people with related skills, such as writing applications for embedded systems, said mvion's Pineda. Because the companies provide the training and experience, they often don't have to pay higher salaries.

FINDING HANDHELD PROGRAMMERS

Companies are pursuing several strategies to try to find experienced handheld programmers.

Back to the future

In the early days of the personal computer, developers had to make every bit of limited memory work efficiently.

HiddenMind's Tyra said, "All the old operating-system hacks have found a new home in handheld devices. The device is so small, we have to go back to microcoding again. The kind of developer who does very well [with handhelds] is the kind that used to write device drivers."

Like handheld applications, device drivers are written with low-level code that interacts intimately with the hardware and thus requires efficient programmers who know the OS and hardware well.

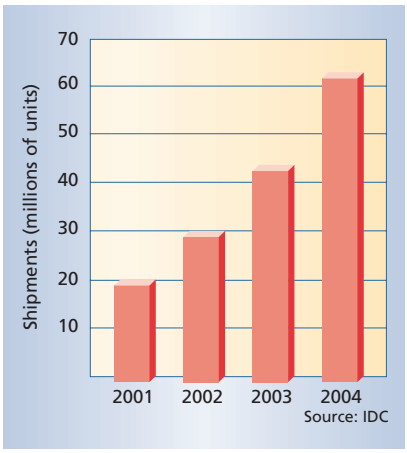

Figure1. IDC, a market research firm, projects rapid growth in the worldwide shipment of intelligent handheld devices at least through 2004.

Also, said Carl Zetie, an analyst who specializes in wireless-application development tools for Giga Information Group, a market research firm, "Anybody with a background in embedded systems is going to be more comfortable with the resource-constrained mobile and wireless environment."

Language skills

Companies face a challenge assembling a staff that can produce applications for the various types of handheld devices and mobile operating systems.

HiddenMind's Tyra noted that a device can function as a browser, a forms-based engine on a client running some code, or a full client. The skills that programmers need to write applications for each type of device are different, he said.

Further complicating the programming process are the different types of mobile-browser technologies, including WAP (wireless application protocol), Microsoft's Pocket Internet Explorer, and NTT DoCoMo's i-mode.

Meanwhile, as Figure 2 shows, IDC predicts the mobile operating system market will remain fragmented among current market-leader PalmOS, runner-up Windows CE, and other OSs such as Symbian's Epoc.

To cope with the numerous mobile technologies, many companies are invest-

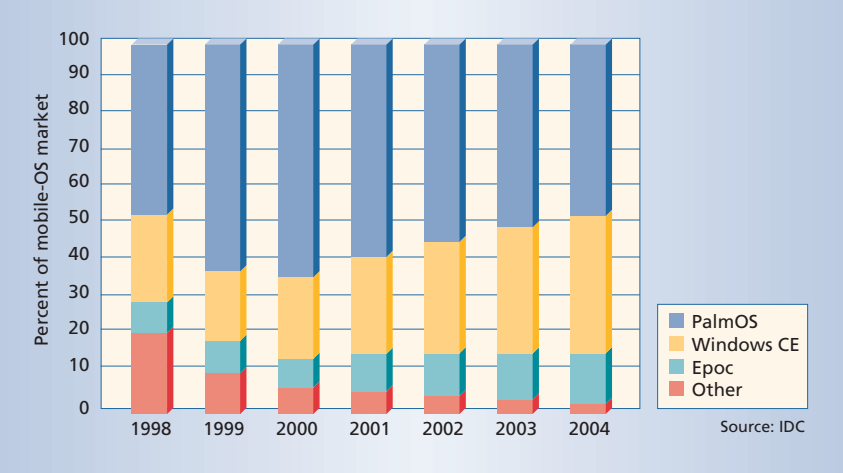

Figure 2. IDC predicts that for at least the next few years, there will be numerous operating systems for handheld devices, as has been the case in the past. Mobile-software vendors thus frequently must find programmers who can program for multiple OSs.

ing heavily in Java (including the Java 2 Micro edition) for its cross-platform capabilities. They are thus looking for programmers with Java experience.

XML (Extensible Markup Language) is also making portability possible by providing a lightweight, standard format for moving data between servers and handheld devices. XML enhances portability by letting any enabled device transform data into whatever format the machine needs for a particular use.

"As much as we talk about Java, our world is much more centered around XML. XML is the nucleus of our system. It is the most important piece of what we do," said Black Pearl's Hammitt.

Other languages also have a place. For example, most applications or parts of applications designed for a specific device are written in C++. C++ is designed for low-level systems programming that permits direct interaction with hardware. However, the resulting code will not be portable.

Self-instruction

Many of tomorrow's handheld programmers do not currently have the necessary skill sets to work on mobile applications. Frequently, Giga's Zetie said, developers teach themselves the skills necessary for handheld programming by, for example, experimenting with software developer's kits. He said that such self-instruction has been the pattern in many "previous technology revolutions."

Because of this, he said, "I think that what employers [who need handheld programmers] should be looking for right now are general skills, flexibility, the ability to learn rapidly, and the willingness to experiment."

Act locally, think globally

One way that some US vendors are coping with the shortage of handheld programmers is to recruit abroad. Black Pearl's Hammitt said her company has found its best handheld programmers in Europe because that's where handheld devices are most widely used.

Meanwhile, said mvion's Pineda, "Sometimes we have to contract pieces of the work in order to get it to market quickly. That's an area in which we're drawing on some very strong technical talent, particularly offshore. There are several large US companies that have very strong laboratories, in India for example, and we tap into those resources."

Colleges

While vendors say they are not looking to hire programmers right out of school, colleges represent a potential source of future handheld and wireless programmers. However, few schools have programs in this new field.

Moreover, said PhoneOnline's Young, "A shortcoming of colleges in the past 20 years is that they don't emphasize the vocational and realistic part of getting out in the real world and becoming a working professional. Computer-science and computer-engineering programs in general are much too theoretical and [primarily] prepare students for graduate school."

He said more schools should offer undergraduate courses in PalmOS, Windows CE, and other types of wireless programming, as well as an introduction to the Wireless Markup Language.

Some companies are beginning to develop partnerships with schools to design such courses, share resources, and provide internships that would expose students to real-world development.

LOOKING AHEAD

Companies must continue to be aggressive and creative in looking for new handheld programmers.

One potential factor in the companies' favor is that handheld development is leading-edge technology, which tends to attract skilled workers. However, leading-edge technology also requires practitioners to keep up with rapid changes and developments, which could leave today's programmers without tomorrow's skill sets, said PhoneOnline's Young.

Nonetheless, the search is worthwhile because many companies that buy handheld and wireless applications believe the vendors with the best programmers have the best products.

Said Aileen Heal, MapXtend product manager for MapInfo, a wireless application and tool vendor, "At the end of the day, you depend on the people you hire." ✷

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