Random Fact 12.1

Programmer Productivity

If you talk to your friends in this programming class, you will find that some of them consistently complete their assignments much more quickly than others. Perhaps they have more experience. However, even when programmers with the same education and experience are compared, wide variations in competence are routinely observed and measured. It is not uncommon to have the best programmer in a team be *five to ten times* as productive as the worst, using any of a number of reasonable measures of productivity.

That is a staggering range of performance among trained professionals. In a marathon race, the best runner will not run five to ten times faster than the slowest one. Software product managers are acutely aware of these disparities. The obvious solution is, of course, to hire only the best programmers, but even in recent periods of economic slowdown the demand for good programmers has greatly outstripped the supply.

Fortunately for all of us, joining the rank of the best is not necessarily a question of raw intellectual power. Good judgment, experience, broad knowledge, attention to detail, and superior planning are at least as important as mental brilliance. These skills can be acquired by individuals who are genuinely interested in improving themselves.

Even the most gifted programmer can deal with only a finite number of details in a given time period. Suppose a programmer can implement and debug one method every two hours, or one hundred methods per month. (This is a generous estimate. Few programmers are this productive.) If a task requires 10,000 methods (which is typical for a medium-sized program), then a single programmer would need 100 months to complete the job. Such a project is sometimes expressed as a "100-man-month" project. But as Fred Brooks explains in his famous book, *The Mythical Man-Month (*Addison-Wesley, 1975), the concept of "man-month" is a myth. One cannot trade months for programmers. One hundred programmers cannot finish the task in one month. In fact, 10 programmers probably couldn't finish it in 10 months. First of all, the 10 programmers need to learn about the project before they can get productive. Whenever there is a problem with a particular method, both the author and its users need to meet and discuss it, taking time away from all of them. A bug in one method may have other programmers twiddling their thumbs until it is fixed.

It is difficult to estimate these inevitable delays. They are one reason why software is often released later than originally promised. What is a manager to do when the delays mount? As Brooks points out, adding more personnel will make a late project even later, because the productive people have to stop working and train the newcomers.

You will experience these problems when you work on your first team project with other students. Be prepared for a major drop in productivity, and be sure to set ample time aside for team communications.

There is, however, no alternative to teamwork. Most important and worthwhile projects transcend the ability of one single individual. Learning to function well in a team is just as important as becoming a competent programmer.