Computers in engineering

Quality for programming survival

Offshoring of high-paying jobs to low-cost countries has been going on since the start of the industrial revolution. The latest casualty would appear to be the embedded programming industry, which is under attack from the aggressive training of software development skills in emerging markets. A programmer in India, China, or Russia now costs about one-quarter of what an American, European, or Japanese programmer costs. It would appear that there is little to prevent all programming jobs being sent offshore.

But some individuals and companies have not given up hope that there is still a future for engineers in the Western world. There is a gradually emerging trend in manufacturing indicating that sound investment in technology and automation can produce significantly higher quality than hordes of low-cost workers, and the goods are produced close to the end markets, saving considerable transportation costs and time. Production speed is often significantly improved, and the latest knowledge and technical skills are maintained internally.

In the software industry, transportation is rarely an issue due to instantaneous electronic communications around the world. But quality is a very big issue, together with intellectual property, and **Green Hills Software** offers a solution for companies who want to distinguish themselves in their own markets.

"There are two business strategies for making money—[focus on] quantity or quality," said Dan O'Dowd, Founder and CEO of Green Hills Software. "You can make a low-cost product that basically works and sell it in large volume. Or you can do something that nobody else does at high quality and charge a higher price."

Trying to compete in the high-volume, low-cost programming market with emerging-market companies is not practical, as demonstrated over the last few years by companies such as **Sun**, **HP**, and **IBM**, who have all opened software development facilities overseas in countries such as India, China, Russia and Brazil. Green Hills has built its business on high-quality products, and it encourages American, European, and Japanese businesses to follow its lead.

Source: Boeing

The Boeing 787 will literally be flown by millions of lines of software developed using Green Hills Software tools.

"To be able to maintain a high-paying programming job, you must be able to do something that a third-world programmer can't do," said O'Dowd.

He pointed out that in emerging markets, the main programming skills available use generic, widely available, low-cost tools such as Linux, **Microsoft** Windows, and Visual C++. Even promoters of Windows and Linux say it is impossible to write programs that do not fail or cannot be broken into. But at **Boeing**, **Airbus**, and **Lockheed**, thousands of programmers use Green Hills tools to write huge programs that actually fly aircraft such as the 787, A380, and F-35. Software controls the flight systems under directions from the pilot, as the latest aircraft designs have no mechanical connection between the pilot and the flight controls. No crash has ever been traced to a software failure.

The **National Security Agency** and **Department of Defense** have used MULTI and INTEGRITY tools from Green Hills to develop many top-secret cryptographic and weapons systems that no one can break into, creating immunity from attack through methods such as viruses, worms, Trojan horses, and spyware. For the latest military technology—the unmanned combat aircraft—security is absolutely vital. And it is only possible using software that has been developed from the ground up to be secure.

Other benefits of using the Green Hills suite of software include a single operating system that can run on processors from PDAs to multiprocessor servers; coding techniques that either improve run-time performance or allow equivalent performance on lower-cost processors; and reduced development time getting new features to market.

Programming on aerospace and defense projects by necessity must stay in this country, but the advantages of using the same tools extend to many other industries. Every product benefits from reliability. And with the wider availability of Internet connections into everyday life, secure applications are vital. For example, as more features in automobiles become drive-by-wire, the last thing a driver wants is for a hacker to get into the system. There is a very large potential market for companies that want to develop superior products to employ superior programmers and keep their technology secrets in house.

"Investing in new technology is our one advantage over third-world countries," said O'Dowd. "Their advantage is low costs, so it doesn't make sense for them to invest in premium tools. We can afford to invest more to make our workers more productive."

And as well as keeping jobs, we keep the intellectual property and corporate knowledge in this country to build on in the future.

David Alexander