UNIX and High-level Language Education Using Windows Operating Systems

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Extended Abstract

Entering and continuing engineering students need to learn skills in the use of high-level languages and the use of the *UNIX* operating system including the development of shell scripts. In the past, this requirement has been very challenging to educators since it requires access to a laboratory containing (sometimes expensive) computers that are *UNIX*-based workstations. The widespread availability of the *LINUX* operating system helps to alleviate this problem somewhat since the operating system is free and associated high-level language compilers are also freely available through the *GNU* project. Unfortunately, the skills required to successfully install and use *LINUX* often precludes its use as a classroom tool that students can easily maintain. An alternative and free solution based on the use of a *UNIX* emulator that runs under Microsoft® Windows operating systems is described here.

Introduction

Recently, several *UNIX* emulators that are easily installed and used under the Microsoft® *Operating Systems* (OS) commonly referred to as "Windows" have become available. This paper describes the authors' experiences in using these tools in an undergraduate setting for the purpose of teaching the use of *UNIX* and various high-level languages such as *PERL*, **FORTRAN**, *C* and *C++*. In addition to these programming languages, the tools are also useful for teaching more advanced concepts such as *UNIX* shell scripting; all while existing in the native operating system environment Microsoft® provides which is by far the most predominant installation in PCs found today.

In particular, a summary of some of the experiences of using *UWIN* (Unix for Windows) in the educational environment is given. *UWIN* is a package that provides the necessary software to develop and execute Unix applications on a Windows NT or a Windows 98 system. The *UWIN* system provides a means of teaching a wide range of computer engineering and computer science courses. For example, introduction to *C/C++* programming, use of the *UNIX* operating system, and shell script programming to mention a few of the teaching applications.

We discuss experiences in the installation of the *UWIN* system as contrasted with *LINUX* for the new *UNIX* system user. Next, we describe how the system can be used to teach shell scripting and other programming languages. The following section gives a brief overview of the various compilers that are available for high-level languages. In particular, it is noted that equivalent compilers based on the "Windows" operating systems have a significant associated cost as compared with the GNU public license. An outline for a class based on UWIN software is provided and discussed. Finally, a summary is given based on the benefits of using this freely available software (for educational purposes) versus populating and maintaining a laboratory with equivalent commercial software.

Summary and Conclusions

An inexpensive way (in fact, free for educational and research use) to teach *UNIX OS* fundamentals and to obtain compilers for high-level languages was described. This is particularly helpful for students who are only familiar with "Windows" based *OS*es since the emulator tools run directly within this environment. Furthermore, many different programming languages can be taught without purchasing a separate compiler and licenses for each. The rapidly decreasing cost of PC hardware makes this choice attractive as compared to purchasing relatively more expensive *UNIX* based workstations.