Professional Ethics for Computer Programmers

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The Social Context of Computing

- Why do we study the social context of computing? How is this relevant to us?
- The dramatic increase in computer use throughout society requires that people who design computers and software for future users have a higher level of understanding of social issues.
- As computer technology spreads throughout modern society, so do the opportunities for its misuse.
- We should understand the legal and ethical dimensions of computing so that we will be prepared to deal constructively and responsibly with such issues when they arise.
The Intellectual Property

- **Intellectual property** is not physical property, like a car or a house, but is instead an idea, or a representation of an idea in any of a variety of media.

- Intellectual property has rights that can be assigned, licensed, or used as collateral.

- There are currently four commonly used ways in which intellectual property rights can be identified and hence protected:
  1. *Copyright*
  2. *Patent*
  3. *Trademark*
  4. *Trade Secret*
Software as an Intellectual Property

- *Computer software* is a term that applies to the collection of all computer programs.
- For example, computer software facilitates computer use by banks, publishers, and government agencies.
- A *software product* has three complementary aspects: a *source program*, an *object program*, and a *user interface*.
- When a software product is developed for commercial use, its constituent source program (written in a high-level language such as Pascal) is usually not distributed.
- Only the object program (machine language code resulting from the translation of the source program) is distributed along with some documentation and tutorial information.
- A software product's user interface consists of the information presented on the screen by the software along with the interactivity required to effectively use the software.
- A software product is an intellectual property. It is an *original work of authorship*. 
Software Copyrights: Because the source program in a software product is an original work of authorship, it is protected by copyright law.

Copyright law protects all original works of authorship against unauthorized copying.

Copyright protection means that the owner of the copyright has the exclusive right to make, use, and/or sell the original work.

The copyright law protects the verbatim text of the program (source code and machine language code) but not the ideas that underlie the program.

Someone else can independently arrive at the same idea and express it in a different programming style. This will not violate copyright protection.

Any piece of academic work involving computer programs is governed by the same rules of copyrights.

The use or adaptation of another's program in one's own program without proper written acknowledgement constitutes plagiarism.

Copyright law applies to an original work of authorship immediately from the day it is created until 50 years after the owner's death. It also applies automatically.

Many copyright owners prefer to post explicit notice of copyright on all printed copies of the work such as: Copyright 2002, Awad Khalil, All rights reserved.
Applying Intellectual Property Law to Software

- **Software Patents:** Software can also fall into the realm of patent protection.

- *Patent* law explicitly protects processes, machines, manufactured items, or inventions from unauthorized reproduction, use, or sale by anyone besides the owner.

- Some algorithms can be patented. One famous one is Karmarkar's algorithm for solving certain types of problems, which was a truly unique and original algorithm.

- Most algorithms are, however, in the public domain and not patentable.

- Unlike a copyright, patent rights do not automatically apply to a piece of software. A software patent must be obtained by application to the US patent and Trademark office.

- Once obtained, a patent remains in force for a period of 17 years, after which the patented process or machine falls into the public domain.
Applying Intellectual Property Law to Software

- **Software Trademarks:** A *trademark* is any word, name, symbol, or device adopted and used by a manufacturer to identify its products.

- Like patents, trademarks are obtained by applying to the US patent and trademark office.

- **Software Trade Secrets:** A *trade secret* is generally any item of knowledge or characteristic of a product which is generally kept secret from the competition.

- Trade secrets often arise by contract. Employees are bound not to reveal any of the software designs or implementations with which they came into contact.
Software Licenses and Piracy

- By purchasing a software product, a person automatically obtains a *license* to use that software.
- Such licenses come with specific restrictions that are designed to protect the manufacturer's rights to the software product. *Single-user licenses* usually specify the following conditions:
  1. The software product can be used only on one computer.
  2. The software product cannot be copied (except for backup) or modified.
  3. The software cannot be used in the creation of a derivation work.
  4. The software is provided "as is". The manufacturer is not liable for any damages arising out of the use of the software.
- Several variations on the single-user license are also widely used. *Site licenses* are usually purchased by an institution like a college or university.
Software Licenses and Piracy

- *Public domain software* is often distributed with its source code, in the interest of widening the dissemination of technological ideas and improving the quality of future versions of the software.

- Some users obtain software products illegally. Illegal copying of software is called *software piracy* and is a direct violation of copyright law and a violation of the terms of the license agreements.

- Software piracy probably occurs for three main reasons: the cost of the software, the ease with which it can be copied, and ignorance of copyright laws.

- A solution to the software piracy problem is not near at hand. It will require a policy on pricing and licensing that is realistic for users and guarantees a fair return on investment for manufacturers.

- A new level of awareness on the part of users to the real costs of software development and distribution, as well as to the legal and ethical ramifications of software piracy is also required.
Liability for Software Errors

- There are hundreds of documented cases in which a software error has resulted in problems ranging from inconveniences, such as the loss of few hours of one's work to the loss of one's life.
- There are three types of computer errors: hardware errors, software errors, and user errors.
- A hardware error is the failure of a piece of equipment such as a chip fails, a hard disk crashes, or some bits are lost while transmitting a document from one computer to another.
- A software error is the malfunctioning of a computer program. There are two types of software errors: design errors and coding errors.
- A design error results when the software designer does not design a software product to satisfy all the requirements and specifications of the software.
- A coding error occurs when a program does not produce correct output, as a result of errors in the implementation of the program.
- A user error occurs when inaccurate data is entered as input.
The responsibilities of software developers

1. **To produce appropriate software**: This means to identify the user's needs and developing software which meets those needs.

2. **To produce quality software**: Some typical factors include conformity to specifications, portability, reliability, efficiency, user-friendliness, and maintainability.

3. **To represent software honestly**: Vendors should not ethically induce users to buy a piece of software on the basis of false claims for what it can do.

4. **To represent one's qualifications honestly**: specially to developers who write custom software.

5. **To respect the proprietary rights of other developers.**
Other Issues

- Privacy and Misuse of Data
- Computer Hacking
- Misuse of a Computer Resource