The special status of computer ethics

It is necessary to begin with a few disclaimers. First, I do not claim that this set of examples is in any sense complete or representative. I do not even claim that the kinds of examples I will use are the best kind of examples to use in computer ethics. I do not claim that any of these issues is central to computer ethics. Nor am I suggesting that computer ethics should be limited to just those issues and problems that are unique to the field. I merely want to claim that each example is, in a specific sense, unique to computer ethics. By "unique" I mean to refer to those ethical issues and problems that are characterized by the primary and essential involvement of computer technology.

Uniquely Stored

One of the unique properties of computers is that they must store integers in "words" of a fixed size. Because of this restriction, the largest integer that can be stored in a 16-bit computer word is 32,767. If we insist on an exact representation of a number larger than this, an "overflow" will occur with the result that the value stored in the word becomes corrupted. This can produce interesting and harmful consequences.

Uniquely Malleable

Another unique characteristic of computing machines is that they are very general-purpose machines. As James Moor observed, they are "logically malleable" in the sense that "they can be shaped and molded to do any activity that can be characterized in terms of inputs, outputs, and connecting logical operations."

Uniquely Complex

Another unique property of computer technology is its superhuman complexity. It is true that humans program computing machines, so in 8 that sense we are masters of the machine. The problem is that our programming tools allow us to create discrete functions of arbitrary complexity. In many cases, the result is a program whose total behavior cannot be described by any compact function.

Uniquely Fast

Arbitrage, after all, relies only on elementary mathematics. All the necessary calculations could be done on a scratch pad by any one of us. The problem is that, by the time we finished doing the necessary arithmetic for the stocks in our investment portfolio, the price of futures and the price of stocks would have changed. The opportunity that had existed would be gone.

Uniquely Cheap

Because computers can perform millions of computations each second, the cost of an individual calculation approaches zero. This unique property of computers leads to interesting consequences in ethics. Suppose my job is to program the computers that manage bank accounts. I could write the program so that it moves a tiny amount from every account into an account I own. I could make the amount so small that it would fall beneath the account owner’s threshold of concern.

Uniquely Cloned

Perhaps for the first time in history, computers give us the power to make an exact copy of some artifact. If I make a verified copy of a computer file, the copy can be proven to be bit for bit identical to the original. Common disk utilities like diff can easily make the necessary bitwise comparisons. It is true that there may be some low-level physical differences due to track placement, sector size, cluster size, word size, blocking factors, and so on. But at a logical level, the copy will be perfect. Reading either the original or its copy will result in the exact same sequence of bytes.

Uniquely Discrete

In a stimulating paper "On the Cruelty of Really Teaching Computer Science,"Edsger Dijkstra examines the implications of one central, controlling assumption: that computers are radically novel in the history of the world. Given this assumption, it follows that programming these unique machines will be radically different from other practical intellectual activities.

Uniquely Coded

Computers operate by constructing codes upon codes upon codes -- cylinders on top of tracks, tracks on top of sectors, sectors on top of records, records on top of fields, fields on top of characters, characters on top of bytes, and bytes on top of primitive binary digits. Computer "protocols" like TCP/IP are comprised of layer upon layer of obscure code conventions that tell computers how to interpret and process each binary digit passed to it. For digital computers, this is 14 business as usual. In a very real sense, all data is multiply "encrypted" in the normal course of computer operations.