The Case for Beneficial Computer Viruses and Worms

A Student's Perspective

Definition

A beneficial computer virus or worm is a self-replicating program that has a useful purpose.

Media Attention to Viruses

- Reports of malicious viruses can be found throughout
  - Numerous major newspapers
  - Numerous computer magazines
  - Nationally televised news programs
  - Email distribution lists
  - Scholarly journals
  - Numerous books, etc.

Media Attention to Viruses (cont.)

- Reports of beneficial viruses can be found throughout
  - A single article in *Newsweek*
  - A few papers in scholarly journals
  - A few internet sites
  - A single book by one of the few researchers in the area

An Early Experiment

At the Xerox Palo Alto Research Center (PARC), scientists John Shoch and Jon Hupp experimented with using self-replicating programs to perform such tasks as distributed computations.

The Experiment Goes Awry

Unfortunately, the Xerox PARC worms were not without bugs. After leaving one worm overnight, they arrived the next morning to find it had crashed several hosts. When the crashed hosts were rebooted, the worm promptly found the ready machines and proceeded to crash them again.

Serious Harm is Avoided

Shoch and Hupp thankfully had the foresight to include a mechanism into their worms that would await a signal for the worms to destroy themselves, so the situation was easily resolved.

The Computer Virus Concept

Fred Cohen also felt that self-replication could be a useful tool in software. In Cohen's concept, programs would not copy themselves to separate hosts on a network, but would attach themselves to another program.

The Compression Virus

One of Cohen's concepts for a useful virus was one that would automatically compress any executables it found and then attach itself to that program as a decompression utility. However, this concept became less practical as disk and tape storage became considerably cheaper.

The Argument Against Beneficial Viruses

Vesselin Bontchev, a scientist at the Virus Test Center at the University of Hamburg, is vehemently against the use of viruses for beneficial purposes.

Bontchev's 12 Arguments Against Beneficial Viruses

In his paper "Are 'Good' Computer Viruses Still a Bad Idea?" Bontchev details 12 arguments against beneficial viruses.

- Viruses are difficult to fully control
- Viruses waste resources
- Viruses are difficult to identify and remove if unwanted
- Viruses often contain bugs

Bontchev's 12 Arguments Against Beneficial Viruses (cont.)

- Viruses are not compatible with different platforms

- Viruses cannot perform a task better than a normal program

- Viruses alter data without user consent

- Viruses infecting other programs can nullify technical support for those products

Bontchev's 12 Arguments Against Beneficial Viruses (cont.)

- Good viruses may be used as a guise for an attacker to gain entry to a system

- Malicious virus work may be presented as beneficial virus research to the public

- Viruses utilize resources on users' systems without the users' knowledge or consent

- Viruses carry with them a common negative connotation

Bontchev's Attacks Against Individual Concepts

- He attacks good viruses that destroy malicious viruses as causing the same problems as the targeted virus

- He attacks the concept of a compression virus on the grounds that an operating system's file system could perform the same task with less overhead

- He also attacks an encryption virus on a similar basis to the compression virus

Bontchev's Idea for Beneficial Viruses

Despite a thorough attack on the use of beneficial viruses, Bontchev mentions his own guidelines for creating one. They consist of a series of invitations from hosts for the virus to infect and an exchange of digital signatures between the host and virus.

Cohen's More Recent Work

In 1994 Fred Cohen published book entitled *It's Alive: The New Breed of Living Computer Programs.* In order to avoid the negative connotation of the word "virus," he refers to the programs in this book as "living programs."

Cohen's More Recent Work (cont.)

In his new book, Cohen discusses the use of living programs to perform such tasks as distributing software on networks, implementing distributed databases, and performing routine maintenance tasks.

Cohen's Response to Bontchev

As mentioned earlier, Bontchev attacked many concepts for using viruses in a beneficial manner. One concept Bontchev attacked was using viruses for routine maintenance tasks stating that it was inefficient and wasted system resources.

Cohen's Response to Bontchev

In a personal interview Cohen stated that his experiments showed that maintenance viruses consumed few resources. He went on to state that the small expenditure of system resources resulted in a great decrease in the human effort required.

Another Look at the Anti-Virus Virus

As mentioned earlier, Bontchev attacks the use of self-replicating programs to destroy a malicious virus. This author disagrees with his thoughts on this matter.

Another Look at the Anti-Virus Virus (cont.)

Using a simulation of virus activity in a discourse community, it has been shown that an anti-virus virus could effectively destroy a malicious virus.

The simulation consisted of saving the infection state of a set of users that make up a discourse community.

Another Look at the Anti-Virus Virus (cont.)

The experiment was then begun with a single user of the discourse community introducing the virus by sharing executable content. After a long period of sharing within the discourse community, the virus became widespread on the users' machines.

Another Look at the Anti-Virus Virus (cont.)

After the virus had become well entrenched in the discourse community, an anti-virus virus was released that would infect the users' systems and destroy the malicious virus if it were present. It would then remain resident to prevent any future infection of the malicious virus.

Another Look at the Anti-Virus Virus (cont.)

After a time that had been previously determined to be appropriate to destroy the malicious virus (which would depend on how rapidly executable content was shared and the size of the community), the anti-virus virus would destroy itself.

Another Look at the Anti-Virus Virus (cont.)

Use of such an anti-virus virus may help control the rapid spread of malicious viruses. It may also help reduce the panic created by virus warnings, which can cause more damage to productivity than the malicious virus itself.