Computer Forensics

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Computer Forensics

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Agenda

- Types of Computer Crime
- The Cost
- Computer Forensics
- Evidence Management
- Tools
- Summary
- References

Hong Kong Reuters Office Hacked:
Traders at 5 banks lose price data for 36 hours

PA Teenager Charge
Southwestern Bell, E
Costs to Southwester

Million Hack:
d inside help.
yet recovered.

Computer Atta
40 hour shutdo

ips Infected PCs:
Virus Taints Big Japanese Debut

c|net CNET NEWS.COM TECH NEWS FIRST

CNET : News : E-commerce : **Story**

Market Update | My Portfolio | Broker Reports | Tech Sectors |

De Beers security hole reveals customer information

By Stefanie Olsen
Staff Writer, CNET News.com
April 4, 2000, 4:45 p.m. PT

On the Web, diamonds can be a spammer's best friend.

About 35,000 customer email and home addresses were expos
on Adiamondisforever.com, an informational site about diamond
Beers, CNET News.com has learned.

Technology terro
10 products that will

Facts
Back Orifice
System requirements:
386, Windows 95 or 98,

10. Back Orifice

Trick: Allows someone to control your PC remotely--without authorization.
Treat: Your archenemy deletes your files just for the heck of it.

The Net

back to

AOL outage brief but dangerous

By Janet Kornblum
Staff Writer, CNET NEWS.COM
February 24, 1998, 1:00 p.m. PT

news analysis The last time America Online (AOL) suffered a total blackout, members were knocked offline for 19 hours. Last night's outage, by comparison, lasted a relatively painless 2-1/2 hou

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The Net

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Student finds AOL bug

By Janet Kornblum

CNN custom news ORACLE

Custom News
Home
World
U.S.

Feb. 25, 1998 >> 1:34 pm EST

Stephen Cobb's

custom:news

Pentagon says computers invaded by hackers

Washingtonpost.com: Computer Glitch Halts NYSE Trading for One Hour - Netscape

File Edit View Go Communicator Help

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washingtonpost.com

NEWS STYLE SPORTS CLASSIFIEDS

Partners:
Newsweek.com
Britannica-Newsweek Internet Guide

Computer Glitch Halts NYSE Trading for One Hour

By Ianthe Jeanne Dugan and Mark Leibovich
Washington Post Staff Writers
Tuesday, October 27, 1998; Page C01

Stocks froze in their tracks for an hour yesterday on the New York Stock Exchange after an unusual computer glitch forced exchange officials to shut

ber two civilian official.

Computer Crime

- What is a computer crime?
- 3 generic categories
  - Computer Assisted
  - Computer Specific
  - Computer Incidental

Computer Crime

- Computer Assisted Crime:

  Criminals activities that are not unique to computers, but merely use computers as tools to assist the criminal endeavor (e.g., fraud, child pornography).

- Computer Specific or Targeted Crime:

  Crimes directed at computers, networks and the information store on these systems (e.g., denial of service, sniffers, attacking passwords).

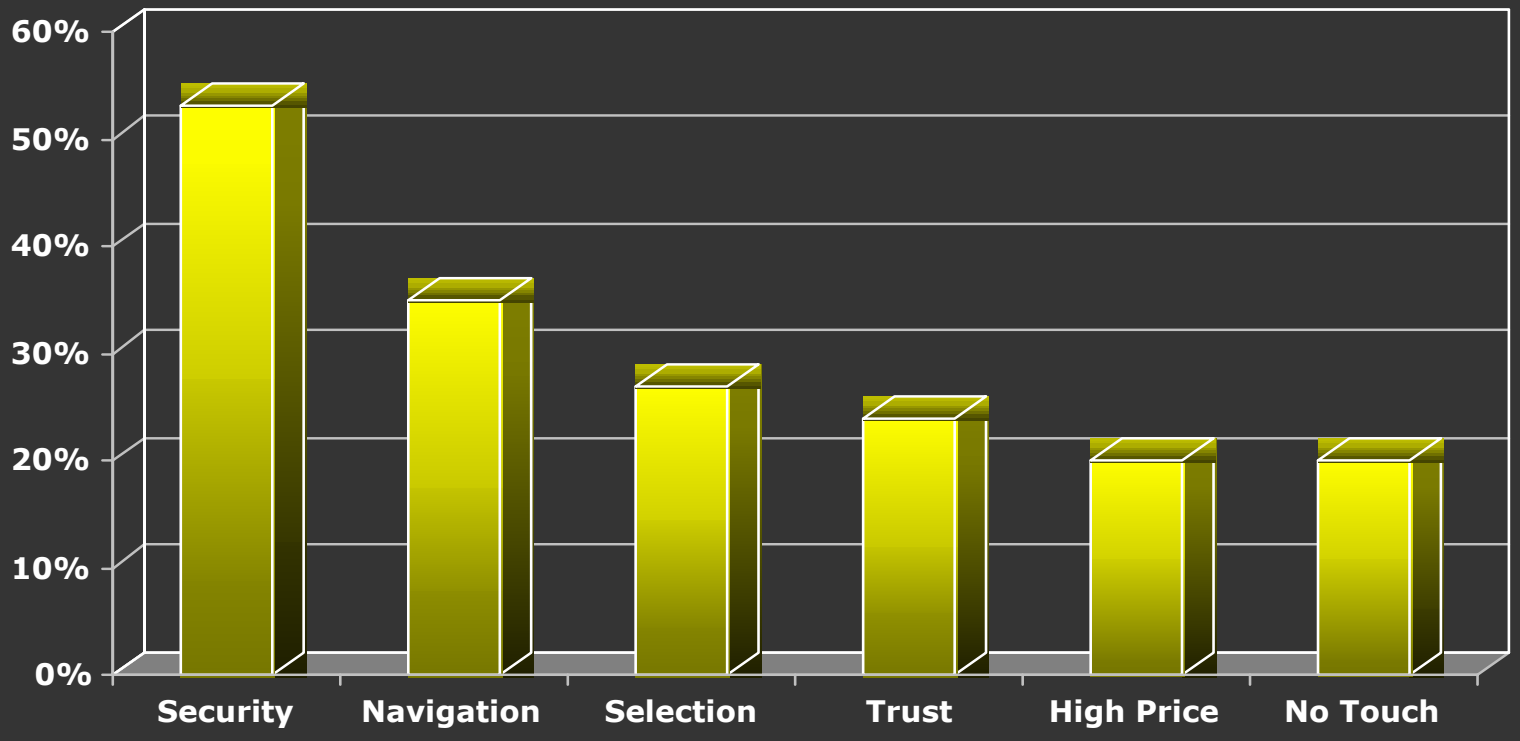
- Incidental:

  The computer is incidental to the criminal activity (e.g., customer lists for traffickers).

The Problem

- How big is the problem?
  - USD $400 Million?
  - USD $10 Billion?
- Canadian Stats?
- Under-reported
- F.U.D.

Consumer e-Commerce Concerns



Privacy/Security issues could potentially put an $18 billion dent in the projected $40 billion 2002 e-Commerce revenue (Jupiter Communications, 2000).

Terms

- **Computer Forensics**: The study of computer technology as it relates to the law.
- **Forensic Analysis**: Examination of material and/or data to determine its essential features and their relationship in an effort to discover evidence in a manner that is admissible in a court of law; post-mortem examination.
- **Electronic Evidence**: Evidence relating to the issue that consists of computer files, or data, in their electronic state.
- **Electronic Media Discovery**: The discoverability of electronic data or files.
- **Chain of Custody**: A means of accountability, that shows who obtained the evidence, where and when the evidence was obtained, who secured the evidence, who had control or possession of the evidence.
- **Rules of Evidence**: Evidence must be competent, relevant, and material to the issue.

Computer Forensics

- History
  - **1984** FBI Computer Analysis and Response Team **(CART)**
  - **1991** International Law Enforcement meeting to discuss computer forensics & the need for standardized approach
  - **1997** Scientific Working Group on Digital Evidence **(SWGDE)** established to develop standards
  - **2002** Still no standards developed or common body of knowledge **(CBK)**

Computer Forensics

- Computer Forensics involves:
  - *Preservation*, *identification*, *extraction*, *documentation*, and *interpretation* of computer data.
  - It is both an *art* as well as a *science*!

Computer Forensics

- 3 Basic Principles
  - **Acquire** the evidence (data) without altering or damaging the original data or scene
  - **Authenticate** that your recovered evidence is the same as the original data
  - **Analyze** the data without modifying it
- Sometimes easier said than done!

Investigative Chronology

- Time attributes (**Modified**, **Accessed**, **Changed**).
- Allow an investigator to develop a **time line** or **Chronology** of the incident
- The time line is vital when examining logs, & event files
- Improperly accessing or searching a system can alter the time lines destroying evidence or erasing trails.

MAC Times

- ***Mtime*** *(modified time),* ***atime*** *(accessed time),* ***ctime*** *(changed time)*
- Reading a file or running a program changes the **atime**
- **Mtimes** are changed by modifying a file's content

MAC Times

- **Ctime** keeps track of when the meta-information about the file was changed (e.g., owner, group, file permission)

- Some systems have **dtimes** (deleted time). **Ctime** can be used as an approximation of when a file was deleted

Digital Evidence

- Digital evidence is *fragile*
- Can be contaminated very easily
- Only really one chance to do things correctly
- Admissibility in court depends on establishing the authenticity and integrity of the evidence

Digital Evidence

- **Authenticity** - does the material come from where it purports?
- **Reliability** - can the substance of the story the material tells be believed and is it consistent? In the case of computer-derived material are there reasons for doubting the correct working of the computer?
- **Completeness** - is the story that the material purports to tell complete? Are there other stories which the material also tells which might have a bearing on the legal dispute or hearing?
- Acceptable levels of freedom from interference and contamination as a result of forensic investigation and other post-event handling

Chain of Custody

- Protects integrity of the evidence
- Effective process of documenting the complete journey of the evidence during the life of the case
- Allows you to answer the following questions:
  - Who collected it?
  - How & where?
  - Who took possession of it?
  - How was it stored & protected in storage?
  - Who took it out of storage & why?

Drive Imaging

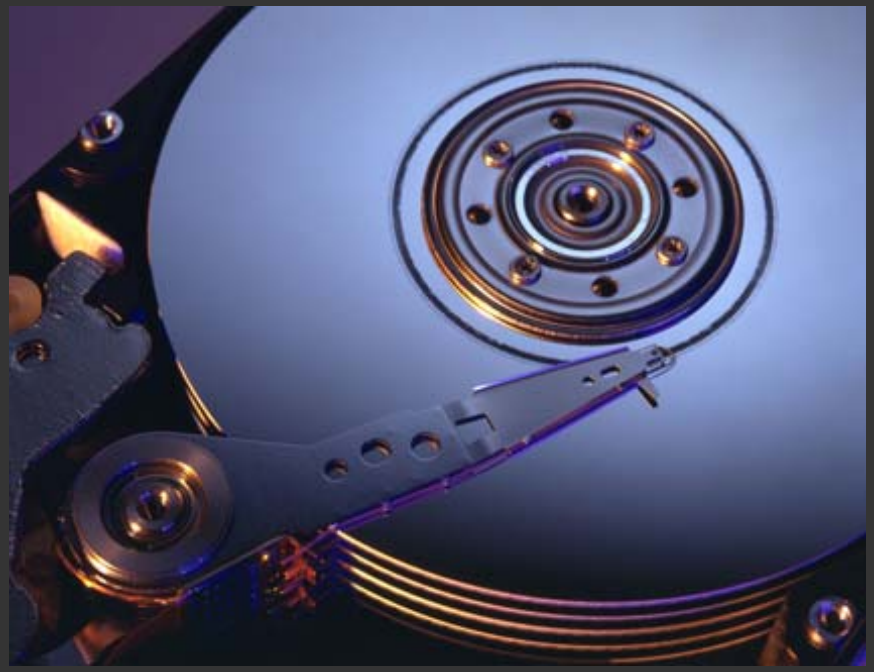
- Forensic Copies
  - **Bit for Bit** copying captures all the data on the copied media including hidden and residual data (e.g., slack space, shadow space, swap, residue, unused space, deleted files etc.)
  - Normal imaging *only* copies the data the file system recognizes
- Often the "smoking gun" is found in the deleted & residual data.
- Image Integrity (mathematical fingerprint)
  - **MD5**, **CRC**

Drive Imaging Tools

- SafeBack (www.forensics-intl.com)
- Ghost (www.symantec.com)
  - Newest version of Ghost has a forensic "switch"
- DD (standard unix/linux utility)
  - #dd if=*device* of=*device* bs=*blocksize*
- Encase (www.encase.com)

Drive Examination Tools

- Encase
- Forensix
- Coroner's tool kit
- Autopsy browser
- @Stake TASK
- iLook
- Hex editors



Issues

- Private Sector vs. Law Enforcement
- Civil vs. Criminal remedies
- Proprietary tools
- Changing definitions of best evidence
- No National or International Computer Forensics Standards

Issues

- No International Definitions of Computer Crime
- No International agreements on extraditions
- Multitude of OS platforms
- Incredibly large storage capacity
  - **100 Gig +**
  - **Terabytes**
  - **SANs**
- Networked environments
- RAID systems

Summary

- Computer Forensics is a **growth** industry
- Very easy to do ***wrong***!
- Computer Forensics is **not** a piece of software
- Computer Forensics **is** a **methodology**
- **Technical skills** need to be *combined* with **investigative skills**
- Need for a **CBK** and **International Standards**
- Unless properly trained in forensics **turn** the suspect system ***over*** to someone who ***is*** trained!

Questions/ Comments

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