Purdue University

Center for Education and Research in Information Assurance and Security

Musings on Disclosure & Vulnerabilities

<http://www.cerias.purdue.edu>

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Metacomments

- There are basically 4 reasons you invite someone as a featured speaker
  - He's someone senior, with lots of experience you want to hear before he rides off into the sunset
  - She's recently done something very noteworthy
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- In this talk, I will not demand a recount

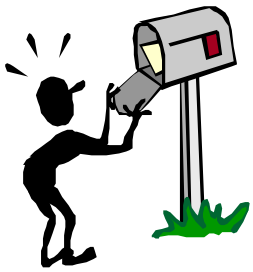
Metacomments

- I don't know the key to success, but the key to failure is trying to please everybody.
  - Bill Cosby
- The toughest thing about success is that you've got to keep on being a success.
  - Irving Berlin
- If all else fails, immortality can always be assured by spectacular error.
  - John Kenneth Galbraith
- Nothing succeeds like excess.
  - Oscar Wilde

State of Security: Poor

- Examples abound:
  - DoD reports 22,000 attacks on Pentagon systems in 2000
  - 2 Break-ins at Microsoft, October 2000
  - Israel/Palestinian sites attacked, October 2000
  - Feb 2000, Denial of Service against eBay, Yahoo, Amazon
- CSI/FBI figures
  - Less than 20% sites report no unauthorized use

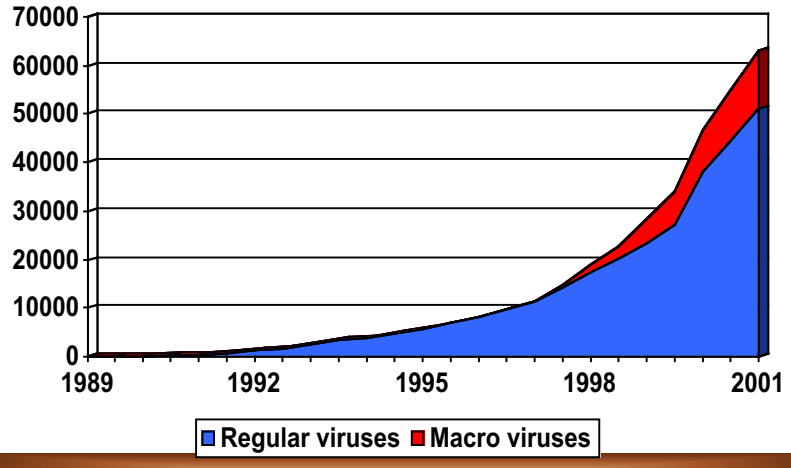
Real losses



- Melissa, March 1999
  - Word 97, Word 2000
  - $300 million in damages
  - Approximately 4 days, 150,000 systems
- ILOVEYOU, May 2000
  - Outlook
  - As much as $10 billion in damages
  - Approximately 24 hours, > 500,000 systems

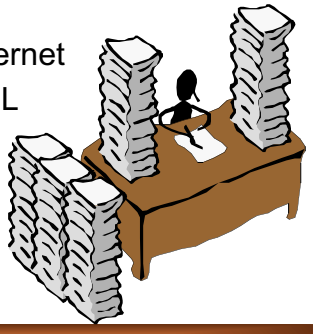
("Brain" took 5 years to do $50 million)

Growth of Viruses "In the Wild"



More data

- CERT/CC fielded 10,000 incidents in 1999
  - On-track for 20,000 in 2000
- On-going probes (via Intel)
  - 50-60 incidents per day on Internet
  - 10-12 incidents per day on DSL
  - 5-6 incidents per day on dial-up

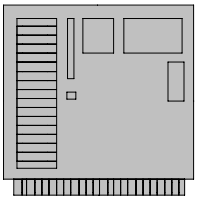


Should I Share the Blame?

- Morris Worm analysis (late 1988)
- COPS (1990)
- Practical Unix Security (1991)

These discussed vulnerabilities in detail, and made the case that computing users needed more information about vulnerabilities.

Vulnerabilities in 1990

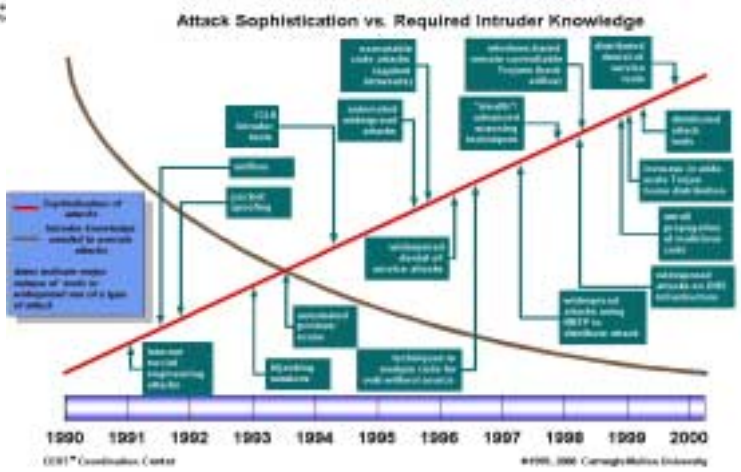


- Platforms
  - Mainframes
  - BSD Unix
  - AT&T Unix
  - VMS
- A few dozen vulnerabilities in low-circulation
- Network access by "trained" and "trusted"
- Limited security info exchanged ("zardoz")
- Little or no automated hacking

Vulnerabilities Now

- CERT/CC is on track to take over 1000 vulnerability reports in 2000
- Buffer overflows still rampant
- Users not installing patches
  - CDUniverse hack in February as example
- About 15 new viruses being reported daily
- Infrastructure attacks increasing

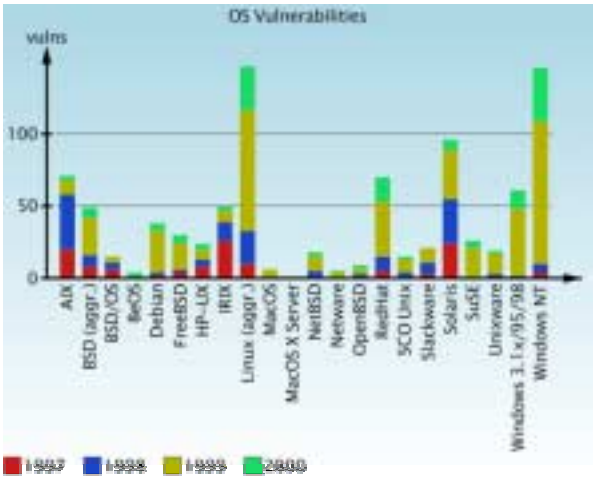
Point & Click Attacks



About 30% are buffer overflows or unchecked data

Over 90% are coding/design flaws.

Source: Securityfocus.com



Note about open source

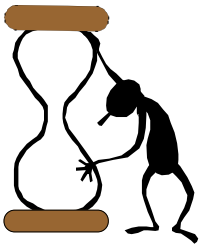
- S/COMP
- Trusted VMS
- CMWS Ultrix and SunOS

…all are closed source systems

The key is quality, and that depends on training, methodology, and control. NOT OS vs. CS

The Future? (ca. 2004)

- 100,000 computer viruses
  - 99% for one vendor's software
  - New viruses @ more than 1 per hour
- Most common desktop system
  - Almost 100 million LOC, 1Ghz+
  - 1 security patch announced per day
- Attacks over network exceed 10 per hour
- Losses to business and government will exceed $100 billion per year



Medical Lessons

- Consider another profession dealing with widespread dangers from systemic flaws and malicious agents
- What can we learn from the medical profession?

Plagues and Trades

- Bubonic/pneumonic plague, 1347–1350: The "Black Death"
- 10 million dead in Europe, perhaps 1/2 the population of China and India
- The populace blamed the Jews or imagined sins
- Again in 1665, London had 100,000 dead
  - Saved by the Great Fire

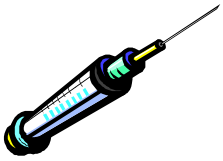
Epidemeology

- Pandemics of cholera
- Quarantine did not help
- John Snow in 1854
  - Broad Street pump

(Who will remove the handle from Word and other faulty software?)

Vaccines and Prevention

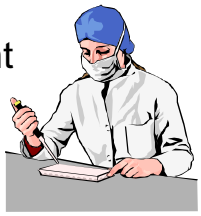
- Preventative care is better than response
- Goal is to reach threshold immunity
- "Live vaccines" are often not the best choice
  E.g., polio
- The disease is not distributed with the vaccine
- Killing the bugs is more effective than treating the disease
  - DDT is still the most effect malaria and dengue countermeasure



Autopsies & Reporting

- Why did the patient die?
- What did the treatment do?
- What is the incidence of disease?

- Pathology is intended to prevent the spread of pathogens and increase knowledge of diseases



Disclosure and Response

- "Full disclosure"
  - Full details of the flaw
  - Often includes exploit script
  - Often released before patches are available
- Typified by
  - Bugtraq
    - 19000+ postings since 11/93
    - 4800 this year
  - Rootshell.com
  - PacketStorm

Argument #1

"Vendors won't fix flaws. Full disclosure is the only way to get fixes."

- Not in recent history
- Bigger problem is bad design
- Exploits are not needed for this goal
- There are other ways to address this problem

Argument #2

"This is the only way to ensure we have fixed the flaws."

- No guarantee
- Most users cannot take advantage of this info
- Exploits are not needed for this goal
- Better not to have the flaws in the first place

Argument #3

"This helps us learn to avoid similar flaws in the future."

- See the growing incidence of security flaws.
  - CERT/CC is on track for 1000 vulnerability reports for 2000
  - Still seeing buffer overflows after 20 years
- Exploits are not needed for this goal

Argument #4

"I need the exploit to program my firewall/IDS/etc and protect myself."

- Self-fulfilling condition.
- Better to fix underlying systems
- Practice endangers the whole community
  - Consider case of 500 people using it vs. 250,000 using it

Argument #5

"All the bad guys know about it already. We should let the 'white hats' know."

- Untrue for most things for years
- Underground more fragmented, less talented
- Disclosure is also to the thousands (more?) of script kiddies
- See paper by Arbaugh, et al. in IEEE Computer

Legal picture

- Council of Europe Convention
  - Making hacking programs and information illegal
- DMCA in US
- UCITA
  - Negative effect

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3. Prevention is better than cure. Start now.
4. The world has changed in 10 years, and will change more in the next few -- get used to it
5. In a few years, lawyers might be the best friends of security practitioners

My concluding conclusions

- Full disclosure is of unproven value in today's Internet, and may lead to harm
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  - We need science here, not folklore
- More specifically, publication of exploits is antisocial and harmful to the general public
- Legal backlash may be unpleasant and overbroad. We'd be better to clean up on our own.

Thank you!