Worms, Viruses and Other Icky Stuff

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Penn State Teaching and Learning with Technology

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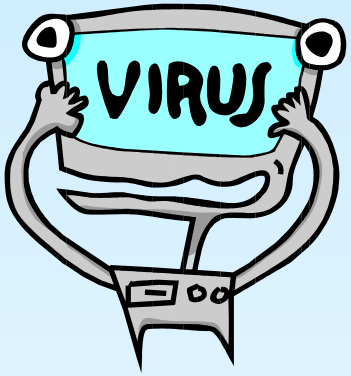
My Group

- Classroom and Lab Computing (name changed from Distributed Computing)
  - About 30 full time & 60 hourly employees
  - Student Labs (44)
  - Technology Classrooms (126)
  - Workstations and Servers (2000)
  - Serve up applications (hundreds)
  - 42K Students at University Park campus
  - 80K Students system-wide

Topics of Discussion

- What Are We Dealing With
- Locked Down and Safe?
- Historical Perspective
- Things That Hurt
- Current efforts
- Lessons Learned
- What next?

What's a Virus



- ***THE NECESSARY CONDITION OF BEING CONSIDERED A COMPUTER VIRUS*** *is the capability to produce copies of itself (not exact bytewise replicas) and to incorporate them into computer networks and/or files, system areas of computers, and other executable objects. In addition to that copies also maintain the capability to spread further.*

Worms

- These programs spread in a computer network and, like viruses-"companions", don't change files or sectors on disks. They penetrate the computer's memory from a computer network, calculate network addresses of other computers and send their own copies to these addresses.

Trojan Horses

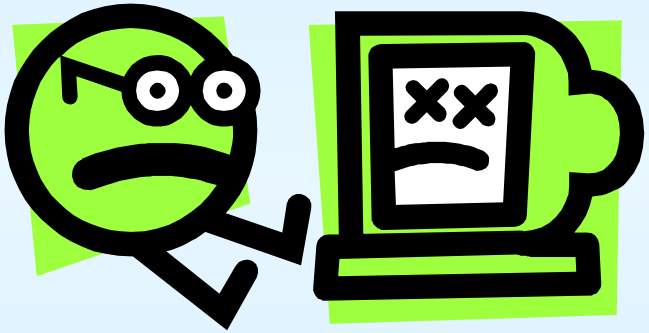
- This is a program or part of program code that performs destructive actions, i.e. depending on some conditions wipes out information on disks, hangs the system etc.

Other Icky Things

- Denial of Service
- Combinations
- Smart Viruses
- Zombies
- Macro viruses

Historical Perspective

- Does it seem like we are getting attacked more often?
- Does it seem like we are getting more different kinds of attacks?
- YES!



Review of Advisories

- CERT Windows focused advisories
  - 1999 there were 4
  - 2000 there were 8
  - 2001 there were 14
  - Have 2 already for 2002
- For full picture see
  - http://www.cert.org/stats
  - http://www.cert.org/advisories

Locked Down Implies Safe?

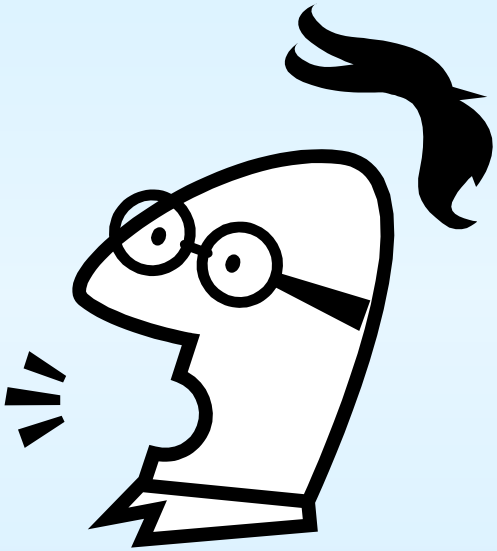
- Student machines
  - Restrict write access
  - Prevent boot of other media
  - Administrative password
  - Refresh initialization files
  - Physical security
- Run Virus software here
  - Not at first
  - MacAfee last year
  - Norton Antivirus now

Locked Down Servers

- Tight ACLs
- Strong passwords for admin privileges
- Physical security
- Limited number of people who are authorized to make changes
- Did not run Virus Scans here
  - Concerned about performance & privacy

But Wait!

- Student space on central file server
  - Students manage own ACLs
- Instructor shares on central servers
  - Instructors manage own ACLs
- Student media
- Student and instructor private machines



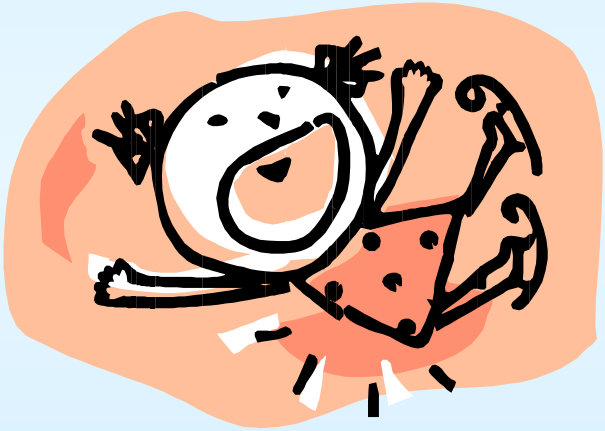
Still Vulnerable

- Access to file servers by students and faculty from their machines
- Open permissions on shares set by students or faculty
- Server deployed applications that write back to their own directories
  - “ill formed applications”
- FTP servers to faculty shares

Guilty by Association

- Data on our servers can get contaminated
- Ill formed applications become victims and even spread viruses
- Enabling shared data helps spread viruses
- Providing remote access is a good service but
  - At the mercy of how others manage their computers

Some Incidents That Hurt



Melissa

- MS Word macro virus
- Replaces normal.dot
- Anything you save becomes template
- Sends infected documents to others in your address book

Melissa Cure

- Maintenance on Office
  - Warns about imbedded macros
- Delete normal.dot
- Run virus scanning software

Smurf Attack

- a.k.a. Tribe Flood
- Virus plants Trojan horse
- Trojan horse phones home
  - Awaits command
  - On command sends specific string to targets
  - Could be ping with spoofed origin
  - Could be mal-formed packet that crashes your system

Smurf Cure

- Don’t route packets with spoofed source
- Don’t route broadcast packets
- Work with security team to locate infected machines and repair
- Grit your teeth and endure…
- Worst case – sever connection to Internet

Smurf Exposures

- Centrally managed routers tend to be OK
- Privately managed routers not
  - Software router on NT server
  - Personal and departmental routers
- Even had this in my labs
  - Mac Ethernet routed off Windows Token Ring

VBS Worm

- Annakarnakova.jpg.vbs
- Attachment is VBS script (masquerading as a jpeg)
- Email invites you to look at the picture
- Bad settings in Outlook Express or Outlook automatically execute .vbs
- Hidden file extension only shows Annakarnakova.jpg
- Wipes out all your jpegs
- Sends itself on using your address book

VBS Worm Cure

- Maintenance from Microsoft to lock down Outlook and Express
- Don’t open that attachment!
- Tough luck if you didn’t have a backup
  - Your Jpegs were gone
- Virus scanners catch this

Code Red Worm

- Exploited IIS buffer overflow
- Floods network
- Attacks other servers
- Has dormant phase (so it might be there on your restore)
- http://www.cert.org/advisories/CA-2001-19.html

Code Red Cure

- This was ugly!
- Take server offline
- Try a restore (depending on damage)
- Run virus scan in all cases

Nimda

- Builds on Code Red Trojan
- Attacks web content files
- Can spread via HTML
- Can attack open shares
- Can overwrite executables (.exe)
- Can spread via email
- http://www.cert.org/advisories/CA-2001-26.html

Nimda Cure

- Like Code Red
- Take server offline
- Restore (maybe)
- Scan (for sure)
- Watch out for corrupted EXEs
  - Remember my ill formed apps…

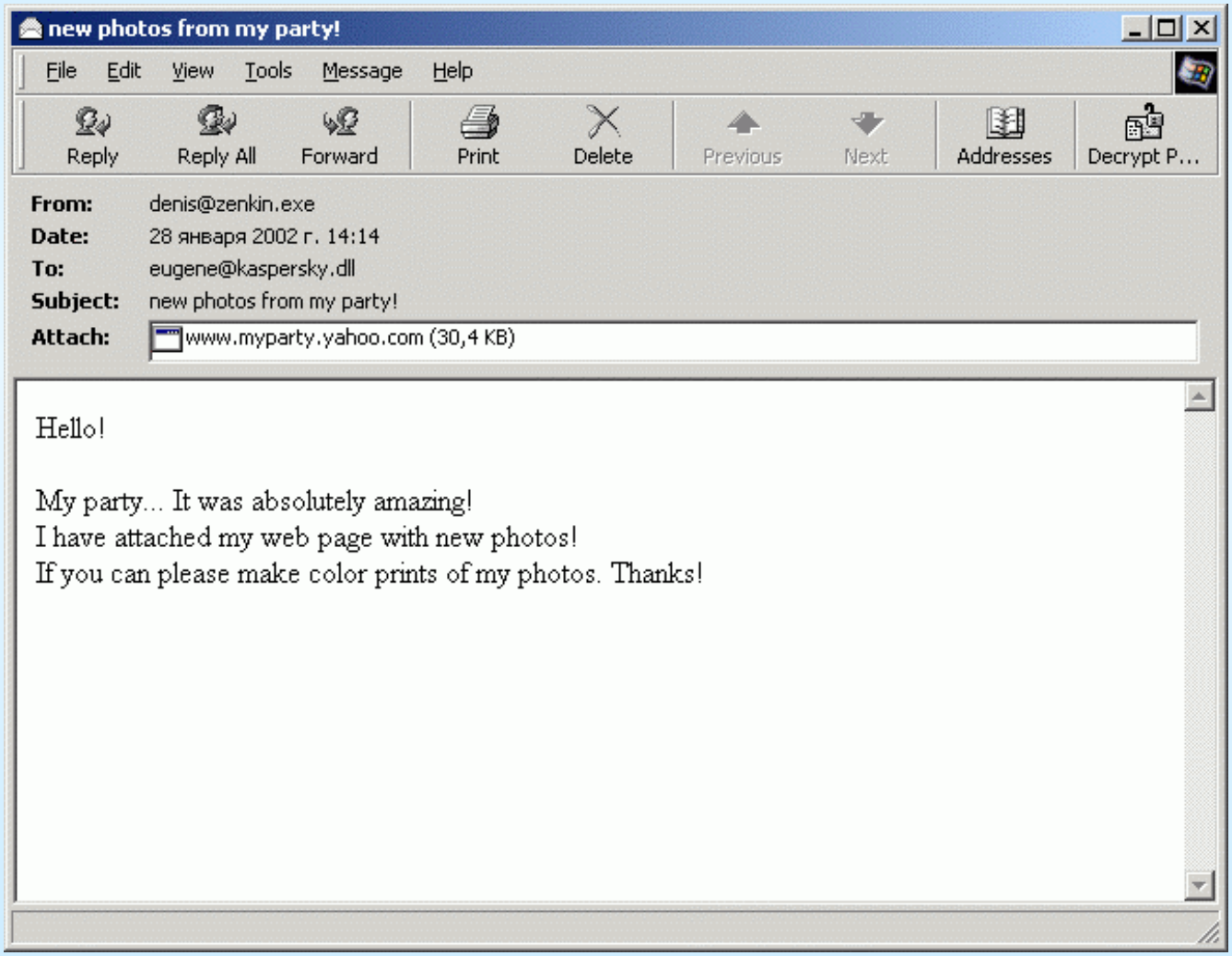
Nimbda

- Maintenance was available months before the crisis
- Caught us with an “about to be replaced” IIS server
- Attacked Instructor File Server on same subnet
- Replaced executable files in “ill formed” applications
- Nasty to get rid of
  - Did restore
  - Scanned
  - Even deleted some directories

Myparty

- Attachment is an executable program
- Overwrites files
- Leaves backdoor auto start
- Sends itself to others
- http://www.microsoft.com/technet/treeview/default.asp?url=/technet/security/virus/alerts/myparty.asp
- http://www.viruslist.com/eng/viruslist.html?id=47011

Myparty


new photos from my party!
File Edit View Tools Message Help
Reply Reply All Forward Print Delete Previous Next Addresses Decrypt P...
From: denis@zenkin.exe
Date: 28 января 2002 г. 14:14
To: eugene@kaspersky.dll
Subject: new photos from my party!
Attach: www.myparty.yahoo.com (30,4 KB)
Hello!
My party... It was absolutely amazing!
I have attached my web page with new photos!
If you can please make color prints of my photos. Thanks!

Myparty Cure

- Devious
  - First pass attachment was an .exe
  - Second pass was a .com
    - Looked like a URL
- Virus scans catch
- Maintenance on Outlook detects
- May have subsided
  - Rumor that it only worked Jan. 27-29

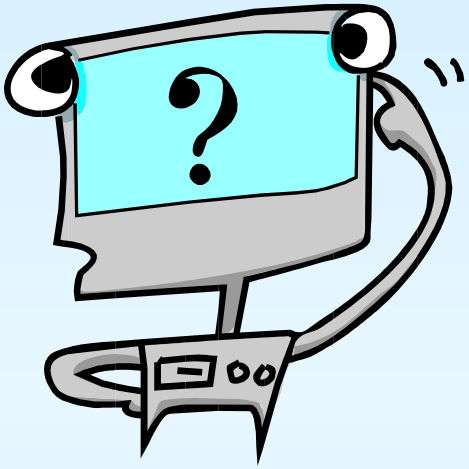
General What To Do

- Don’t open that attachment!
- Apply maintenance
  - To Office
    - Especially Outlook
  - To Exchange
  - To IIS
  - To OS
- Run a virus scan program
  - Keep it current

General What To Do

- Secure your system
  - http://personal.cfw.com/~tkprit/inet/secure.html
  - http://www.microsoft.com/ntserver/techresources/security/default.asp
  - http://www.microsoft.com/technet/treeview/default.asp?url=/technet/security/bestprac/bpentsec.asp
- Good passwords
- Use ACLs to restrict access

What Next?



- Automate detection of attacks
  - SNORT intrusion detection
  - http://snort.safenetworks.com/
- Automate correction?
  - HOGWASH to neutralize attacks
  - http://hogwash.sourceforge.net/
- Where should firewalls play?
  - University “freedom” issue
  - Question of effectiveness
- University-wide license for Norton AntiVirus

Intrusion Detection

- It helps to know when something is happening
- Detection can identify known problems
- Suggests a solution
- First step to taking action
- May be useful in setting up a shill

Automated Response

- Can take action quickly
- Can prevent a crisis
- Need to recognize attack first
- Need to know of a corrective action that works

Two Approaches

- Inline packet capture
  - Two network cards
  - Read and forward each packet
- Parallel packet review
  - One network card
  - Watch packets as the go by

Inline

- Capture each packet and examine
- Can send out alert
- Can modify the packet
- Can take corrective action
  - Reset session
- This has performance implications
- Must allow promiscuous network connection

Parallel

- Watch packets as they go by
- Send out alert if you recognize a problem
- Can take action such as a session reset
- Must be quick
- Not the performance impact
- Must allow promiscuous network connection

Firewalls

- Contrary to University mindset
  - Open is good
  - Sharing is good
- Some argument about effectiveness
- Disagreement about need
- Much better than no defense
- Under consideration where appropriate

Microsoft and Security?

- Microsoft Strategic Technology Protection Program
  - Focus on security for Windows
  - Providing security toolkit for NT prior to XP
  - http://www.microsoft.com/security/mstpp.asp
- Windows XP automated update capability

What Have We Learned?

- In spite of good effort, can get hit
- In spite of good effort, can look bad
- File servers need to be scanned, too
- Poorly designed applications are a liability
  - Self modifying code
  - Writing & Sharing information in executable directory
  - Makes share open for attack
- Attacks are more frequent and smarter
- They've discovered Windows

What Have We Learned?

- Locking down student machines isn’t good enough
- Even if it’s free, people still don’t use antivirus scan software
- No matter how often you tell them, they will open that attachment
- Windows is not necessarily more vulnerable

Open Issues

- Scan user files on servers?
  - Size issue
  - Performance issue
  - Privacy issue
- Deal with multiple mail products?
- Deal with “Ill Formed” applications?
- Firewall initiative?
  - Cost
  - Resistance to control of freedom

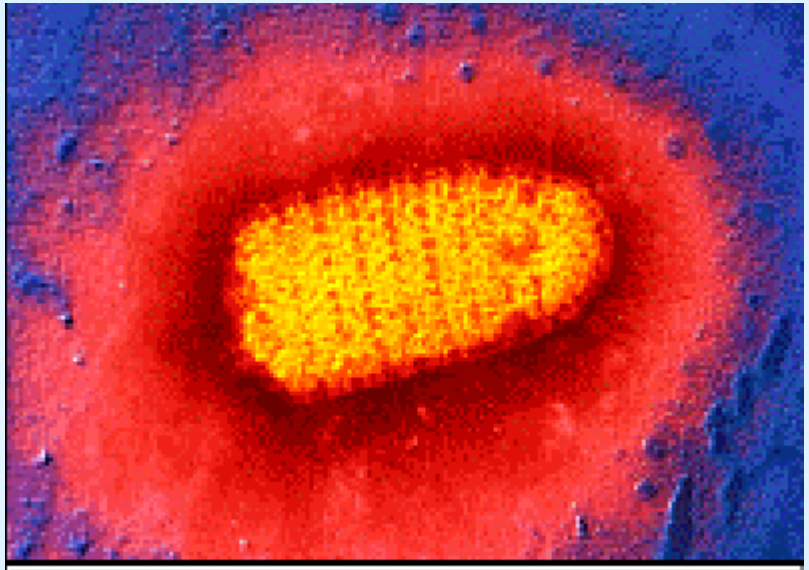
Resources

- Carnegie Mellon Software Engineering Institute
  - http://www.cert.org/nav/index_main.html
- Virus Encyclopedia
  - http://www.avp.ch/avpve/
- Computer Virus Help
  - http://pages.prodigy.net/henri_delger/
- IBM Antivirus Research
  - http://www.research.ibm.com/antivirus/

Resources

- DOE Computer Incident Advisory Capability
  - http://www.ciac.org/ciac/
- Microsoft
  - http://www.microsoft.com/security/

Questions?



Rabies Virus

It could be worse!
Corollary: It probably will be.