COMPSCI 111 / 111G

Mastering Cyberspace:
An introduction to practical computing

Risks

Social concerns

Technology changes our world rapidly

- Laws, traditions, social expectations change slowly

Problems

- Unemployment
- Crime
- Privacy
- Reliability
- Alienation / Lack of human contact
- Exclusion

Anonymity

Questions

- Is the Internet anonymous?
- Should it be anonymous?
- What are the implications of anonymity?

Advantages

- Allows discussion of sensitive issues
- sexual abuse, mental illness, substance abuse
- alt.support.impotence, alt.support.eating-disorders, etc.

Disadvantages

- Allows people to be irresponsible
- False accusations, Personal abuse

Social Imperialism

The Internet is an international resource

- Dominant language is English
- Dominant culture is American

Smaller cultures

- Diluted?
- Empowered?

Who *really* controls the Internet?

- Internet Corporation for Assigned Names and Numbers (ICANN)
- Top-level domain xxx

"Dangerous" material

Material that could be misused?
- How to guide for stalkers, rapists, murderers
- How to pick locks, make guns, chemical warfare
- Make bombs out of household cleaners
- Make nuclear weapons

Other "dangerous" material
- Religious views
- Political views (Capitalism, Democracy, Socialism)
- Racial views
- Invasion of privacy (abortion)
- Means to organise activists

Peer to Peer networks

P2P
- Form a direct connection to other computers
- Allows access to files on those computers

BitTorrent
- Swarming downloads

Copyright Act (1994)
- May not legally make copies
- Backup permitted
- May not change format
- Amendment allowing format shifting for music considered

Access across borders

Medicine
- Illegal Pharmaceuticals

Films, Videos, and Publications Act (1993)
- New Zealand censorship laws
- Office of Film and Literature Classification

Two distinct censorship issues
- Prevention of viewing illegal material
- Prevention of legal material being viewed illegally

Sexual Content on Internet

WWW - Legal material
- Traditional Magazines (Playboy, Penthouse etc.)
- Peep shows, Live Webcams, Streaming video
- Amateurs
- Archives of pictures

WWW - Illegal material
- Usually hidden
- Sometimes archived by search engines

IRC
- Sex discussion rooms
- Pedophiles use Internet to talk to children

Protecting Children

Internet as Education Medium
- Internet available in schools
- Children, Parents, Teachers want access

Some material unsuitable for children
- X-Rated material
- Foul language
- Anti-social information

Online attention
- 57% of children (12-17) have created blogs or posted photos (U.S.)
- 20% of children (10-17) receive unwanted sexual solicitation (U.S. DOJ)
  - Estimated 1 in 4 of these are from pedophiles

Research - "Girls on the Net"

Survey in New Zealand 2001 (11-19 year olds)
- 68.5% were using the Internet most days.
- 33.5% have had a personal face-to-face meeting with someone they met on the Internet.
- 60% had done at least one potentially unsafe behaviour.
  - 35.5% gave out personal information e.g. address/phone no.
  - 26.5% sent a photo of themselves to someone they met
  - 14.5% had posted a picture of themselves on the Net.
- 95.5% use the Internet at home
  - 75% of users state that their use of the Internet at home is only occasionally (37.5%) or never (37.5%) monitored by an adult.
- 44.5% use the Internet at school
  - 58% of users state that their use of the Internet at school is monitored only occasionally (28.5%) or never (29.5%) by an adult.
- 22.5% report having felt unsafe or threatened while using the Internet (most commonly from sexual threats).

http://www.netsafe.org.nz/research/research_girls.aspx

Methods available to parents

Supervise your children
- Situate computer in public place (lounge)
- Check the logs of sites visited
- Discuss Internet content with your children

Blocking software
- Stops access to sites based on the IP address
- White list / Black list

Filtering software
- Stops access to sites based on the content
- Keyword / phrases / image analysis
- PC, ISP, Third-party

http://www.aba.gov.au/newspubs/documents/filtereffectiveness.pdf

Software Errors: Therac-25

Medical linear accelerators
- Accelerate electrons to create high- energy beams
- Destroy tumors with minimal impact on healthy tissue.
- Shallow tissue is treated with accelerated electrons
- Deeper tissue is treated with X-ray photons
- Normal dose is 200 rads

Details
- Therac-6 and Therac-20 used successfully
- Therac-25 was the latest model
- Eleven Therac-25 machines were installed from 1982 onwards
- 5 in US
- 6 in Canada
- Six accidents reported between 1985 and 1987
- Machine withdrawn in 1987

http://en.wikipedia.org/wiki/Therac_25

Computer Error

Indiana State University (May 21st 2002)
- Personal details of 10,000 students accidentally published
- Names and Social Security numbers available via internet
- Software error caused problem

Errors identified in all major institutions
- Banks
- Nuclear Power Stations
- Military Defense Systems
- Missile Guidance
- NASA Space shuttle
- Air Traffic control systems
- Government Agencies
- IRD/ IRS

Malicious Software (malware)

Logic Bomb
- Deliberate error left in software by the programmer
- Triggered by a predetermined event

Trojan
- Real purpose of the program is disguised

Worm
- Replicate across a network
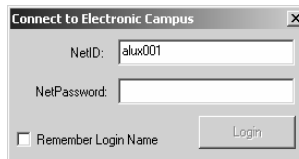- Does not attach itself to other files

Virus
- Attaches itself to existing files
- Replicates by modifying other files

Trojan Horse

Login Trojan
- Common in environments with shared computing resources
- Stores Login and Password details entered

http://en.wikipedia.org/wiki/Trojan_horse_%28computing%29

Worms

John Brunner: The Shockwave Rider (1975)

Xerox Worm (1982)
- Program designed to do computer housekeeping
- Diagnostic checks, Backups, Archives etc
- Automated, ran when machines were unused
- If computer was not in use, it copied itself onto that machine
- Left running on 6 machines overnight
- All machines in network crashed (100+)
- Restarting the machines resulted in worm restarting
- Had to write a vaccine to prevent the worm
- First Anti-virus software

http://en.wikipedia.org/wiki/Computer_worm

Internet Worm

Robert Morris 1988
- Used a flaw in the Berkeley Unix system
- Possible to send commands via email
- Program sent, and command to execute it sent
- Looked for all email addresses on the system
- Sent copy to all other addresses

Consequences
- 6000 Military computer jammed
- Approx 250,000 systems affected
- 700 major institutions
- Arpanet, NASA network, NSFnet all closed
- 48 hours before they developed countermeasures

Viruses

First viruses seen "in the wild"
- 1982 - Apple II computers

Fred Cohen 1983 Doctoral Thesis

Definition:
- A virus is a program that can infect other programs by modifying them to include a copy of itself

Good Viruses?
- Fred Cohen advocates use of "good viruses"
- Too dangerous
- Too problematic (ownership, upgrades, choice)

http://en.wikipedia.org/wiki/Computer_virus

Virus Panic

Michelangelo (1992)
- Designed to spread until March 6th, then delete hard drives
- Panic spreads, reports estimate 5 million machines affected
- 5,000 - 10,000 actually damaged

Email Hoaxes

Good Times Virus (1992)
- Any message containing subject "Good Times" is a virus

SULFNBK.EXE Hoax (2001)
- You may have a virus, delete this file if it is on your machine
- SULFNBK.EXE is a legitimate part of the Windows OS.

Some Truths about viruses

All Viruses are potentially dangerous
- Most viruses are harmless

No known virus has ever damaged hardware
- It is possible to get viruses from hardware
  - Printers, BIOS, EEPROM etc.

Any File could contain a virus
- Commercial Software can have viruses
- CD-ROMS can have Viruses

Viruses can be stored and never activated
- A program must be executed before the virus can spread
- May be executed automatically

Prevention

Run anti-virus software
- Scan all files automatically
- Only recognise files that are in its database
- Must update regularly
- Still possible to get viruses

Email
- Don't **ever** open executable files sent via email … **EVER**
- Disable macros in all MS Office products
- Disable VB Scripting in Windows
- Use Web-based email services (Yahoo, Hotmail etc.)

References - Social Issues

Internet Safety Group (NZ)
- http://www.netsafe.org.nz/

Report on Filtering
- http://www.aba.gov.au/newspubs/documents/filtereffectiveness.pdf

Ministry of Economic Development
- http://www.med.govt.nz
- Copyright Law
- Broadband
- SPAM

Virus References

http://www.mcafee.com/anti-virus/

http://www.symantec.com