Last time

- Administering Security
  - Security planning
  - Risk Analysis

This time

- Physical security
- Legal and ethical issues
  - Intellectual property

Physical security

- All the firewalls in the world won't help you defend against an attacker who physically steals your laptop off your desk
  - See the Data Loss archive from last week for *many* examples of personal information being lost in incidents just like this
- We need to protect the physical machines, as well as the software and data

Physical threats

- There are two major classes of physical threats:
  - Nature, e.g.:
    - Fire
    - Flood
    - Blackouts
  - Human, e.g.:
    - Vandals
    - Thieves
    - Targetted attackers
- What are the major differences in the security controls needed to protect against these two classes?

Physical controls against humans

- Last time, we looked at being able to recover from natural disasters
  - Many of these techniques will also be useful against thefts, etc.
- This time, we will discuss what additional measures are necessary to protect against humans
  - Need to not only recover from the loss, but also deal with the release of potentially sensitive data

Vandals

- Some human attacks aren't actually after the data
- Sir George Williams (later Concordia U) “Computer Centre Incident” of 1969 — the largest student uprising in Canadian history

- How would you control this kind of threat?

Thieves

- Most thefts are after what?
  - Hardware?
  - Software?
  - Data?
- We've already talked about controls against theft of software and data
- What about hardware?

Targetted attackers

- What if the thieves are actually targetting you?

- Now what are they most likely to be after?
  - Hardware?
  - Software?
  - Data?

Protecting offline data

- We have a good sense of how to protect data on an active machine hooked up to a network
- What about data sitting on a shelf?
  - Backup tapes / disks
  - Printouts / reports
- What happens after they're on the shelf?
- Why is offline data like this attractive to attackers?

Protecting offline data

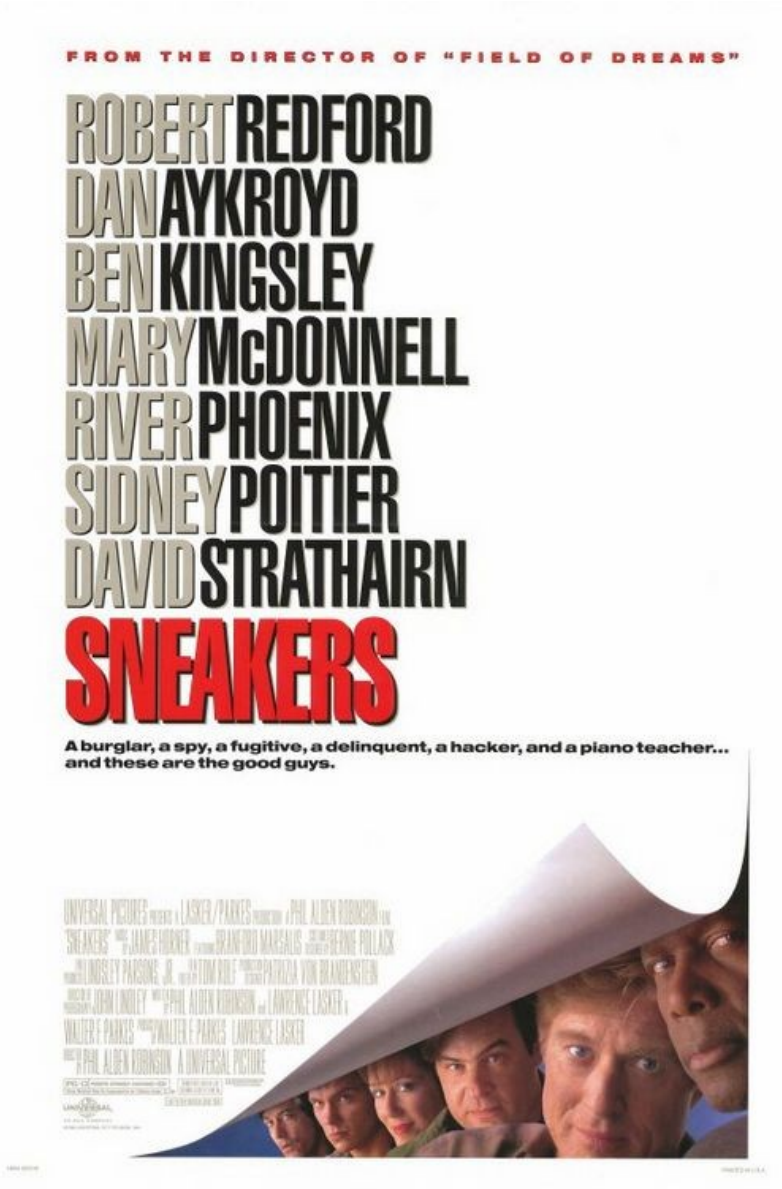
- It's obviously harder for a network-based attacker to get at that kind of data
- But what about a physical attacker?
  - Thief
  - Insider
- How do you safely dispose of data?
  - Paper
  - Magnetic media
  - Optical media

Putting it together

- So now we know how to protect:
  - Programs
  - Operating Systems
  - Networks
  - Internet applications
  - Databases
  - Physical computers and data
- How can we test if we've done it right?

Tiger teams

- Tiger teams are teams of security professionals
- You can hire them to try to break into your site, systems, networks, etc.
  - And tell you what's wrong



Legal protections

- Remember this from lecture 1:

- How can we defend against a threat?
  - Prevent it: block the attack
  - Deter it: make the attack harder or more expensive
  - Deflect it: make yourself less attractive to attacker
  - Detect it: notice that attack is occurring (or has occurred)
  - Recover from it: mitigate the effects of the attack

- In addition to (sometimes instead of, unfortunately) using technological defences, we can also use legal defences

Legal protections

- The most obvious legal protections are against threats to hardware
- If someone steals a laptop, it's completely straightforward that he can be charged with a crime
- What if someone copies the laptop's hard disk, but leaves the laptop where it is?
- This is much newer law, and is often less clear
  - Caveat: IANAL; this course does not consitute formal legal advice. :-)

Overview of IP

- In contrast to real property, so-called “intellectual property” (IP) differs in important ways:
  - It is non-depletable
  - It is replicable
  - It has minimal marginal cost
- So the laws for IP differ from the laws for real property, and indeed are much more complicated
- Four kinds of IP concern us:
  - Trade secrets, trademarks, patents, and copyrights

Overview of IP

- These four kinds of IP:
  - Cover different kinds of intangibles
  - Convey different rights
  - Have different durations
  - Have different registration requirements
  - (But are nonetheless often confused for each other!)

- Note: IP law is similar, but not identical, in Canada and the US; we will make note of the most important differences

Trade secrets

- This is the simplest kind of IP
- You want to protect some secret information
  - The formula for Coca-Cola
  - The method for computing how many airline seats to oversell
  - Your new O(n) sorting algorithm
- Just don't tell anyone, and call it a trade secret
  - Unfortunately, you have to tell *someone*, or it's not useful
  - You get legal protection if that person passes it on

Reverse engineering

- Reverse engineering is the process of taking a finished product, and taking it apart to figure out how it works
  - If someone successfully does this, you've lost your trade secret protection
  - General rule for trade secrets: it has to be a secret
- A similar rule applies to software, with some caveats we'll see later
- RC4 was originally a trade secret, but it was reverse engineered in 1994

Trademarks

- Even though the RC4 algorithm was no longer protected, its name was!
- Trademarks protect names, brands, logos
- To get one, make a legal filing showing that you are using the name in commerce
  - This lets you sue others who use that name in a confusing manner
- Domain names are often protected under trademark law

Patents

- Applies to inventions, which must be:
  - Novel
  - Useful
  - Nonobvious
- The bargain is that:
  - You tell everyone how your invention works
  - In exchange, you get to have a monopoly over it for 20 years
- The most difficult form of IP to obtain

Cryptography patents

- Many cryptographic algorithms are (or were) patented
- Notably:
  - Diffie-Hellman (expired 1997)
  - RSA (expired 2000)
  - IDEA (block cipher used in early PGP, expires 2012)
  - Lots of patents on elliptic curve cryptography
- Since 2000, you could pick a good unpatented example of each type of crypto

Recap

- Physical security
- Legal and ethical issues
  - Intellectual property

Next time

- Legal and ethical issues
  - Copyright and paracopyright
  - Computer crime
  - Redress for software failures
  - Codes of professional ethics