Access Control and Privacy Policies (4)

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Slides: KEATS (also homework is there)

Unix-Style Access Control

- Q: "I am using Windows. Why should I care?"
  A: In Windows you have:

  administrators group
  (has complete control over the machine)
  authenticated users
  server operators
  power users
  network configuration operators

- Modern versions of Windows have more fine-grained AC; they do not have a setuid bit, but have `runas` (asks for a password).

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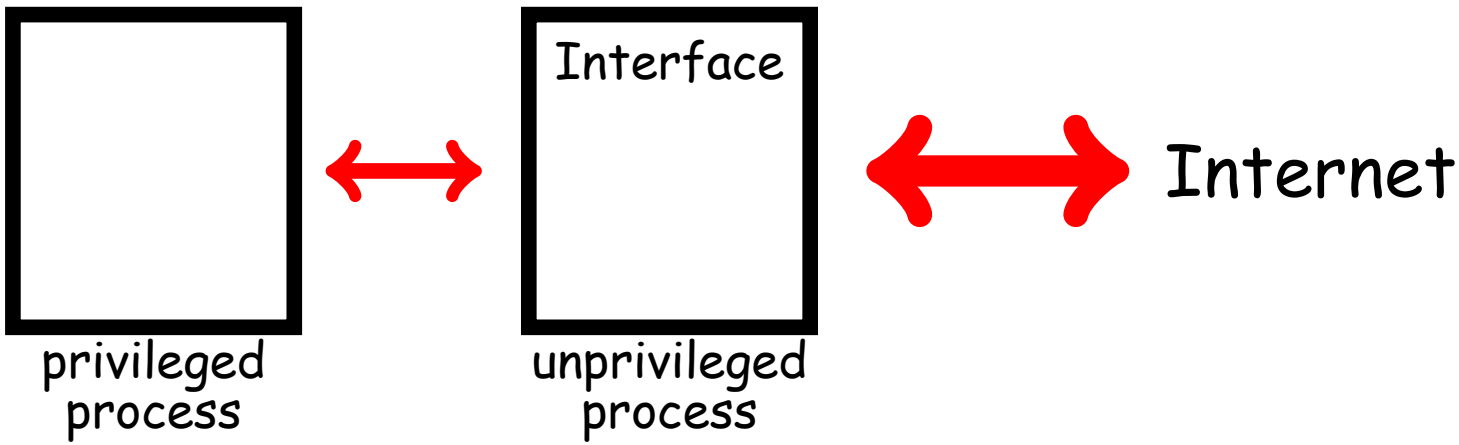
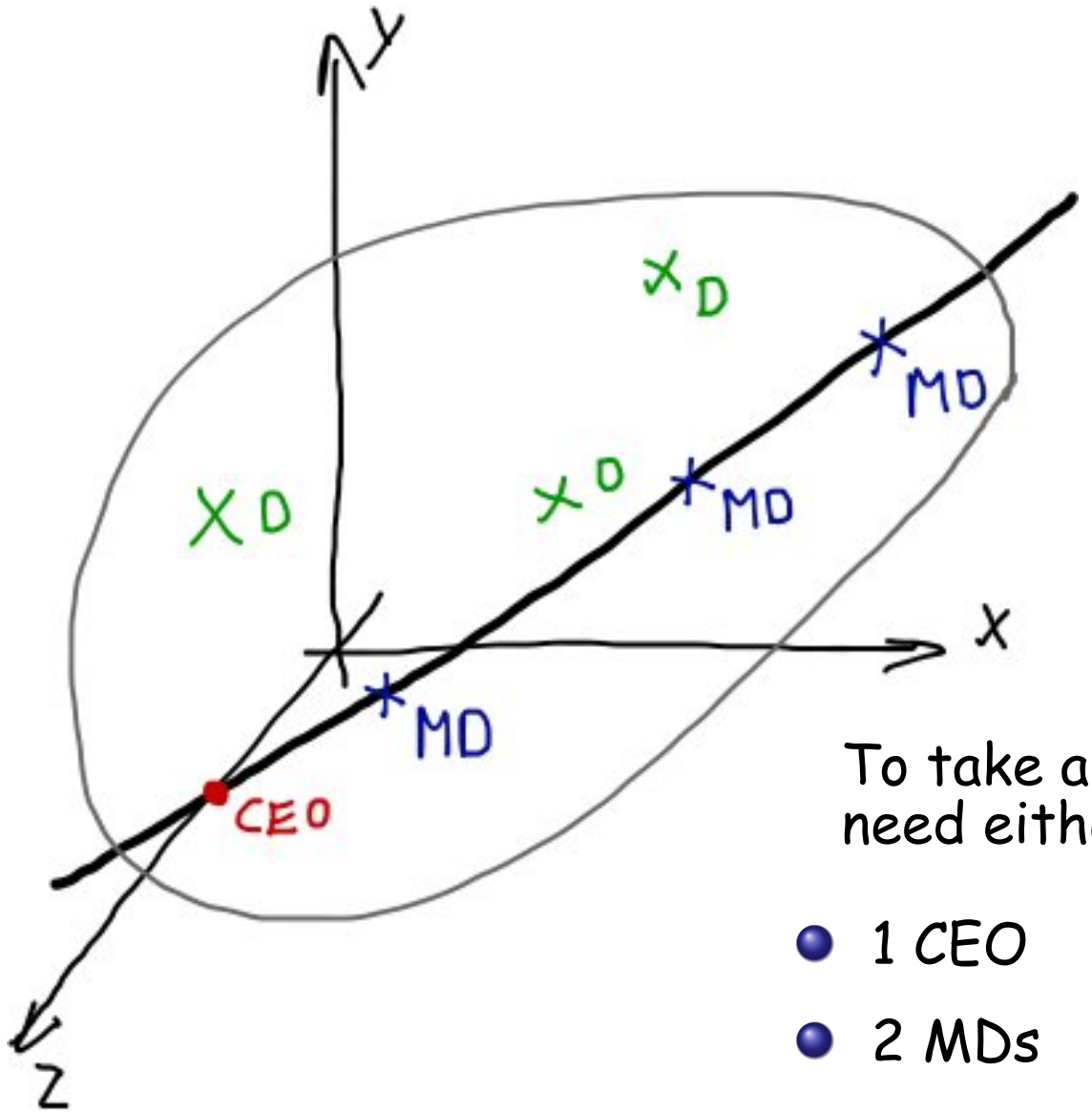
- OS provided access control can add to your security.

Network Applications: Privilege Separation



- the idea is make the attack surface smaller and mitigate the consequences of an attack

Shared Access Control



To take an action you need either:

- 1 CEO
- 2 MDs
- 3 Ds

Lessons from Access Control

- if you have too many roles (i.e. too finegrained AC), then hierarchy is too complex
  you invite situations like. . . let's be root

- you can still abuse the system. . .

A "Cron"-Attack

The idea is to trick a privileged person to do something on your behalf:

- root:

```
rm /tmp/*/*
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  ```
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  ```

  the shell behind the scenes:

  $\texttt{rm /tmp/dir}_1\texttt{/file}_1\ \texttt{/tmp/dir}_1\texttt{/file}_2\ \texttt{/tmp/dir}_2\texttt{/file}_1\ \ldots$

  this takes time

A "Cron"-Attack

1. attacker (creates a fake passwd file)
   `mkdir /tmp/a; cat > /tmp/a/passwd`
2. root (does the daily cleaning)
   `rm /tmp/*/*`

   records that `/tmp/a/passwd`

   should be deleted, but does not do it yet
3. attacker (meanwhile deletes the fake passwd file, and establishes a link to the real passwd file)
   `rm /tmp/a/passwd; rmdir /tmp/a;`
   `ln -s /etc /tmp/a`
4. root now deletes the real passwd file

A "Cron"-Attack

1. attacker (creates a fake passwd file)
   `mkdir /tmp/a; cat > /tmp/a/passwd`
2. ro
   rr

To prevent this kind of attack, you need additional policies.

records that `/tmp/a/passwd`
should be deleted, but does not do it yet

3. attacker (meanwhile deletes the fake passwd file, and establishes a link to the real passwd file)
   `rm /tmp/a/passwd; rmdir /tmp/a;`
   `ln -s /etc /tmp/a`
4. root now deletes the real passwd file

Schneier Analysis

- What assets are you trying to protect?
- What are the risks to these assets?
- How well does the security solution mitigate those risks?
- What other risks does the security solution cause?
- What costs and trade-offs does the security solution impose?

There is no absolutely secure system and security almost never comes for free.

Example: Credit Cards

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- What assets are you trying to protect?
  your credit card number

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  With credit cards you loose a fixed amount £50. Amazon £50.

Example: Credit Cards

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  Well, hackers steal credit cards from databases. They usually do not attack you individually.

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  None (?)

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  Internet shopping is convenient and sometimes cheaper.

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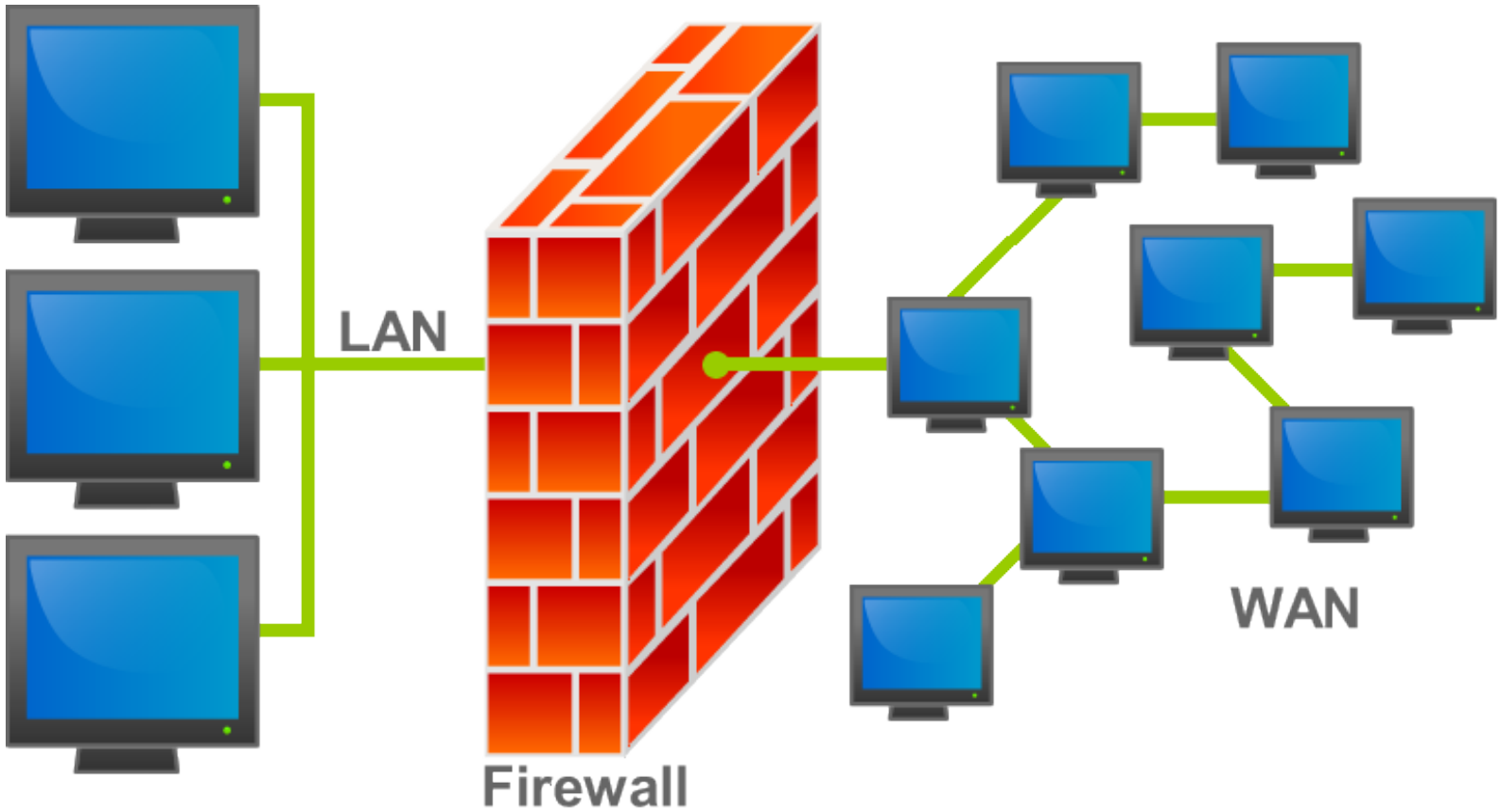
No!

Example: Firewall



A firewall is a piece of software that controls incoming and outgoing traffic according to some rules.

Example: Firewall

- What assets are you trying to protect?

  Whatever is behind the firewall (credit cards, passwords, blueprints, ...)

Example: Firewall

- What assets are you trying to protect?
- What are the risks to these assets?

  With a small online shop you are already at risk. Pentagon, definitely.

Example: Firewall

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  Well, at home so not much. Everywhere else, if properly configurated then it does.

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  There might be backdoors or bugs in the firewall, but generally they are secure. You choose to prevent certain traffic.

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  Minimal to modest. Firewalls are part of free software. You need a knowledgeable person to set them up.

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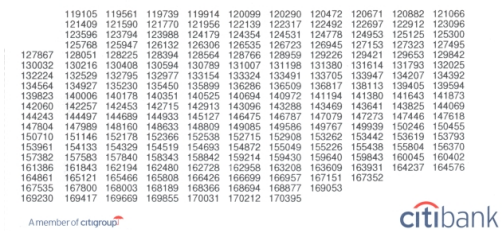
  Yes!

Ex: Two-Factor Authentication

Google uses nowadays two-factor authentication. But it is an old(er) idea. It is used for example in Germany and Netherlands for online transactions.



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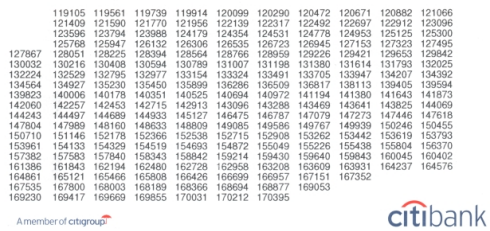

Or nowadays by SMS (restricts the validity of the numbers) or with a secure generator

Ex: Two-Factor Authentication

- What assets are you trying to protect?

  Your bank account.

Ex: Two-Factor Authentication

- What assets are you trying to protect?
- What are the risks to these assets?

  Nowadays pretty high risk.

Ex: Two-Factor Authentication

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  It prevents problems when passwords are stolen. Man-in-the-middle attacks still possible.

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  Your mobile phone or creditcard/pin might be stolen. SIM card become valuable.

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  Banks need to establish an infrastructure.

  For you it might be inconvenient.

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Security Seals

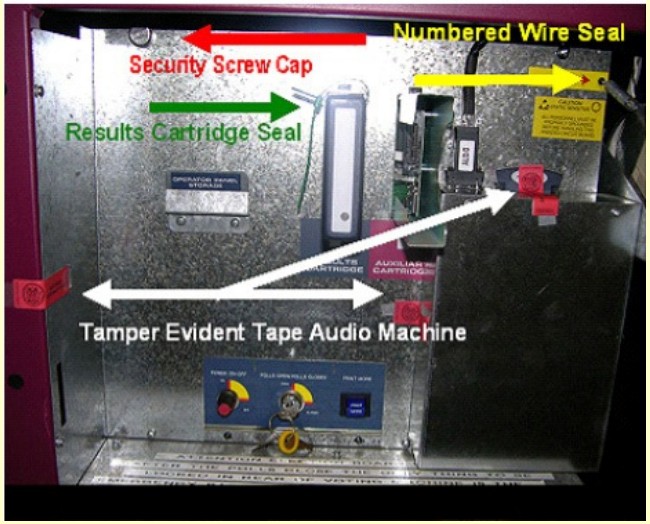
According to Ross Anderson: "... is a tamper-indicating device designed to leave non-erasable, unambiguous evidence of unauthorized entry or tampering."

They also need some quite sophisticated policies (seal regiment).

Security Seals (2)

- at the Argonne National Laboratory they tested 244 different security seals (including 19% that were used for safeguard of nuclear material)
  - mean time to break the seals for a trained person: 100 s
- Andrew Appel defeated all security seals which were supposed to keep voting machines safe.

Security Seals (2)



- The tamper-indicating tape can be lifted using a heat gun.
- The security screw cap can be removed using a screwdriver, then the serial-numbered top can be replaced (undamaged) onto a fresh (unnumbered) base.
- The wire seal can be defeated using a #4 wood screw.
- The plastic strap seal can be picked using a jeweler's screwdriver.

Ex: Security Seals

- What assets are you trying to protect?

  Voting machines, doors.

Ex: Security Seals

- What assets are you trying to protect?
- What are the risks to these assets?

  Casual thiefs, insider attacks.

Ex: Security Seals

- What assets are you trying to protect?
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  Needs a quite complicated security regiment.

Ex: Security Seals

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  You might not notice tampering.

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  The "hardware" is cheap, but indirect costs can be quite high.

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  No! Though in some areas they work: airport.