Port Scanning

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Outline

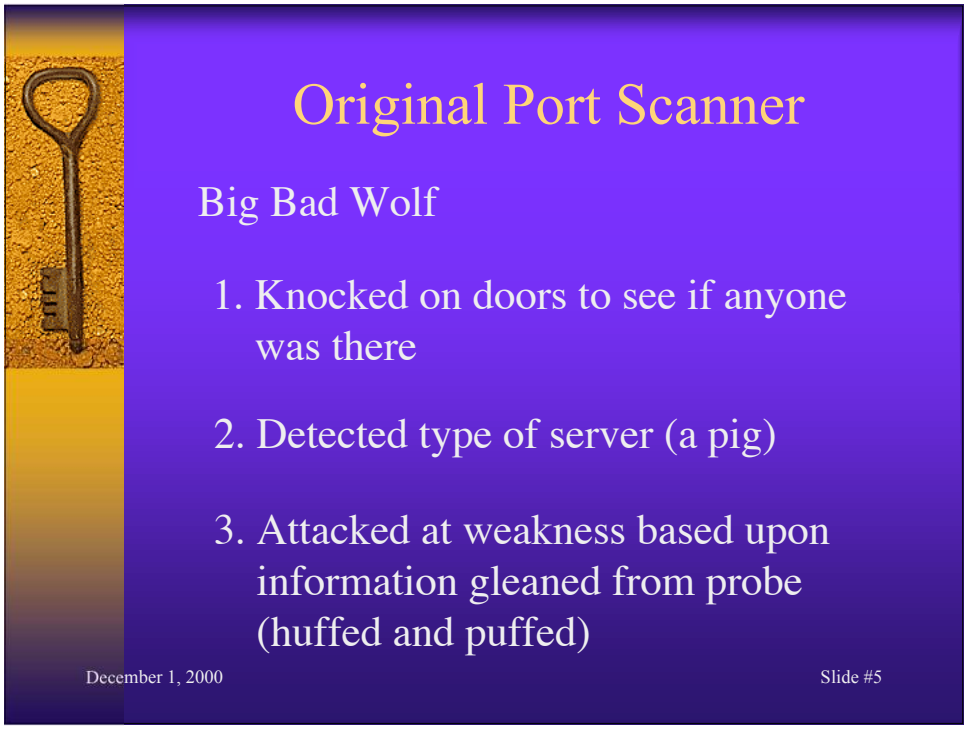
- What is port scanning?
- How do you do it?
- Why should you do it?
- Is it ethical?
- Some random thoughts

Port Scanning by Analogy

- Look at the door of a building
- By looking at the type of door, you may gain information about what the site does
  - Door with counter halfway up: fast food
  - Door with heavy glass and sliding tray: drive-up teller
  - Door with iron bars: jail
  - Door with multiple locks: “secure” facility

In Computer Terms

- Servers make your computer available to “outsiders”
- The functions your computer will perform is reflected by the servers you run
- Good place for attackers to check out your computer


Original Port Scanner
Big Bad Wolf
1. Knocked on doors to see if anyone was there
2. Detected type of server (a pig)
3. Attacked at weakness based upon information gleaned from probe (huffed and puffed)
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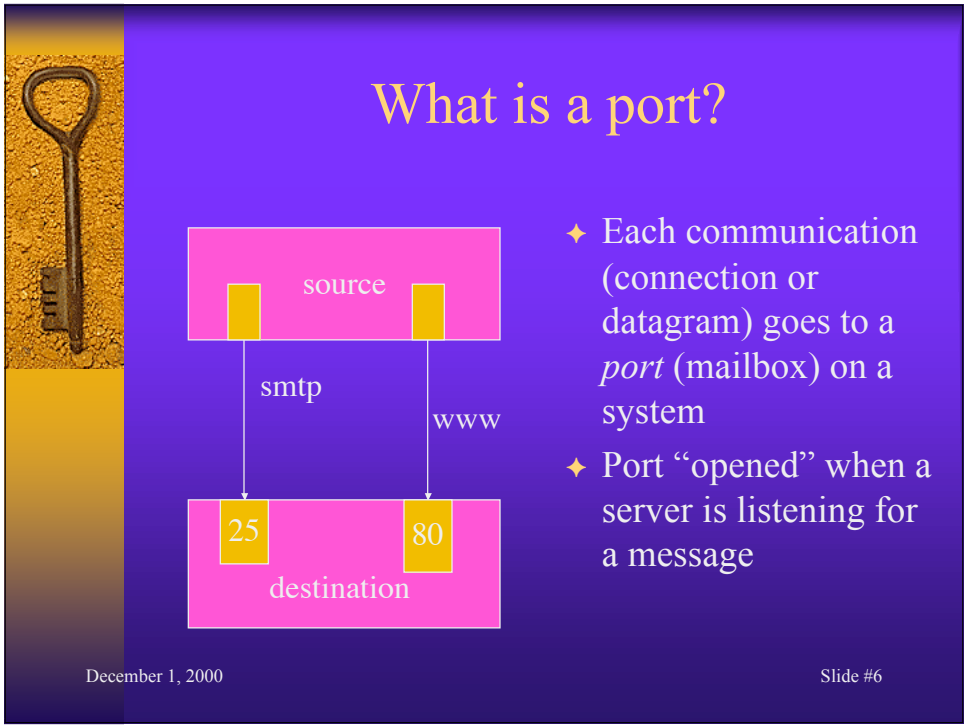
What is a port?
source
smtp
www
25
80
destination
Each communication (connection or datagram) goes to a *port* (mailbox) on a system
Port "opened" when a server is listening for a message
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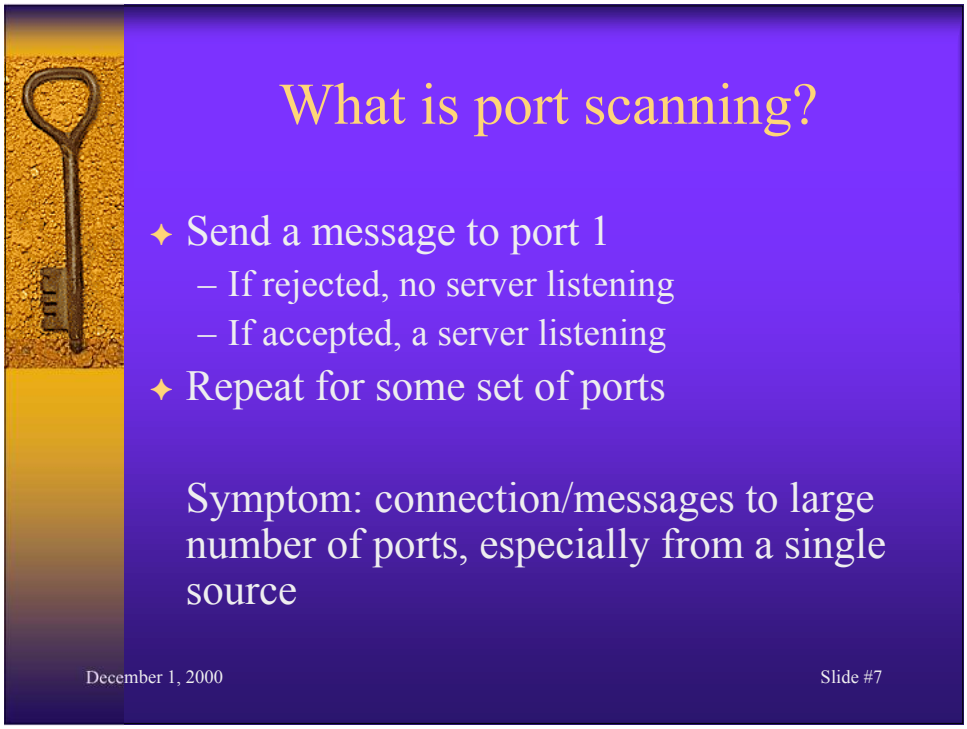
What is port scanning?
Send a message to port 1
– If rejected, no server listening
– If accepted, a server listening
Repeat for some set of ports
Symptom: connection/messages to large number of ports, especially from a single source
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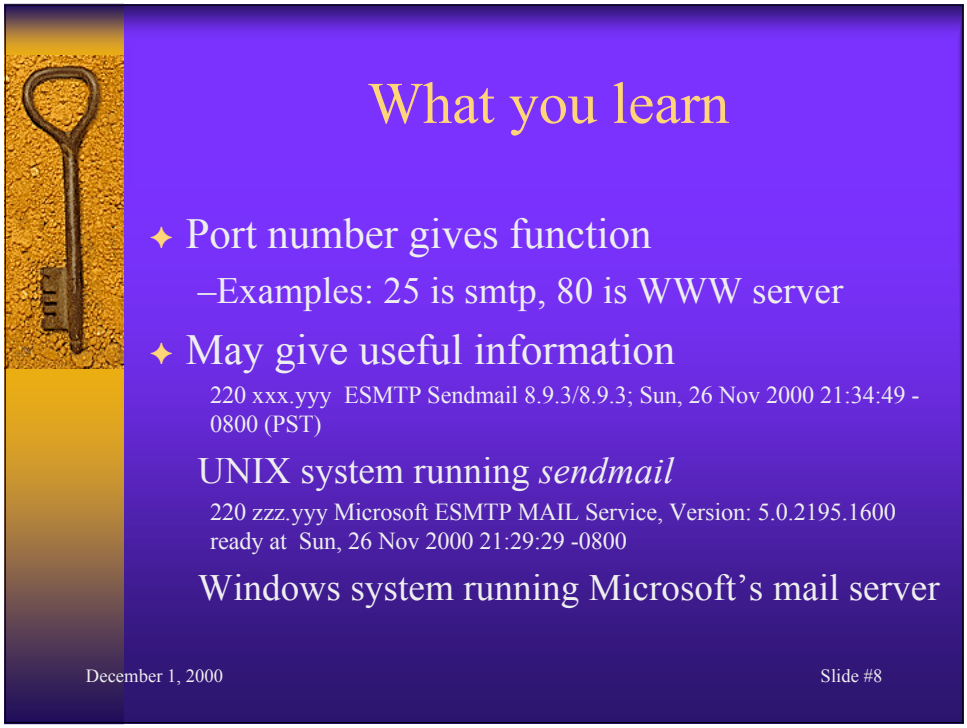
What you learn
Port number gives function
–Examples: 25 is smtp, 80 is WWW server
May give useful information
220 xxx.yyy ESMTP Sendmail 8.9.3/8.9.3; Sun, 26 Nov 2000 21:34:49 -0800 (PST)
UNIX system running sendmail
220 zzz.yyy Microsoft ESMTP MAIL Service, Version: 5.0.2195.1600 ready at Sun, 26 Nov 2000 21:29:29 -0800
Windows system running Microsoft's mail server
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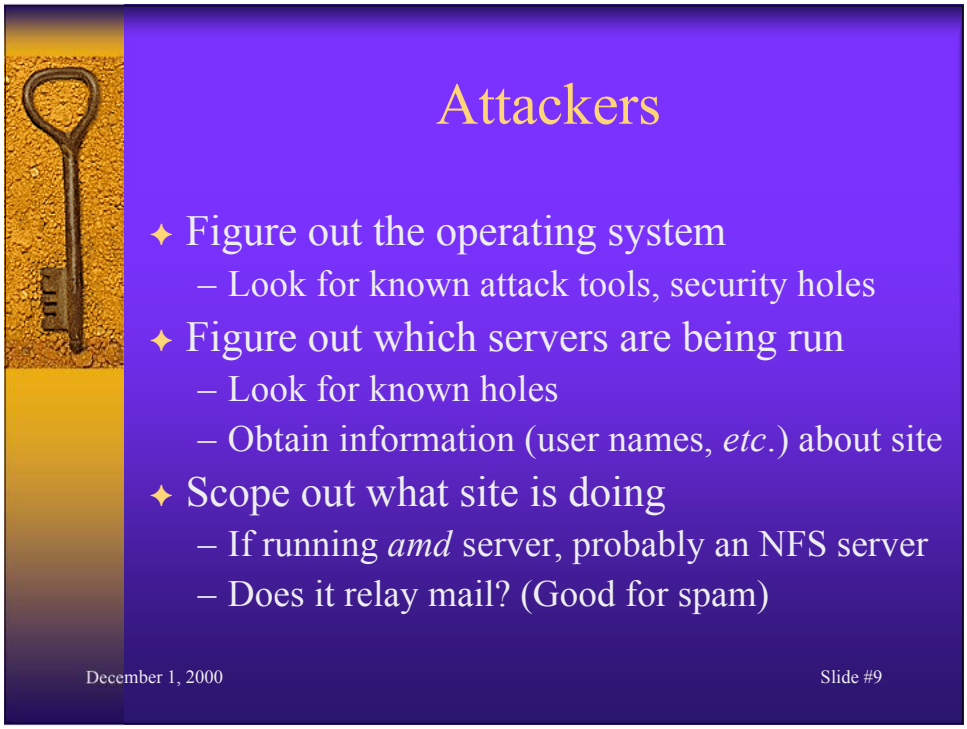
Attackers
Figure out the operating system
– Look for known attack tools, security holes
Figure out which servers are being run
– Look for known holes
– Obtain information (user names, *etc*.) about site
Scope out what site is doing
– If running *amd* server, probably an NFS server
– Does it relay mail? (Good for spam)
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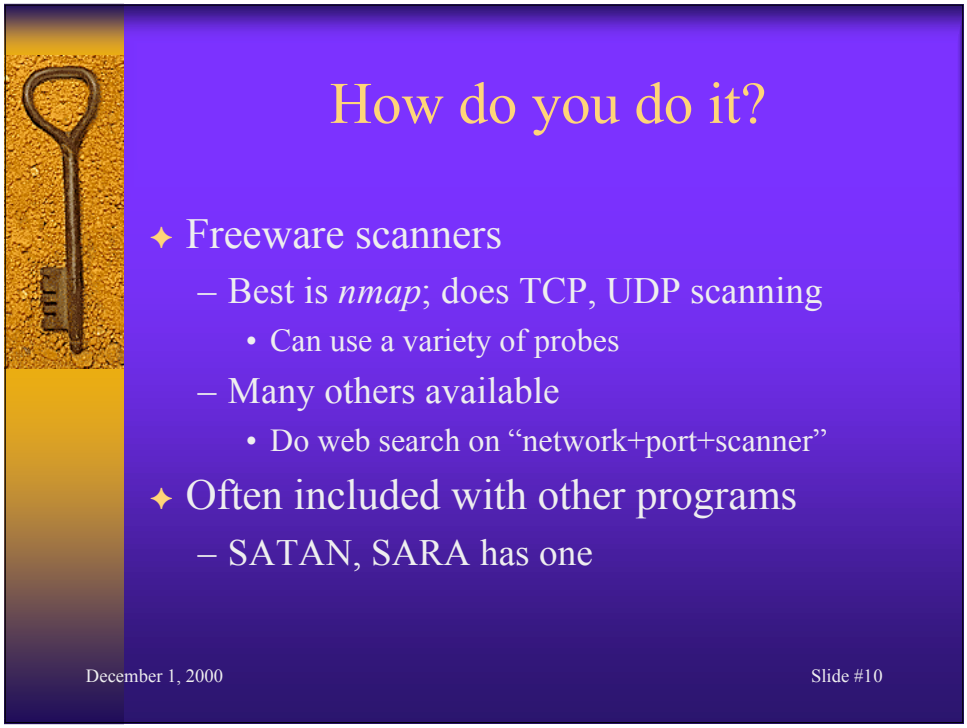
How do you do it?
Freeware scanners
– Best is *nmap*; does TCP, UDP scanning
• Can use a variety of probes
– Many others available
• Do web search on "network+port+scanner"
Often included with other programs
– SATAN, SARA has one
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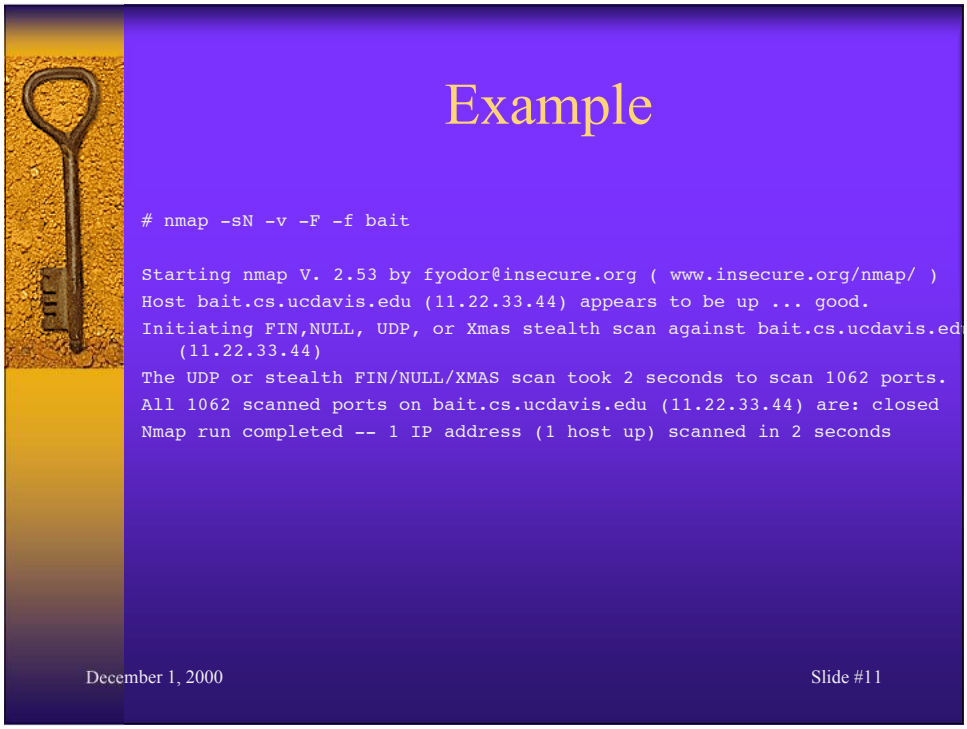

Example

```
# nmap -sN -v -F -f bait

Starting nmap V. 2.53 by fyodor@insecure.org ( www.insecure.org/nmap/ )
Host bait.cs.ucdavis.edu (11.22.33.44) appears to be up ... good.
Initiating FIN,NULL, UDP, or Xmas stealth scan against bait.cs.ucdavis.ed
   (11.22.33.44)
The UDP or stealth FIN/NULL/XMAS scan took 2 seconds to scan 1062 ports.
All 1062 scanned ports on bait.cs.ucdavis.edu (11.22.33.44) are: closed
Nmap run completed -- 1 IP address (1 host up) scanned in 2 seconds
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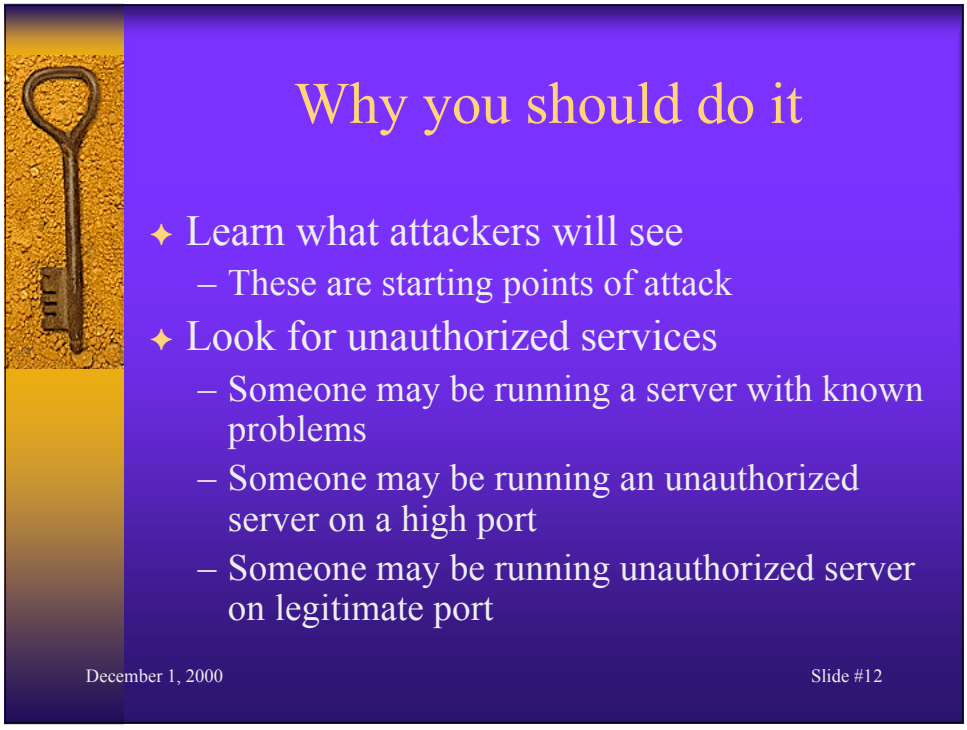
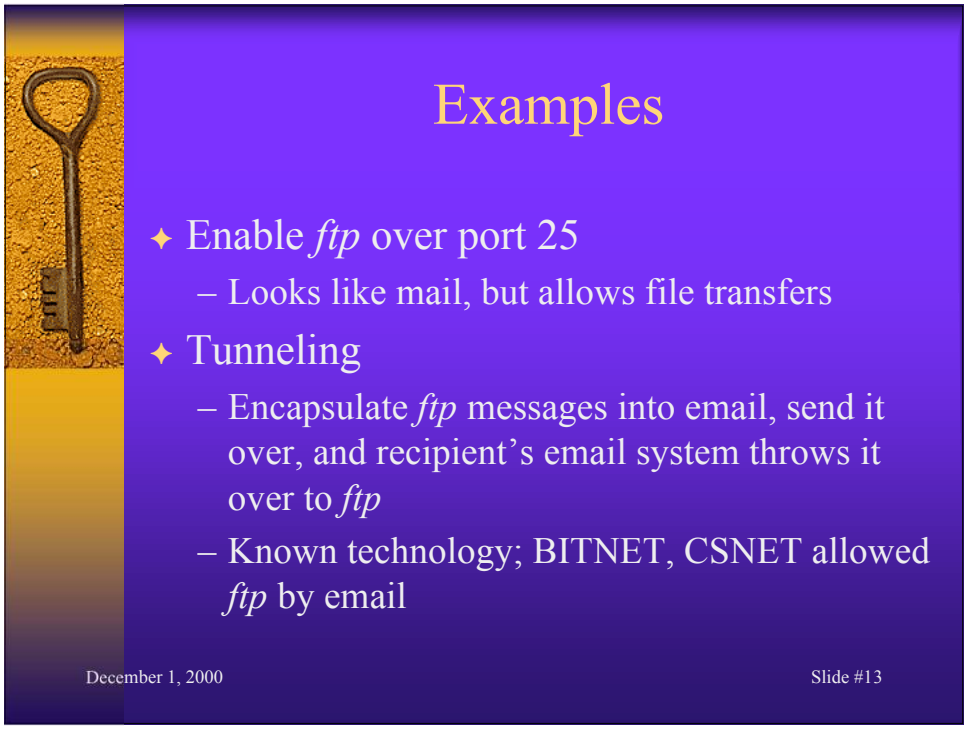


Why you should do it

- Learn what attackers will see
  - These are starting points of attack
- Look for unauthorized services
  - Someone may be running a server with known problems
  - Someone may be running an unauthorized server on a high port
  - Someone may be running unauthorized server on legitimate port


Examples
Enable *ftp* over port 25
– Looks like mail, but allows file transfers
Tunneling
– Encapsulate *ftp* messages into email, send it over, and recipient's email system throws it over to *ftp*
– Known technology; BITNET, CSNET allowed *ftp* by email
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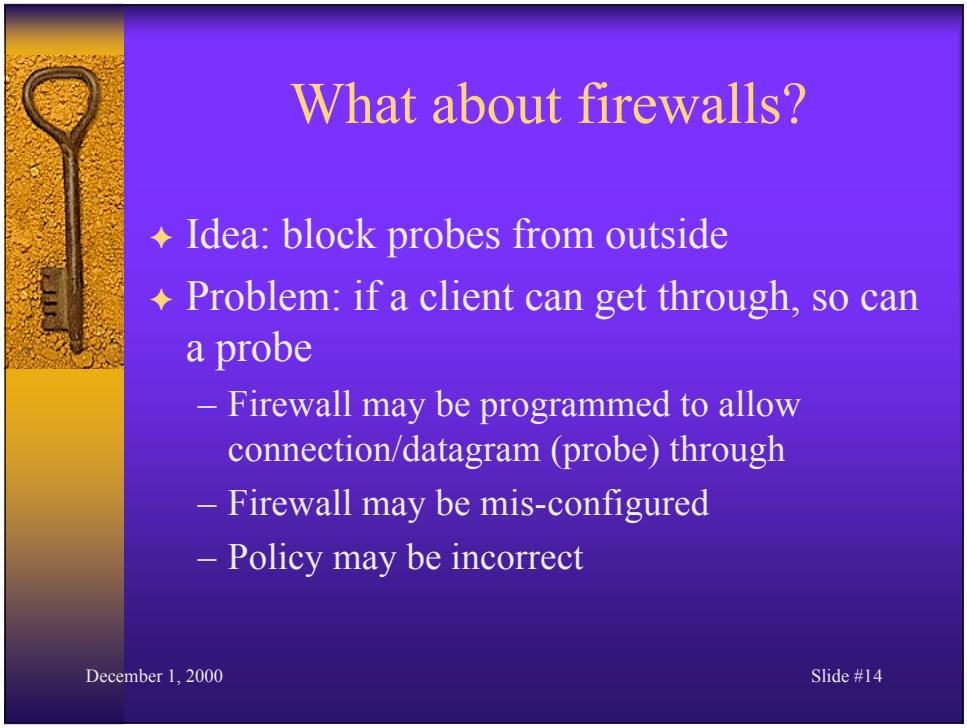
What about firewalls?
Idea: block probes from outside
Problem: if a client can get through, so can a probe
– Firewall may be programmed to allow connection/datagram (probe) through
– Firewall may be mis-configured
– Policy may be incorrect
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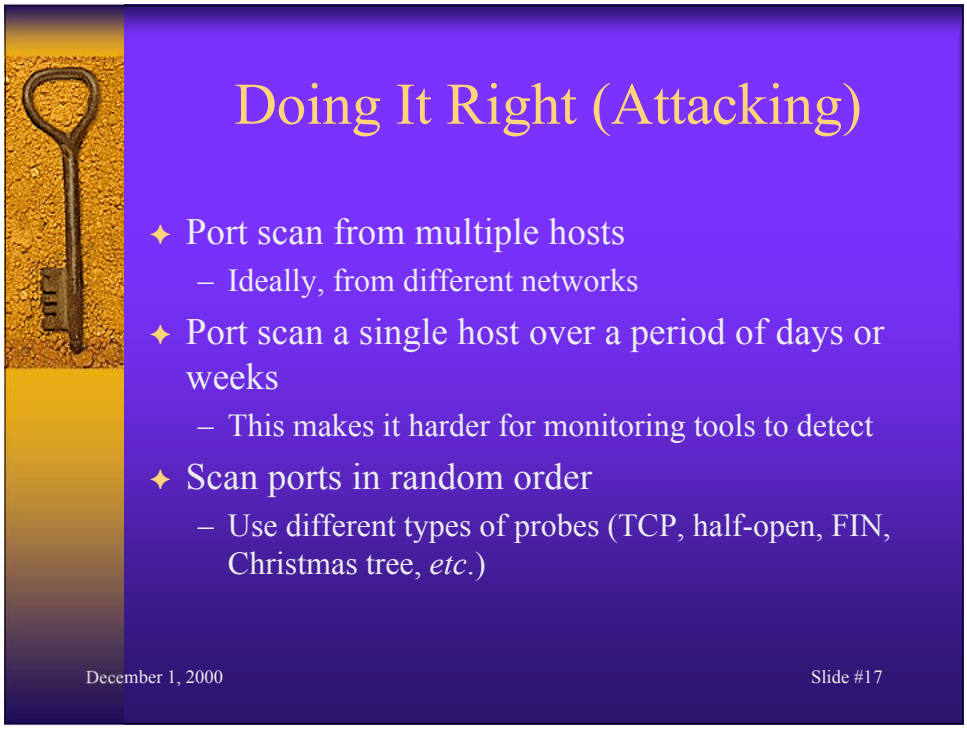
Is It Ethical?

- Consider our door
- If you check the doors of your house to see which are unlocked, that's fine
- If you check the doors of your neighbor's house, that's questionable
  - Is it illegal if you don't open the door?

Random Thoughts

- When is it port scanning?
  - Can be done very slowly
  - Unintentional connections, messages to various ports
- What does it mean?
  - Curiosity
  - Precursor to attack


Doing It Right (Attacking)
Port scan from multiple hosts
– Ideally, from different networks
Port scan a single host over a period of days or weeks
– This makes it harder for monitoring tools to detect
Scan ports in random order
– Use different types of probes (TCP, half-open, FIN, Christmas tree, *etc*.)
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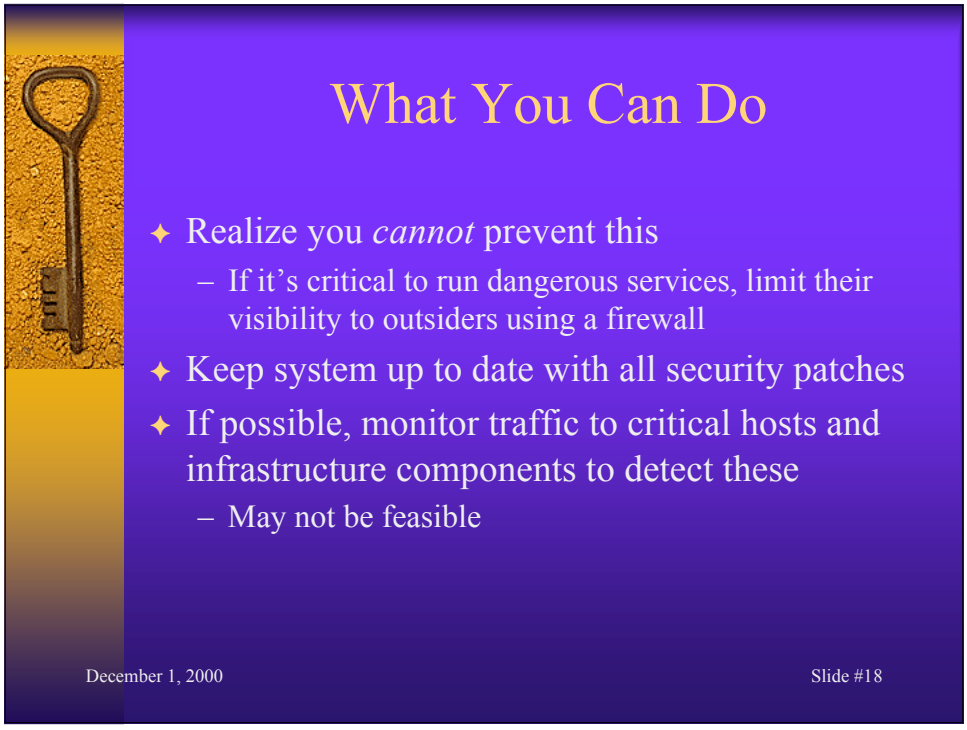
What You Can Do
Realize you *cannot* prevent this
– If it's critical to run dangerous services, limit their visibility to outsiders using a firewall
Keep system up to date with all security patches
If possible, monitor traffic to critical hosts and infrastructure components to detect these
– May not be feasible
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A Final Thought

When it seems hopeless, remember Dorothy Parker's words:

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Razors pain you;
Rivers are damp;
Acids stain you;
And drugs cause cramp.
Guns aren't lawful;
Nooses give.
Gas smells awful;
You might as well live.
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