Penetration Testing and the Metasploit Framework

Iowa State IASG

September 14, 2010

Jonathan Cran

Introduction

- Jonathan Cran
  - Former CISSP
  - Security Consultant (Rapid7, LLC)
  - QA Engineer (Metasploit)
- Talk is split into two parts
  - Security Consulting / Penetration Testing
  - Metasploit Framework & Practical 0wnage


Eyeliner go like dis
right?
I good makeup artist
ICANHASCHEEZBURGER.COM

InfoSec Today

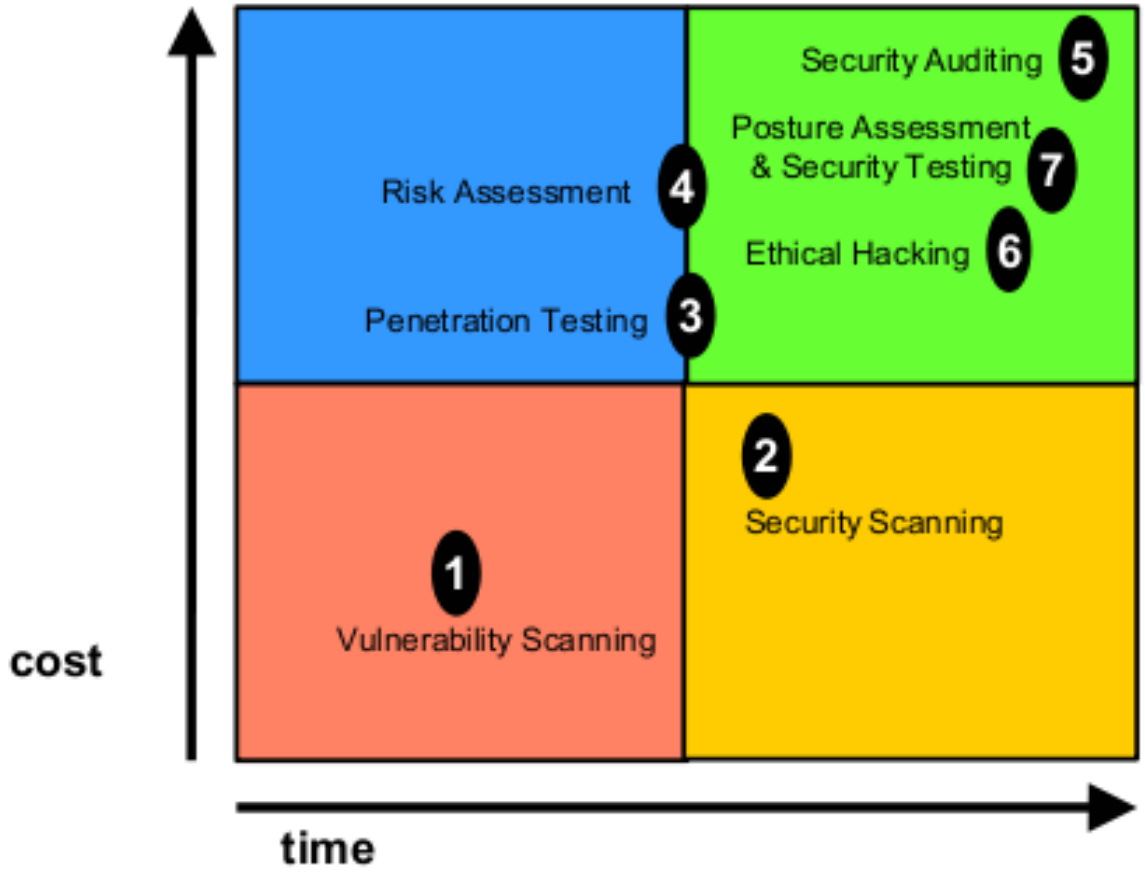
- Scary out there
  - Customized malware!
    - Zeus Trojan & ACH Transfers
      - Read Brian Krebs if you're not already
  - Verizon Data Breach report
    - Qualys, Veracode, etc, etc, etc
  - SQL Injection Worms, Massive Botnets

But … most people don't know it, or have too much to do already

Security Assessment Today

- Everybody needs it – usually because of regulation, sometimes because of best practice
  - Verticals:
    - Financial
    - Government (Federal,State,Regional)
    - Healthcare, Retail, Education, Insurance, etc
- Who does it
  - Lots of local firms, boutique shops
  - Government Contractors
  - Big4

What Kind of Security Assessment?



Penetration Testing Today

- Business Side
  - SOWS / RFPs,
  - Generally Small Teams
- Technical Side
  - Network / Application (Web / Fat Client)
  - Wireless
  - Tons of specialties, but jack-of-all-trades is helpful

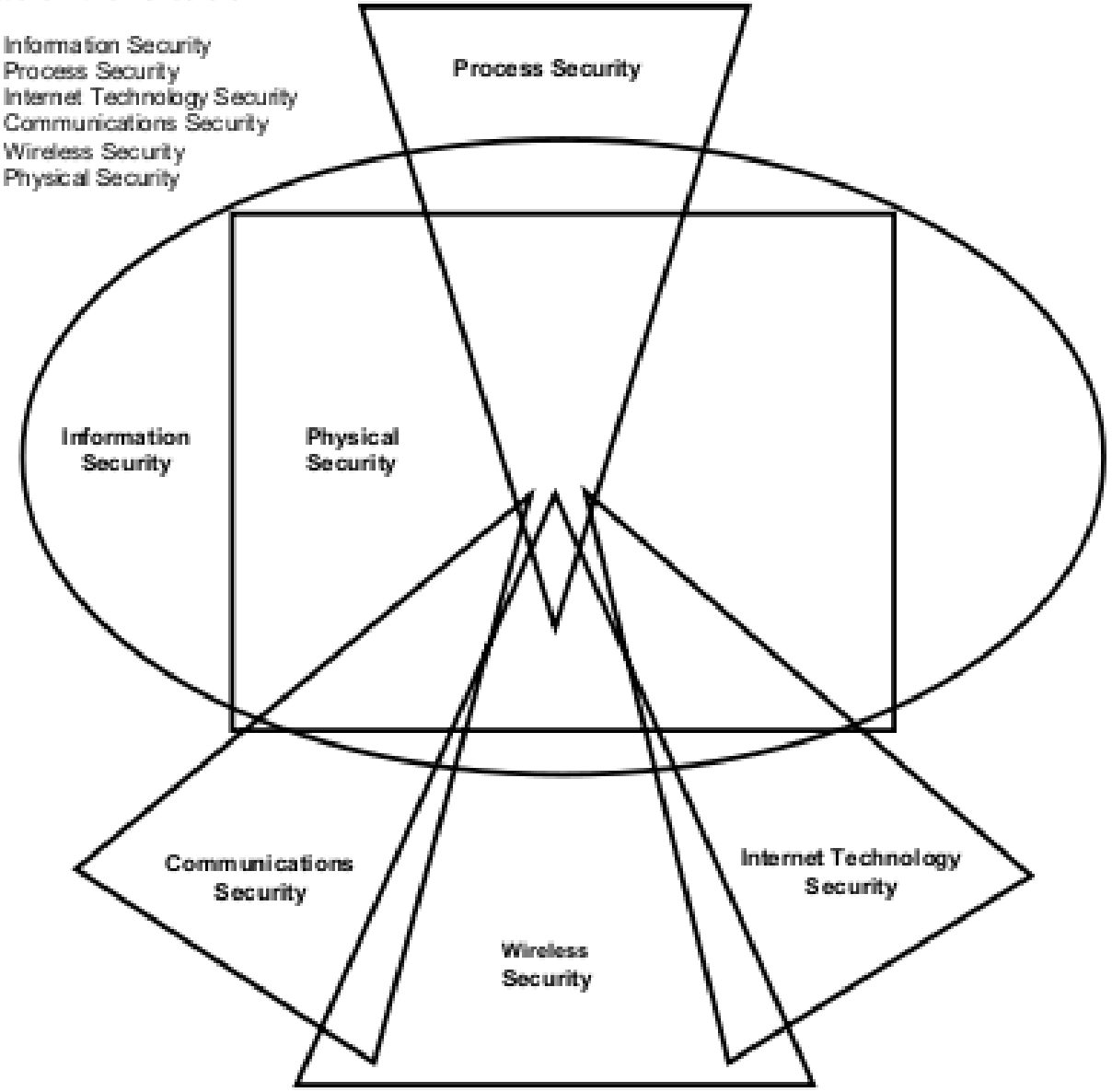

Best YouTube video ever ...
in...3...2...1...
ICANHASCHEEZBURGER.COM

Methodology

- Hacking Exposed 5-step Model
  - recon,discover, enumerate, exploit, persist
- Vulnerability-Assessment.co.uk
- NIST SP800-115 & ISSAF
- OWASP for web
- OSSTMM
  - Much more than just infosec – “domains” of security
  - Measurement

The sections in this manual are:

1. Information Security
2. Process Security
3. Internet Technology Security
4. Communications Security
5. Wireless Security
6. Physical Security



Penetration Testing Today

- Focus on Network / Application
- Remote Engagements
  - Mostly App layer
    - Asp.net, J2EE, various enterprise frameworks
    - Asp,jsp,php (win!)
  - Or Social Engineering
  - “Harder than it used to be” – but get a shell, and you’re internal

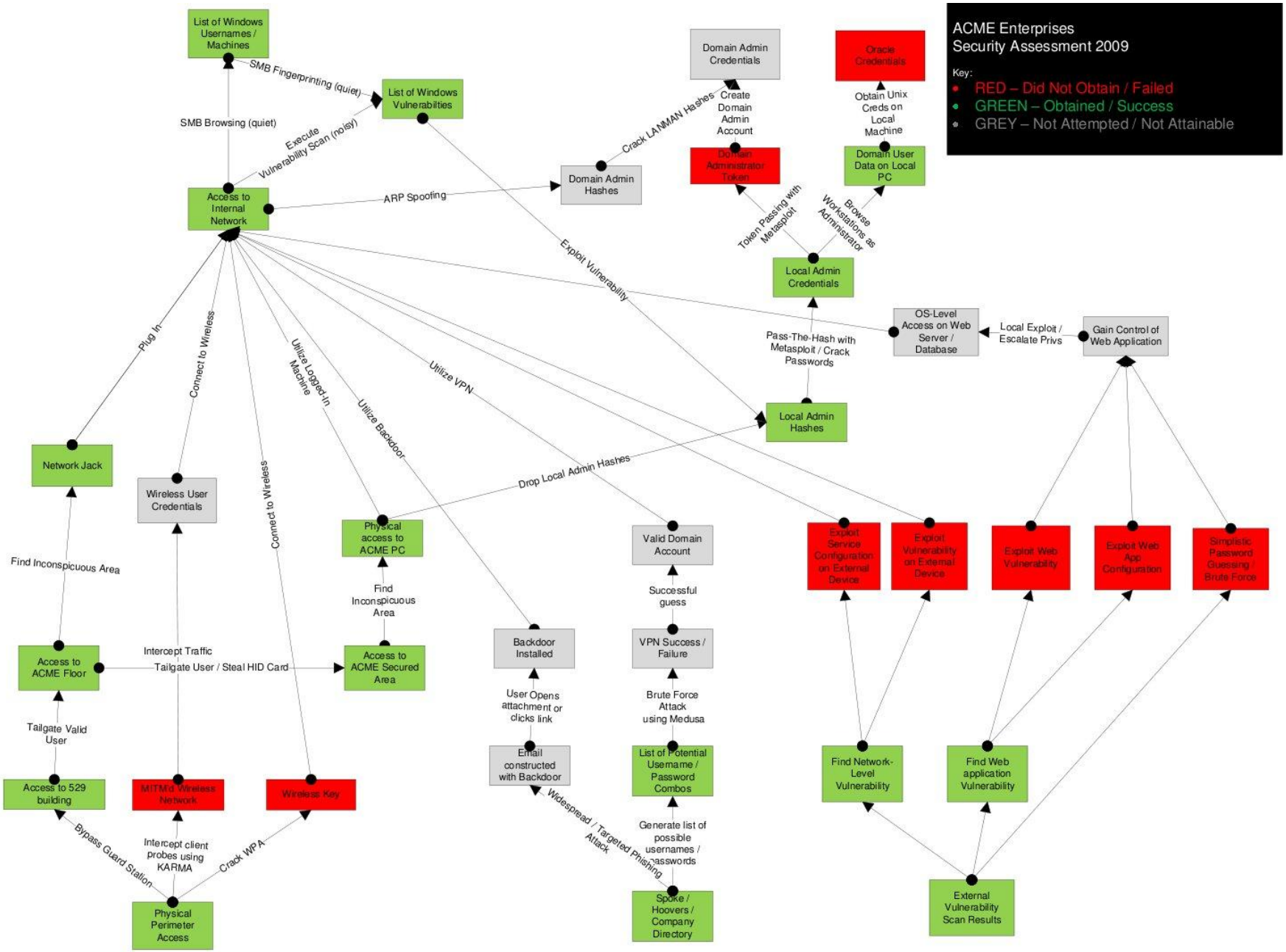
Penetration Testing Today

- Internal Engagements
  - Some physical work
  - Still wide open
  - Certain vulnerabilities still not well understood & relatively easy to exploit
    - Arp spoofing / mitm
    - Windows exploitation
    - Wireless is getting better
  - Generally some weak points


Helping othurs...
it's hows we roll...
ICANHASCHEEZBURGER.COM

Penetration Testing Today

- Typical engagement – 1-2 weeks
- Once / year, mandated by various regs
- Lots of silly constraints
  - "Don't touch these systems, we know they'll break"
  - Social Engineering not allowed
- Working with the security team
  - Which is generally part of IT
- Generate a report w/ remediation


ACME Enterprises
Security Assessment 2009
Key:
RED – Did Not Obtain / Failed
GREEN – Obtained / Success
GREY – Not Attempted / Not Attainable
List of Windows Usernames / Machines
SMB Fingerprinting (quiet)
List of Windows Vulnerabilties
SMB Browsing (quiet)
Execute Vulnerability Scan (noisy)
Access to Internal Network
ARP Spoofing
Domain Admin Hashes
Crack LANMAN Hashes
Domain Admin Credentials
Create Domain Admin Account
Domain Administrator Token
Token Passing with Metasploit
Oracle Credentials
Obtain Unix Creds on Local Machine
Domain User Data on Local PC
Browse Workstations as Administrator
Local Admin Credentials
Exploit Vulnerability
OS-Level Access on Web Server / Database
Local Exploit / Escalate Privs
Gain Control of Web Application
Pass-The-Hash with Metasploit / Crack Passwords
Local Admin Hashes
Plug In
Connect to Wireless
Utilize Logged-In Machine
Utilize Backdoor
Utilize VPN
Drop Local Admin Hashes
Network Jack
Wireless User Credentials
Connect to Wireless
Physical access to ACME PC
Valid Domain Account
Exploit Service Configuration on External Device
Exploit Vulnerability on External Device
Exploit Web Vulnerability
Exploit Web App Configuration
Simplistic Password Guessing / Brute Force
Find Inconspicuous Area
Find Inconspicuous Area
Successful guess
Access to ACME Floor
Intercept Traffic
Tailgate User / Steal HID Card
Access to ACME Secured Area
Backdoor Installed
VPN Success / Failure
Tailgate Valid User
User Opens attachment or clicks link
Brute Force Attack using Medusa
Access to 529 building
MITM'd Wireless Network
Wireless Key
Email constructed with Backdoor
List of Potential Username / Password Combos
Find Network-Level Vulnerability
Find Web application Vulnerability
Bypass Guard Station
Intercept client probes using KARMA
Crack WPA
Widespread / Targeted Phishing Attack
Generate list of possible usernames / passwords
Physical Perimeter Access
Spoke / Hoovers / Company Directory
External Vulnerability Scan Results

Toolkit

- Technically, Penetration testing requires:
  - An ability to learn the environment & improvise
  - Bag of tricks
    - Lots of tools / techniques.
      - If you don't mind being noisy, start with a vulnscan
      - If an admin uses it, so can you :)
    - Practical attacks!
- Commercial Tools
  - Handy if you're short on time / patience!


FORR THE LUVS OF GODZ!
NO MOR WATURRRRR!!!!!!
ICANHASCHEEZBURGER.COM

What is Metasploit?

- Metasploit Project
  - HD Moore & Friends
  - A community-driven project since 2003
- Rapid7
  - Maker of NeXpose Vulnerability Management
  - Purchase the Project from HD
- Metasploit Framework
  - The original open-source exploit framework

Metasploit Versions

- 1.0 released in 2003 (Perl)
- 2.0 released in 2004 (Better Perl)
  - 2.7 released in late 2006
- 3.0 released in 2007 (Ruby)
  - 3.2 released in late 2008
  - 3.3 released in late 2009
  - 3.4 released in early 2010
  - 3.4.1 is the most recent release
    - Metasploit now has 567 exploits and 283 auxiliary modules (up from 551 and 261 in v3.4)

Metasploit Filesystem

- Organized by directory
  - lib: the meat of the framework code base
  - data: editable files used by Metasploit
  - tools: various useful command-line utils
  - modules: the actual modules
  - plugins: loadable plugins
  - scripts: metepreter and other scripts
  - external: source code and third-party libs

Metasploit Libraries

- Rex is the basic library for most tasks
- Sockets, protocols, text transformations
- SSL, SMB, HTTP, XOR, Base64, Unicode
- Msf::Core provides the 'basic' API
  - Defines the framework
- Msf::Base provides the 'friendly' API
  - Simplified APIs for the framework

Metasploit User Interfaces

- msfconsole
  - This is what you should ALWAYS use
  - Most features and the most stable
  - Windows supported via Cygwin
- msfgui, msfweb, msfcli
  - Useful for specific tasks
  - Less supported

Metasploit Core Concepts

- Exploits
  - Defined as modules which use payloads
  - Exploits without payloads: Auxiliary
- Payloads, Encoders, Nops
  - Payloads run remotely
  - Encoders make sure they get there
  - Nops keep payloads sizes consistent

Demo Strategy

Show you cool stuff, and where to learn more

5 min / demo

Quick & Dirty Reconnaissance

Propecia.c

Vulnerability scanner

Metasploit Aux Modules

Quick & Dirty Network Attacks

Metasploit MS08_067 DEMO – msfconsole

Metasploit MS08_067 DEMO – msfgui

Autopwn DEMO

Epic Tangent: Meterpreter Scripting

- Start a process

```
note = client.sys.process.execute('notepad.exe', nil, {'Hidden' => true })
```

- Get all process

```
processes = client.sys.process.get_processes.sort_by { |ent| ent['pid'] }
```

- Migrate

```
client.core.migrate(target_pid)
server = client.sys.process.open
```

- Kill a bunch of processes

```
annoying = ['notepad.exe', 'calc.exe']
client.sys.process.get_processes().each do |x|
    if (annoying.index(x['name'].downcase))
                print_status("Killing off #{x['name']}...")
                client.sys.process.kill(x['pid'])
    end
end
```

Quick & Dirty Physical Attacks

Kon-Boot DEMO

Hash-Stealing DEMO


A brief nap
ICANHASCHEEZBURGER.COM

Quick & Dirty Windows Attacks

DLL Hijacking DEMO (maybe)

Pass-The-Hash DEMO

Quick & Dirty Social Engineering

Browser AutoPWN DEMO

Meterpreter Connect-Back DEMO

SET DEMO

All your base are belong to us!

Quick & Dirty Web Hacking

Burp DEMO

Scripting For Fun & Profit

- PacketFu Demo

Le Questions?

Network Pentesting Resources

- http://www.backtrack-linux.org/ - Backtrack Linux
- http://www.owasp.org/index.php/Category:OWASP_Testing_Project OWASP Testing Guide
- http://www.isecom.org/osstmm/ OSSTMM
- http://www.vulnerabilityassessment.co.uk/ VulnAssessment.co.uk Methodology
- http://www.exploit-db.com/ Exploit DB – Daily updates for exploits
- http://seclists.org/fulldisclosure/ Pretty much every bug hits this list at some point

Metasploit Resources

- http://www.metasploit.com/
  - http://blog.metasploit.com/ (Blog, News)
  - http://www.metasploit.com/redmine/projects/framework/activity (RSS / Tracker / New Features)
- http://www.offensive-security.com/metasploit-unleashed/ (metasploit tutorial)
- http://blog.metasploit.com/2010/05/introducing-metasploitable.html (metasploitable – exploitable VM)

Reading List

- Basics
  - CounterHack Reloaded
  - Hacking Exposed
  - The Art of Software Security Assessment
  - $SCRIPTING_LANGUAGE book
  - Web Application Hacker's Handbook
- Advanced Reading
  - Jon Erickson's Hacking: The Art of Exploitation
  - Shellcoders Handbook