Get Rich or Die Trying
"Making money on the Web, the black hat way"

Jeremiah Grossman
Founder & CTO

OWASP Chicago
08.21.2008
"the embodiment of converged IT and physical security"

Larry Greenemeier (Information Week)
WhiteHat Sentinel

• Unlimited Assessments – customer controlled and expert managed – the ability to scan websites no matter how big or how often they change

• Coverage – authenticated scans to identify technical vulnerabilities and custom testing to uncover business logical flaws

• Virtually Eliminate False Positives – Operations Team verifies results and assigns the appropriate severity and threat rating

• Development and QA – WhiteHat Satellite Appliance allows us to service intranet accessible systems remotely

• Improvement & Refinement – real-world scans enable fast and efficient updates
The other half of the Top Ten

Percentage likelihood that a website has a particular vulnerability by class
QA overlooks them
Tests what software should do, not what it can be made to do

Scanners can’t identify them
Lack intelligence and don’t know if something worked (or not)

WAFs / IDSs can’t defend them
All the HTTP requests appear completely normal

Business logic flaws = $$$
3-5 years XSS, SQLi, and CSRF probably on the way out
Online Ballot Stuffing for Fame and Fortune

Web-based online polls are an extremely common way to capture or sway public opinion. No niche is too big or too narrow.
In response to an Austin beagle winning the Westminster Dog Show, the Austin American Statesman newspaper held an online poll (Austin's Best in Show) for Central Texas (grouped by breed). Thousands submitted photos and voted on their favorite underdogs.

**Prize: Bragging rights**

Winning the contest was all about **percentages**, not total votes...
3 ways to cheat

1. Overwhelming the positive votes
2. Overwhelming the negative votes towards competitors
3. At the last minute create a new dog and give it a positive vote - no chance of negative votes and you'll win at 100% positive.

Robert “RSnake” Hansen’s girlfriend’s co-worker asks him to help her chihuahua “Tiny” win the contest.

RSnake fires up Burp proxy...
Taking the path of least resistance attempts #1 - submits 2,000 votes

RSnake boosts Tiny into 1st...
“ChooChoo” pwns Tiny with technique #2

During the last minutes of the contest the competition submitted 450+ negative votes, which still made Tiny the winner in total by more than 2:1, however as a percentage of positive to negative, Tiny lost by a landslide.

WTF!?
Solving CAPTCHA’s for Cash

Completely Automated Public Turing test to tell Computers and Humans Apart. Used for protection against bots.
Spammers want to defeat CAPTCHAs to register for free online accounts on Gmail, YahooMail, Windows Live Mail, MySpace, FaceBook, etc. for spam distribution.

As CAPTCHA technology has become more ubiquitous a market has emerged for those who can successfully defeat the security measures in any manner possible.

CAPTCHA solving done in 3 ways...
1) Flawed Implementation

- Not enough entropy in the answers
- i.e. “what is 4 + 1?”
- The same answers can be replayed multiple times

CAPTCHA Effectiveness Test
1) Test should be administered where the human and the server are remote over a network.
2) Test should be simple for humans to pass.
3) Test should be solvable by humans in less than a several seconds.
4) Test should only be solvable by the human to which it was presented.
5) Test should be hard for computer to pass
6) Knowledge of previous questions, answers, results, or combination thereof should not impact the predictability of following tests.
7) Test should not discriminate against humans with visual or hearing impairments.
8) Test should not possess a geographic, cultural, or language bias.

CAPTCHA Effectiveness Test
http://i32.tinypic.com/2upp66s.jpg
2) OCR

A Low-cost Attack on a Microsoft CAPTCHA

“Our attack has achieved a segmentation success rate of 92%, and this implies that the MSN scheme can be broken with an overall (segmentation and then recognition) success rate of more than 60%.”

A Low-cost automated attacks on Yahoo CAPTCHAs

“Our second attack achieved a segmentation success rate of around 33.4% on this latest scheme. As a result, we estimate that this scheme could be broken with an overall success rate of about 25.9%. Our results show that spammers never had to employ cheap human labour to pass Yahoo CAPTCHAs. Rather, they could rely on low-cost automated attacks.”

Jeff Yan and Ahmad Salah El Ahmad
School of Computing Science, Newcastle University, England

Low-cost automated attacks on Yahoo CAPTCHAs
http://homepages.cs.ncl.ac.uk/jeff.yan/yahoo.htm

A Low-cost Attack on a Microsoft CAPTCHA
http://homepages.cs.ncl.ac.uk/jeff.yan/msn.htm
3) Mechanical Turk / “The Turk”

PC stripper helps spam to spread
http://news.bbc.co.uk/2/hi/technology/7067962.stm

Solving and creating captchas with free porn
RSnake is contacted by a Romanian CAPTCHA Solver...

“300-500 CAPTCHAs per person per hour. The clients pay between $9-15 per 1000 CAPTCHAs solved. The team works around 12 hours a day per person. That means they can solve somewhere around 4800 CAPTCHAs per day per person, and, depending on how hard the CAPTCHAs are, that can run you around $50 per day per person (his estimate).”
Hello,

I’m from VietNam

We have a group with 20 person. We working some site rabot, rubl, look…

Our rate just 4$ for per 1000 captcha solved.

We hope work you

Best Regard,
QuangHung
Hi!!! Hope you are doing well. We the leading Data processing company in Bangladesh. Presently we are processing 100000+ captcha per day by our 30 operators. We have a well set up and We can give the law rate for the captcha solving.

Our rate $2 per 1000 captcha.yahoo, hotmail, mayspace, gmail, facebook etc.

We just wanna make the relationship for long terms. can we go forward? Thank you.

Best Regards
shakilur rahaman shohe
Babu Says:

Dear Sir,

I am interested to work for data entry. Please call me 0171-3335000
Recover someone else’s password - it’s a feature!

Everyone forgets their password(s) eventually and to ease customer support costs, password recovery features are heavily relied upon.
Hijack a Sprint user's accounts

With just a cell phone number...

“change their billing address, order a whole bunch of cellphones sent to a drop location, and leave the victim paying the bill. There’s also the stalker’s wet dream: add GPS tracking to their cellphone and secretly watch their every movement from any computer.”
Answer the following questions

Please answer the questions below to verify that you are the account holder and to help us to protect your account from identity theft and fraud. Once you answer the questions correctly, you'll be able to create your PIN.

Where do these questions come from?
Sprint has partnered with a verification company that has developed an anti-fraud tool that will ask a short series of questions to verify the account holder. The questions that you will be asked to answer are randomly generated through the use of publicly available information regulated by Federal Laws. This anti-fraud tool has been used by numerous industries, as well as the Federal Government, to successfully prevent identity theft and fraud.

Which of the following vehicle makes has been registered at the following address?
- Lotus
- Honda
- Lamborghini
- Fiat
- None of the above

Which of the following people have resided with you or used the same address as you at?
- Jerry Stefl II
- Ralph Argen
- Jerome Ponicki
- John Pace
- None of the above

In which of the following cities have you NEVER lived or used in your address?
- Longmont
- North Hollywood
- Genoa
- Butte
- All of the above
Change Billing Information

Account number: [Redacted]  Account Administrator: [Redacted]

To change your billing address or contact information, update the fields below:

If you want your billing statements sent to a different address than where the phones are used, please contact Customer Care. This may affect how you are taxed. Explanation of Taxes

*Due to billing cycles, your changes may not be reflected on your next invoice.

Billing and Contact Information

* Indicates Required Information

- Account name:
- Order Number/Attn:
- Street Address or PO Box:
- Suite, Apt. or Department:
- City:
- State:
- ZIP Code:
- Contact phone number:
- Contact name:
- Email Address:

Add-ons for [Redacted]

- Cellular Call Detail
- Unlimited Nights Weekends-7pm
- Picture Mail
- America Expanded Voice Coverage

Check the options you want to add to your plan:

- Mobile Locator™: $9.99
- 1000 SMS Text Messages: $5.00
- Sprint Family Locator Service: $9.99
- 300 SMS Text Messages: $5.00
- Unlimited SMS Text Messaging: $15.00

Save changes

See where people are. In real time.

Contact Employees Anytime. Anywhere.
With Web-based Mobile Locator™ you can see the current location of an employee's phone. In real time. In the advanced mapping display on your PC. It's the information you need to provide superior customer service, avoid delays and increase productivity. Or simply enjoy peace of mind.
Email preferred over secret questions
# Heavy WebMail Adoption

<table>
<thead>
<tr>
<th>Provider</th>
<th>No. of Users (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yahoo Mail</td>
<td>262.2</td>
</tr>
<tr>
<td>Hotmail/Live</td>
<td>256.4</td>
</tr>
<tr>
<td>Gmail</td>
<td>87.1</td>
</tr>
<tr>
<td>AOL Mail</td>
<td>48.9</td>
</tr>
<tr>
<td>QQ.com</td>
<td>31.4</td>
</tr>
</tbody>
</table>

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Web Mail Services Market Share (Comscore, Oct 2007)
http://500hats.typepad.com/500blogs/2008/03/web-mail-serv-1.html
China-based online “Password Recovery” services: You pay them to hack into “your” account.

300 Yuan ($43) to break an overseas mailbox password, with 85% probability of success.

200 Yuan ($29) to break a domestic mailbox password, with 90% probability of success.

1000 Yuan ($143) to break a company’s mailbox password (no success rate given).

Also on the menu: passwords for 163, 126, QQ, Yahoo, Sohu, Sina, TOM, Hotmail, MSN…etc.

Variable project-based pricing $150 (USD) minimum. They accept Western Union.

Hire to Hack
http://www.hire2hack.net/
Usernames are valuable too, especially when they’re email addresses.

Phishers use login and password recovery screens to mine for valid email addresses using timing attacks.

Many large ecommerce portals and social networks consider valid email address disclosures a high severity issue because of how their websites operate and what it can lead to.

Unfortunately the only tool we have to fight against timing attacks is time. And time = money.
Monetizing eCoupons

eCoupons are used during online checkout. The customer enters a unique id and a discount is applied to their order.
A large online retailer offered an eCoupon program...

- Coupon (i.e. AmEx) worth between a couple dollars and several hundred contained 16-digit IDs where large sections were static and the rest sequential.
  
  3400 0000 0000 009
  3400 0000 0000 109
  3400 0000 0000 509

- Initially only 3 coupons were allowed to be applied to a single order, until the program became popular with larger orders and the restriction was removed.

- Someone developed a script trying thousands of possible valid coupon IDs. Orders of merchandise worth over $50,000 were bought for mere dollars where 200 or more individual coupons applied.
The problem went unnoticed until...

- A system capacity planning exercise uncovered CPU utilization during the night was spiking at 90%+, where during normal peak usage it was never that high.

- The FBI investigated, but the products were sent to a non-existent address.

- Apparently the person colluded with a mail carrier who intercepted the merchandise.

Coupons are not currency, only a tool for marketing. Instead investigated by the Secret Service and now they face counts of mail fraud.
Real life: Office Space Hack

"Micro-deposits" of a random few cents ($0.01 - $2.00) are used to verify financial accounts and routing numbers are correct and to verify that customers received it.
Opened 58,000 brokerage accounts
“used fake names, addresses and Social Security numbers for the brokerage accounts. Largent allegedly favored cartoon characters for the names, including Johnny Blaze, King of the Hill patriarch Hank Hill, and Rusty Shackelford. That last name is doubly-fake -- it's the alias commonly used by the paranoid exterminator Dale Gribble on King of the Hill.”

Linked to a dozen online bank accounts including Capital One, Bancorp Metabank, Greendot and Skylight.
Google's Checkout: $8,225
E*TRADE, Schwab: $50,225
Profited using pre-paid debit cards

Faces four counts each of computer fraud, wire fraud and mail fraud.

Snared by the U.S. Patriot Act
“You’re a hacker!? Can you hack a bank?”

Application Service Providers (ASP) offer hosting for banks, credit unions, and other financial services companies. ASPs are attractive targets because instead of hacking a single financial institution, an attacker could compromise dozens/hundreds/thousands.
The System

• An ASP provides hosting for banks, credit unions, and other financial services companies. ASPs are attractive targets because instead of focusing on one back at a time, an attack could compromise dozens/hundreds/thousands at a time with the same vulnerability.

• The banking application had three important URL parameters: client_id, bank_id, and acct_id. To the ASP, each of their clients has an unique ID, each potentially with several different banking websites, and each bank having any number of customer bank accounts.

http://website/app.cgi?client_id=10&bank_id=100&acct_id=1000
How to hack 600 banks...

- We changed the `acct_id` to an arbitrary yet valid account #, and the error said, “Account #X belongs to Bank #Y”
- We then changed the `bank_id` to #Y, and an error said, “Bank #Y belong to Client #Z”
- We changed the `client_id` to #Z, and you could drop into anyone else’s bank account, on any bank, on any client.

Success!!!

No notion of “authorization”
First pass at the fix commented out the error in the HTML, while the “real” fix would go in at some unspecified time in the future.

http://website/app.cgi?client_id=10&bank_id=100&acct_id=1000
Reverse Money Transfer

Normal: $10,000 from Account A to Account B
A = A - ($10,000)  
B = B + ($10,000)

Negative: -$10,000 from Account A to Account B
A = A - (-$10,000)  
B = B + (-$10,000)
“Back-end business controls will prevent these issues.”

ASP Security Contact

a few weeks later...
a couple months later...
$70,000 illegally wired to an eastern European country.

Money not recoverable.

ASP lost a customer.

Other customers affected: unknown
When back-end order cancellation procedures are a little too slow

People order things online, then change their minds, and cancel.
Quantina Moore-Perry, 33, of Greensboro, N.C.,

Ordered (then cancelled) over 1,800 items online at QVC including handbags, housewares, jewelry and electronics

Products were shipped anyway

Auctioned off on eBay

Profited $412,000
“QVC became aware of the problem after being contacted by two people who bought the items, still in QVC packaging, on the online auction site.”

Pleaded guilty in federal court to wire fraud.
Unordered Merchandise

...You respond to an advertisement offering a free “trial” pair of pantyhose. To your surprise, you receive four pair with a bill.

...You receive a pocket knife that you never ordered. Despite your objections, the company continues to send you notices demanding payment and threatening your credit rating.

What do you do when you receive merchandise that you didn’t order? According to the Federal Trade Commission, you don’t have to pay for it. Federal laws prohibit mailing unordered merchandise to consumers and then demanding payment.

Here are some questions and answers about dealing with unordered merchandise.

Q. Am I obligated to return or pay for merchandise I never ordered?

A. No. If you receive merchandise that you didn’t order, you have a legal right to keep it as a free gift.

Q. What should I do if the unordered merchandise I received was the result of an honest shipping error?

A. Write the seller and offer to return the merchandise, provided the seller pays for postage and handling. Give the seller a specific and reasonable amount of time (say 30 days) to pick up the merchandise or arrange to have it returned at no expense to you. Tell the seller that you reserve the right to keep the merchandise or dispose of it after the specified time has passed.

Q. Is there any merchandise that may be sent legally without my consent?

A. Yes. You may receive samples that are clearly marked free, and merchandise from charitable organizations asking for contributions. You may keep such shipments as free gifts.

Q. Is there any way to protect myself from shippers of unordered merchandise?

A. When you participate in sweepstakes or order goods advertised as “free,” “trial,” or “unusually low priced,” be cautious. Read all the fine print to determine if you are joining a “club,” with regular purchasing or notification obligations. Keep a copy of the advertisement or catalog that led you to place the order, too. This may make it easier to contact the company if a problem arises.
Affiliate Scams

Online merchants and advertisers enlist the services of affiliate networks to drive traffic and/or customers to their websites in exchange for a share of the revenue generate.
The players

**Merchant**: Pays commissions to affiliates for customer clicks, account sign-ups, purchases, etc.

**Affiliate**: Collects commissions for driving customers towards merchants in the form of cost per-click (CPC) or cost per-acquisition (CPA).

**Customer**: The person who buys stuff or signs-up for promotions.

**Affiliate Network**: Technology framework connecting and monitoring the merchant, affiliate, and customer.
The way it’s supposed to work...

1. Affiliate signs-up with an affiliate network and places special links on their web page(s)
   
   <a href="http://AffiliateNetwork/p?program=50&affiliate_id=100/">really cool product!</a>

2. When users click the link their browser is sent through affiliate network where they receive a special tracking cookie and then redirected to the merchant page.

   Set-Cookie: AffiliateID=100

3. If the customer buys something within X time period (i.e. affiliate cookie still exists) the affiliate receives a commission.

Using effective SEO tactics...
GOOGLE INC.
1600 AMPHITHEATRE PARKWAY
MOUNTAIN VIEW, CA 94043

Date: FEBRUARY 27, 2006

Amount: CAD 901,733.84

Pay against this cheque
To: [Redacted]

The Sum of:NINE HUNDRED ONE THOUSAND SEVEN HUNDRED THIRTY-THREE AND 54/100 CANADIAN DOLLAR.

For: CITIBANK IRL FINANCIAL SERVICES PLC

Authorized Signature
“It was a check for 2 months because the first check they sent was so big it was rejected by his bank.”
Cookie-Stuffing Circa 2002

Nothing besides pesky affiliate networks terms of service requires the user to actually “click a link” to be cookied with an affiliate ID.

Instead of:

```html
<a href="http://AffiliateNetwork/p?
program=50&affiliate_id=100/">really cool product!</a>
```

Use:

```html
<img src="http://AffiliateNetwork/p?
program=50&affiliate_id=100/">
```

or:

```html
<iframe src="http://AffiliateNetwork/p?
program=50&affiliate_id=100/" width="0" height="0"></iframe>
```
Aggressive affiliates figure out they can post their code anywhere online and not just on their own websites (message boards, guest books, social networks, etc).

By 2005, Merchants and Affiliate Networks got wise to cookie stuffing, start monitoring referers and conversion rates, and began kicking out suspicious affiliates.

http://www.blackhatworld.com/blackhat-seo/
http://www.gfy.com/
http://www.seoblackhat.com/forum/
Cookie-Stuffing Circa 2007

Affiliates start posting their code on SSL pages.

“Clients SHOULD NOT include a Referer header field in a (non-secure) HTTP request if the referring page was transferred with a secure protocol.” - RFC 2616

Bottom line: No referer is sent to the affiliate to be tracked. FYI: Not every browser behaves this way, but there are many other methods to do the same using meta-refreshes and JavaScript.

2008: DNS-Rebinding, GIFAR, Flash malware
Gaming customer referral incentives

1. A promotion pays affiliates $5 - $50 commission for each new user they refer who registers by submitting a new credit card number. Often it’s not required that the user buy anything, perhaps only “participate”.

2. Unscrupulous affiliates may register bogus accounts by the thousands with easily obtained one-time credit card numbers. The merchant or the affiliate network has no way of knowing that a credit card number is of one-time use.

3. Sources say tens of thousands to hundreds of millions of dollars have been gleaned using this method in several different marketing promotions.
Gaming referral revenue from purchases

1. Merchants pay affiliates a commissions for online referral purchases.
2. Stolen credit card numbers are used to buy an item and shipped to the owner - therefore no fraud alert is issued and affiliate is paid their commission.
3. Days or weeks later the real credit card owner receives the items, reports the errors, disputes the purchase, and ships the item back. Should the merchant wish to take back their commission it is usually too late because the affiliate has been paid and long gone with the money.
Making Millions by Trading on Semi-public Information

Insider: someone with a fiduciary role within a company. A corporate executive, investment banker or attorney. Not a hacker.
Getting the word out...

Business Wire provides a service where registered website users receive a stream of up-to-date press releases. Press releases are funneled to Business Wire by various organizations, which are sometimes embargoed temporarily because the information may affect the value of a stock.

Press release files are uploaded to the Web server (Business Wire), but not linked, until the embargo is lifted. At such time, the press release Web pages are linked into the main website and users are notified with URLs similar to the following:


Before granting read access to the press release Web page, the system ensures the user is properly logged-in.
Just because you can't see it doesn't mean it's not there.

An Estonian financial firm, Lohmus Haavel & Viisemann, discovered that the press release Web page URLs were named in a predictable fashion.

And, while links might not yet exist because the embargo was in place, it didn’t mean a user couldn’t guess at the filename and gain access to the file. This method worked because the only security check Business Wire conducted was to ensure the user was properly logged-in, nothing more.

According to the SEC, which began an investigation, Lohmus Haavel & Viisemann profited over $8 million by trading on the information they obtained.

SEC Vs. The Estonian Spiders
A Ukrainian hacker breaks into Thomson Financial and steals a gloomy results announcement for IMS Health, hours before its release to the stock market ...

- Hacker enters ~$42,000 in sell orders betting the stock will fall
- The stock fell sharply making the hacker ~$300,000
- Red flags appear and the SEC freezes the funds
- Funds are ordered to be released, “Dorozhko’s alleged ‘stealing and trading’ or ‘hacking and trading’ does not amount to a violation” of securities laws, Judge Naomi Reice Buchwald
- The Times speculates that the DoJ has simply deemed the case not worth pursuing - probably due to the difficulties involved in gaining cooperation from local authorities to capture criminals in Ukraine.
Passive intelligence gathering

When online purchases are made, customers are usually provided an order tracking ID - often (semi)-sequential.

3200411
3200412
3200413
...

Pen-testers notoriously try to rotate URLs to gain access to other people’s order information often containing PII:

http://foo/order_tracking?id=3200415
http://foo/order_tracking?id=3200416
http://foo/order_tracking?id=3200417
...

but we don’t care about PII, only the number itself...
The art of inference

If one could closely estimate how many “orders” a public company was on track to process at the end of a quarter, you may be able to infer (based upon historical data) how well they are going to do (or how the stock price will move).

Often these order numbers can be obtained without actually fulfilling order, OR, order then cancel.

Hopefully the items won’t show up anyway. :)

3200418
3200419
3200420
...
Business logic flaws = $$$
Prime target for the bad guys

Test often, test everywhere
Not all vulnerabilities can be identified in the design phase, by analyzing the code, or even during QA

Detect attacks by profiling
HTTP requests appear legitimate, but active attacks will appear anomalous
Solving CAPTCHAs - $ four figures
Manipulating payment systems - $ five figures
Hacking Banks - $ high five figures
Scamming eCommerce - $ six figures
Exploiting Affiliate Networks - $ high six figures
Gaming the stock market - $ seven figures
pwning RSnake in a chihuahua contest

PRICELESS
Questions!?

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