SECURITY (COMP0141): ABUSE FOR PROFIT

WHAT DOES MALWARE DO?

What is the point of spreading malware?

Financial motivation:

- expand botnet (A)
- steal information like credentials (CIA)
- ransomware (A)

Political motivation:

- state-level attacks (cyber warfare) (CIA)

Remember that in the vast majority of cases, malware and botnets are driven by the desire to make money

REPORTED INTERNET CRIME

By Victim Count

Crime Type	Victims	Crime Type	Victims
Phishing/Vishing/Smishing/Pharming	114,702	Lottery/Sweepstakes/Inheritance	7,767
Non-Payment/Non-Delivery	61,832	Misrepresentation	5,975
Extortion	43,101	Investment	3,999
Personal Data Breach	38,218	IPR/Copyright and Counterfeit	3,892
Spoofing	25,789	Malware/Scareware/Virus	2,373
BEC/EAC	23,775	Ransomware	2,047
Confidence Fraud/Romance	19,473	Corporate Data Breach	1,795
Identity Theft	16,053	Denial of Service/TDoS	1,353
Harassment/Threats of Violence	15,502	Crimes Against Children	1,312
Overpayment	15,395	Re-shipping	929
Advanced Fee	14,607	Civil Matter	908
Employment	14,493	Health Care Related	657
Credit Card Fraud	14,378	Charity	407
Government Impersonation	13,873	Gambling	262
Tech Support	13,633	Terrorism	61
Real Estate/Rental	11,677	Hacktivist	39
Other	10,842		

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This table is from https://www.ic3.gov/Media/PDF/AnnualReport/2019_IC3Report.pdf

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REPORTED INTERNET CRIME

By Victim Loss

Crime Type	Loss	Crime Type	Loss
BEC/EAC	$1,776,549,688	Employment	$42,618,705
Confidence Fraud/Romance	$475,014,032	Civil Matter	$20,242,867
Spoofing	$300,478,433	Harassment/Threats of Violence	$19,866,654
Investment	$222,186,195	Misrepresentation	$12,371,573
Real Estate/Rental	$221,365,911	IPR/Copyright and Counterfeit	$10,293,307
Non-Payment/Non-Delivery	$196,563,497	Ransomware	**$8,965,847
Identity Theft	$160,305,789	Denial of Service/TDoS	$7,598,198
Government Impersonation	$124,292,606	Charity	$2,214,383
Personal Data Breach	$120,102,501	Malware/Scareware/Virus	$2,009,119
Credit Card Fraud	$111,491,163	Re-shipping	$1,772,692
Extortion	$107,498,956	Gambling	$1,458,118
Advanced Fee	$100,602,297	Health Care Related	$1,128,838
Other	$66,223,160	Crimes Against Children	$975,311
Phishing/Vishing/Smishing/Pharming	$57,836,379	Hacktivist	$129,000
Overpayment	$55,820,212	Terrorism	$49,589
Tech Support	$54,041,053		
Corporate Data Breach	$53,398,278		
Lottery/Sweepstakes/Inheritance	$48,642,332		

The crimes we've seen so far this week are actually pretty far down this list (caveat: they are likely to be heavily underreported)

FINANCIALLY MOTIVATED ABUSE

DoS, botnets, and malware all require a high degree of technical sophistication

Much easier: **run a scam**

motivation: money
capabilities: limited

vulnerability: us!
human behaviour, weakness, etc.

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EXERCISE

how could these platforms be abused for profit?
how could you prevent it from happening?

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Before we look at some specific scams, please take a few minutes to think about your favourite platform. How could it be (or have you seen it be) abused by a scammer or fraudster?

FINANCIALLY MOTIVATED ABUSE

Social media: spammer accounts, promotional accounts

Messaging apps: spammer accounts, promotional accounts

App stores: SEO, bad apps

Airbnb: scam rentals

TripAdvisor: fake reviews, fake restaurants

Uber: colluding drivers

Dating apps: spammer accounts, romance scams

DETECTING SPAM

Spam is all about operating in **bulk**: even if the chance of a click is only 0.0001%, can still get thousands of clicks with billions of emails

This makes it possible to have highly effective spam classifiers

- patterns across sent/received emails (if large provider)
- how many links are embedded?
- do you know the sender?
- huge volume of training data for ML classifiers

CONFIDENCE FRAUD / ROMANCE

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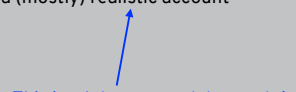
Let's look at some of these scams, starting with confidence/romance scams

DATING SCAMS

Spam is all about operating in **bulk**: even if the chance of a click is only 0.0001%, can still get thousands of clicks with billions of emails

Need to access spam recipients: an email address
Need to access dating apps: a (mostly) realistic account



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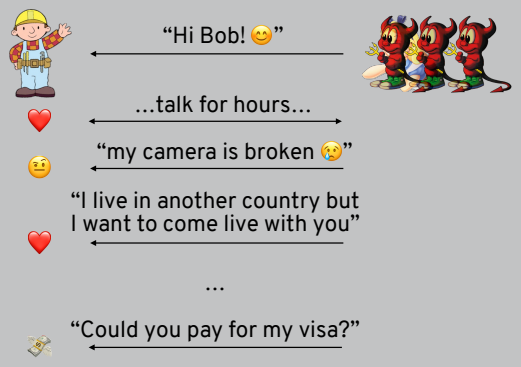
So, scams are often much more **targeted**

Do also see spam, promotions, etc. but these can be detected using the same techniques as for normal spam

DATING SCAMS



There are many variants on this (can even have faked video calls), but the eventual goal of the attacker is almost always the same: to extract money from the target. There is an exception that you can find in this article, which incidentally was the first time I ever heard about this type of scam: https://www.nytimes.com/2013/03/10/magazine/the-professor-the-bikini-model-and-the-suitcase-full-of-trouble.html

DETECTING DATING SCAMS

This is much harder than for spam because:

- unsolicited messages are the point of a dating app
- the target is a willing participant
- interactions quickly move off the platform
- scam interactions are designed to resemble normal ones

Still, we can try to look for:

- key things missing in a profile
- higher representation of niche traits (e.g., widowed)
- altered, repurposed, or repeated images

ADVANCED FEE FRAUD

By Victim Loss

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A closely related scam is advanced fee fraud

ADVANCED FEE FRAUD

"Hi Bob! I need your help."

...talk for a bit...

"If you just give me X
I will give you Y in return."
(where Y ≫ X)

Also known as:

- Spanish Prisoner scam (dates back to early 1800s)
- Previously called a 419 scam

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The attacker can be impersonating a prince, or even someone you know who's in a foreign country and has had their passport and wallet stolen.

ADVANCED FEE FRAUD DEMO

Steve Hailes <stevehailes428@gmail.com>
to S.Meiklejohn@cs.ucl.ac.uk

Are you available at the moment,

Best Regards,
Head of department,
Steve.

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This scam has gotten much more personalised in recent years, it now happens to me reasonably often. Can see the full thread looked at here: https://twitter.com/sjmurdoch/status/1217157683796680708

HONEYPOTS

A honeypot is designed to be highly attractive to an attacker

- unlocked car with keys in the ignition
- computer with unpatched OS, old browser version, etc.
- dating profile highlighting wealth and loneliness

Operated to find out more information about them (IP address, location, etc.) or provide enough evidence to report

Honeypots are also useful in trapping scammers

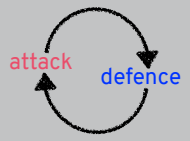
DETECTING ADVANCED FEE FRAUD

This can be even harder than for dating scams because:

- it happens over email (easier to impersonate)
- the target is a willing participant
- scam interactions are designed to resemble normal ones

Still, we can try to look for:

- spam-like distribution patterns
- similar language to known bad emails



Just like we've seen multiple times this week, this really becomes an arms race and we've already seen fraudsters here become much more sophisticated

REAL ESTATE / RENTAL

By Victim Loss

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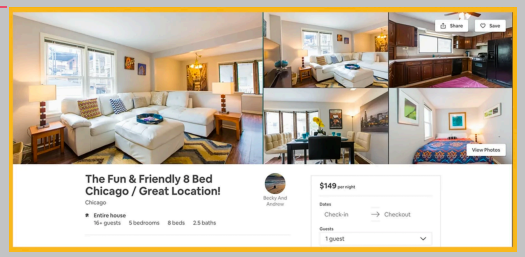
LAST-MINUTE CHANGES

There's a great article about this type of scam at https://www.vice.com/en/article/43k7z3/nationwide-fake-host-scam-on-airbnb

PROMISE VS. REALITY



"The whole place felt grimy, and there was a hole punched in a wall. The only decor was a giant wooden cross and a few pieces of generic Chicago-themed artwork, and the dining room's Overstock.com barstools looked as if they would turn into dust if you sat on them."

Basically it's a classic bait and switch: the target is promised one thing and is then pressured into changing to another, which ends up being much worse. Because they've officially changed their reservation there's not much they can do

DETECTING SCAM RENTALS

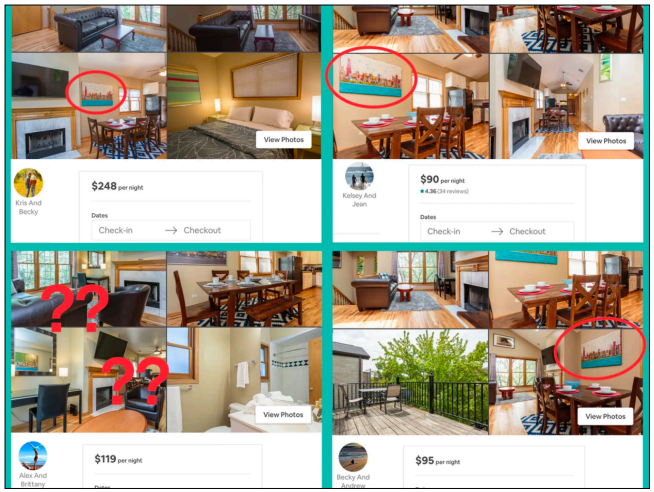
This can be hard because:

- targets don't want to spend time/energy on this
- targets are in a vulnerable position (foreign city, etc.)
- the platform is not really incentivised to address the issue

We can try to look for:

- similarities across listings (need platform to do this)
- bad reviews (positive reviews can be faked)

Targets here are in a somewhat unique state of mind: they've been planning this trip, they just got off a long flight, they're reuniting with friends or family, and they don't want to deal with this – if they can afford it it's easier to just move to a hotel and avoid the problem



HOW TO IMPROVE

Users lack intuition about complex computing devices →
Provide security education and training

Users are in charge of their own (complex) devices →
Make security invisible

It is hard to estimate risks →
Help users build more accurate mental models

Security measures feel like they get in the way →
Make security the path of least resistance

This goes back to the question of how do we help users avoid security mistakes, which in this case means falling victim to scams. Often here we end up falling back on the weakest and most ineffective approach, which is trying to educate and warn users

QUIZ!

Please go to

`https://moodle.ucl.ac.uk/mod/quiz/view.php?id=2778274`

to take this week's quiz!