WHEN THE HUNTER BECOMES THE HUNTED

HUNTING DOWN BOTNETS USING NETWORK TRAFFIC ANALYSIS

/ABOUT/ME

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/ABOUT/THETALK

- Common IR problems
- What is **Malcom** and how it leverages network traffic analysis and OSINT to solve them
- Malcom vs. botnets (demos, yay!)
- How you can use Malcom to **deal with these problems**
- How you can help Malcom grow stronger

I HAVE A LOT OF PROBLEMS

PROBLEM #1

KILL THE MALWARE

PROBLEM #1: KILL THE MALWARE

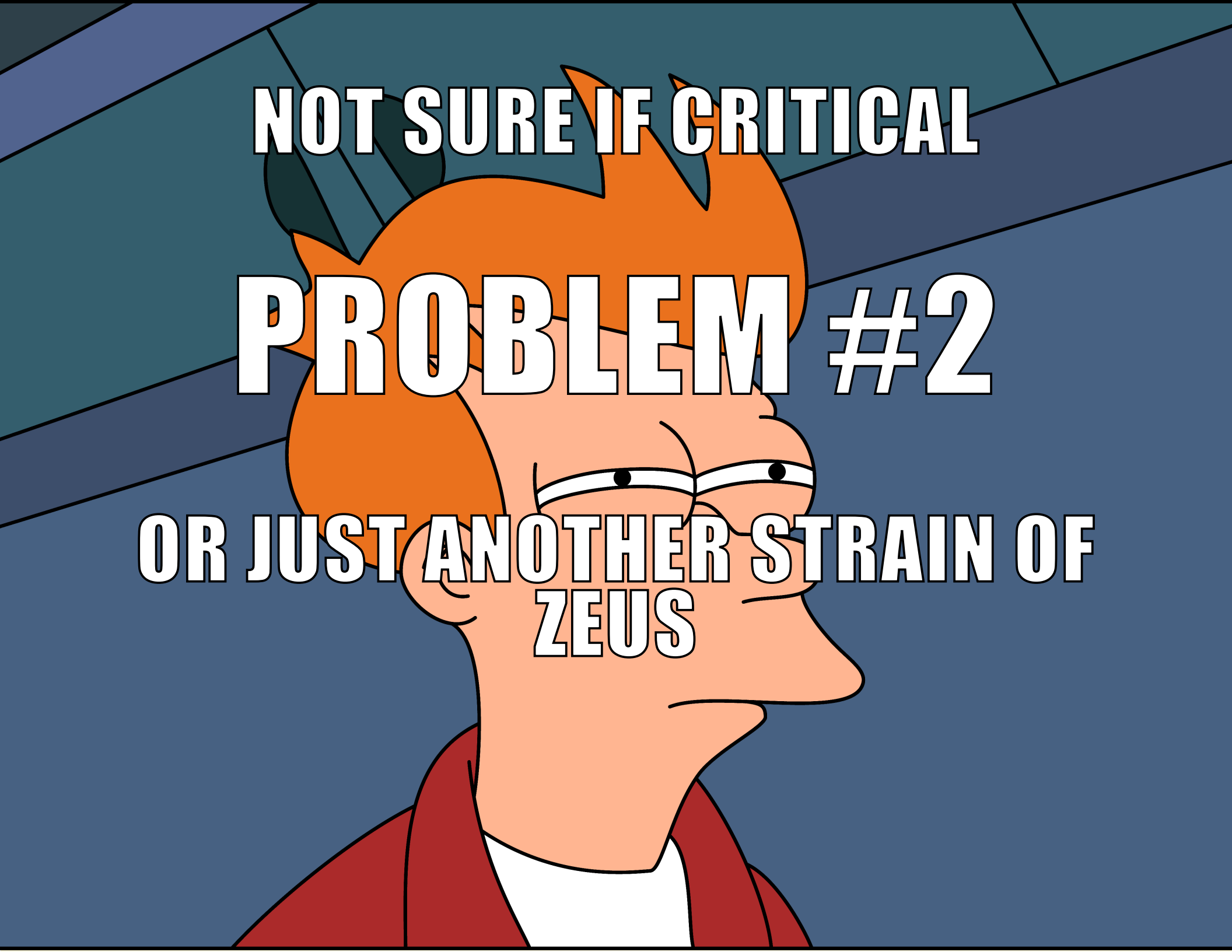
I need to:

- **Enumerate** domain names / IP addresses
- **Identify** resources (gates, dropzones, configs, etc.)
- **Gather** exchanged data (Configuration files? Stolen data?)

PROBLEM #1: KILL THE MALWARE

So I can:

- **Alert** the owners of stolen info & send **takedown** requests
- **Build** threat intelligence (so that I can refer to it later)
- **Start** incident remediation


NOT SURE IF CRITICAL
PROBLEM #2
OR JUST ANOTHER STRAIN OF ZEUS

PROBLEM #2: WTF IS THIS?

Sure, I could:

- Do an antivirus scan on it and get **Troj/Gen Suspicious**
- Reverse engineer it (3 samples a day? yeah right)
- Obvs: run it in a **sandbox** and do some behavioral analysis
- **x-ref** network artifacts against public blacklists

PROBLEM #3

I NEED TO DO IT FAST

('cause incidents keep popping up)

PROBLEM #3: GOGOGO

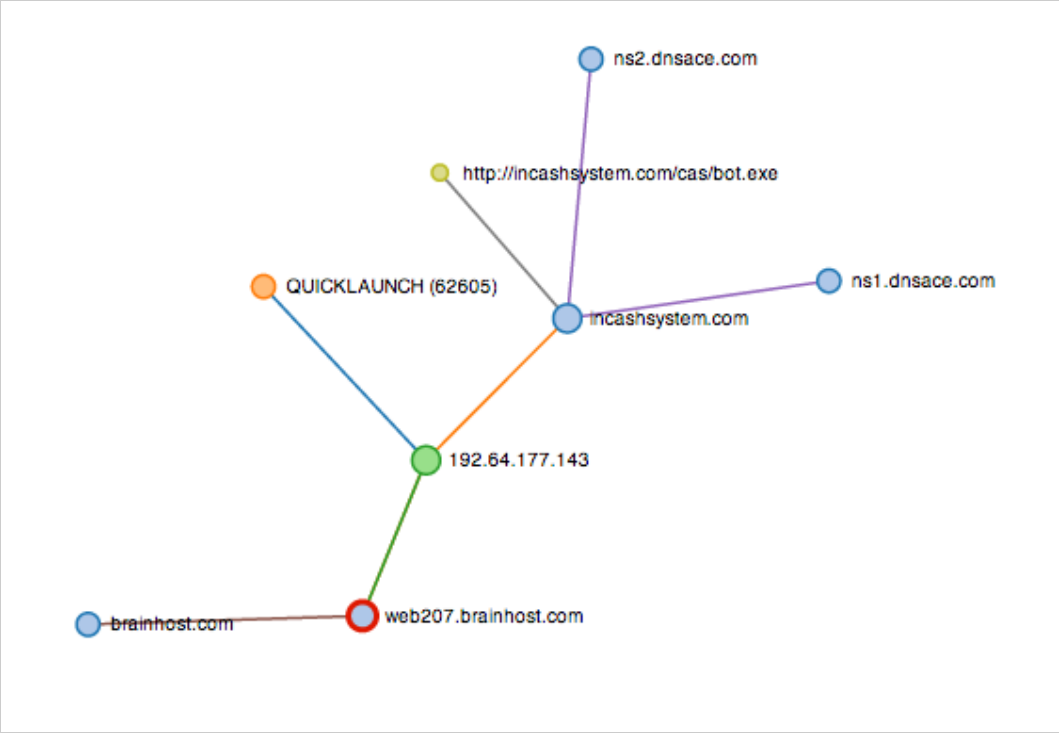
- **Don't want**: start Wireshark, text editor, snort, tcpflow, foremost, etc.
- **Want**: Drop my malware in a VM, and quickly know:
  - its behavior (which family does that?)
  - its peers (send the drones!)
- **Rinse & repeat**: Maybe get more intel, save the data to get results faster next time

YOU GUESSED IT

MALCOM SOLVES MOST OF THESE PROBLEMS

MALCOM?

Malware **com**munications analyzer



Available on GitHub: **https://github.com/tomchop/malcom**

WHAT IS MALCOM?

THREAT INTEL + MALWARE ANALYSIS

- **Gather intelligence** on network artifacts by syphoning the internet (and other sources)
- Match that intel with artifacts issued from ongoing malware analysis
- Identify targets, draw conclusions, act **FAST**!

WHAT IS MALCOM?

1 SLIDE ON ARCHITECTURE & FEATURES

- **Python**, **scapy**, **mongodb** (buzzword alert!), **flask**/**bootstrap**/**d3js**. Meant to be virtualised.
- Three modules:
  - Analytics & correlation engine
  - Feeding engine
  - Web interface
- Element types and tags
  - Each element has an analysis function
  - Each element is tagged according to its context

OPERATIONAL

THE ONLY THING I HAD IN MIND

- Quickly yield **actionnable intelligence**
- Other techniques may lead to more accurate / complete information, but I don't have **enough time**!
- Also, I wanted a visual tool

RECURRING TASK #1

'IS THIS [ARTIFACT] SOMETHING WE SHOULD WORRY ABOUT?'

- OSINT search for artifact: CBLs, blacklists, etc.
- Malcom gathers all badness in a **single spot**
- Easy to query, easy to hop from artifact to artifact

RECURRING TASK #2

'I HAVE RECEIVED THE FOLLOWING 0-DAY APT ATTACHMENT. IS IT MALICIOUS?'

- Yes/no/maybe/I don't know: throw it in a **sandbox** already!
  - If you do this often, you probably already have a sandbox with all the proper tools ready to use. That's ok.
- Your sandbox → **Malcom** → the Internetz
- Put Malcom in front of a **Cuckoo**?

RECURRING TASK #3

'WHO DO I HAVE TO SEND THIS ABUSE EMAIL TO?'

- Malcom will graph a host's network comms in **real-time**
  - You can also store them for later use, and replay them (PCAP)
  - You'll instantly know if you're dealing with one or many C&Cs, a P2P network, fast-flux architecture, or DGAs.
- And **cross-reference** them with stuff it already knows
  - You'll know if you (or someone) has run into the same artifacts

ENOUGH

DEMO TIME.

(fingers crossed)

DEMOS

Show how Malcom graphs several types of communication

- C&C infrastructure
- Single and double fast-flux
- Domain flux (DGA)
- P2P botnets

C&C INFRASTRUCTURE

C&C == CnC == C2

- IRC → HTTP
  - Google / Facebook / Wikipedia ping
  - Fetch a configuration file from a central C&C server
  - Pony + Zeus Demo **DEMO!**
- Countermeasures
  - Quickly identify the malicious host. Strange domain name? Non-standard encryption? Weird file transfers? Strange x509 certificates?
  - Dig into database **Demo on CERTSG's Malcom**

FLUXING

'Flux' == 'change'

- Domain flux
  - Domain generation algorithms **DEMO!**
- Single and double fast-flux
  - Can be painful to manually sort everything out
  - Single FF: flux on the domains' **A records**. **DEMO!**
  - Double FF: flux on domain A records **and NS records** **DEMO!**

PEER-TO-PEER

- Very resilient!
- No real single point of failure
- Taking these down usually involves cracking their protocol and hijacking the botnet
- In these cases, there's not much Malcom can do, besides:
  - Giving the initial peers' IP addresses
  - Pinpointing the "fallback" C&C used by the bot
- PHP.net pwnage dropping ZeroAccess **DEMO!**

SOUNDS COOL!

WHY SHOULD I TRY IT OUT?

EASY TO CUSTOMIZE

- **You choose** which sources Malcom will feed off
  - Internal / community / external data
- Easy to create a feed
  - Can read anything Python can!
- Elements have individual refresh rates
  - Important stuff gets refreshed more often
- Easy to add new element types (emails, IDs, specific hashes, etc.)

SHARING IS CARING

- **Share incident data!** You know how valuable it is 
- Open your Malcom instance to the world, let people feed off you
  - With another Malcom instance or any other tool
  - JSON feed for now, more formats soon
- API key enables access to specific tags (testing)

I still have 5 minutes left...

ROADMAP - FEATURES

- Yara rules in flows' payload
  - Identify PEs, shellcode, nopsleds, etc.
- Application layer identified? → automatic payoad extraction
- Compare communication patterns with known patterns (automatically)
  - Comms on non-standard ports, HELLO packets, etc.
  - Broids / suricata?
- "Pcap2bubbles"
  - Webservice to bubbleize your pcaps
  - Early early beta (not multiuser)

BACKEND

- Make it less “hack all the things”
  - Work on UI to add rules, feeds, etc.
- Use **redis** to synchronize processes
- Some performance improvements are in the scope

WANT TO HELP?

- Python / flask enthusiast
- Mongodb enthusiast
- Web / websockets / D3.js enthusiast (please!)

Poke around: **https://github.com/tomchop/malcom**

(the **dev branch** has waaay more features)