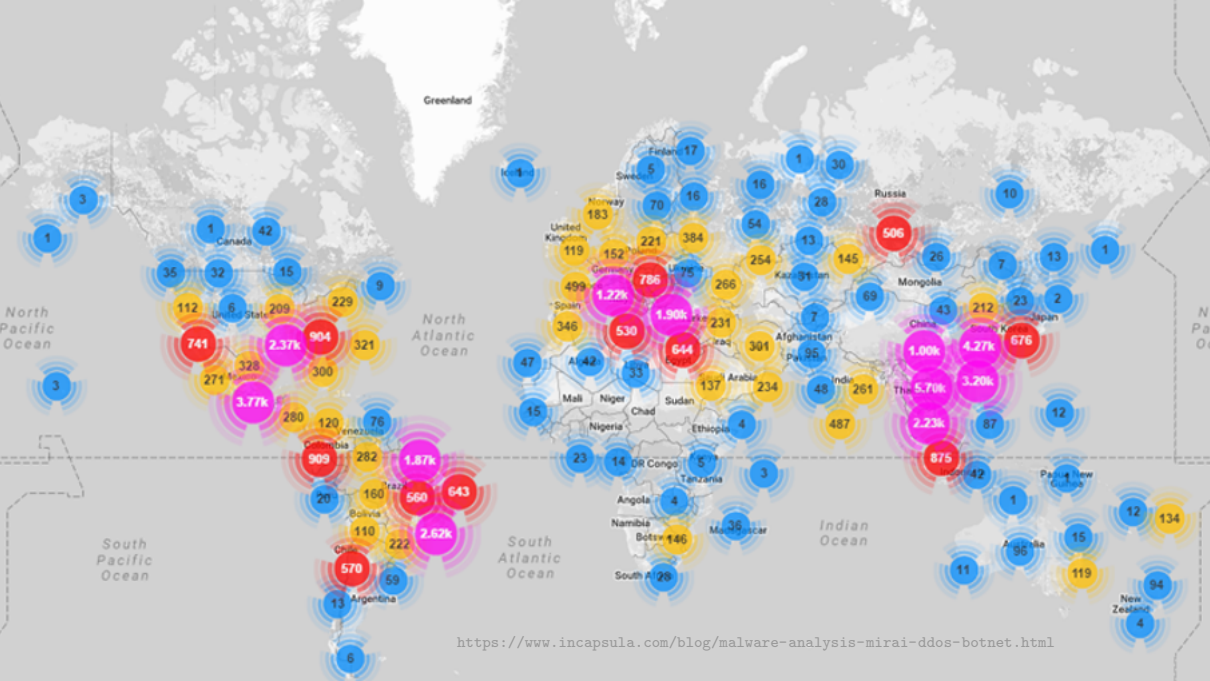
# Runtime Security Lab

**Michael Schwarz**

September 3, 2018

Security Week Graz 2018




https://www.incapsula.com/blog/malware-analysis-mirai-ddos-botnet.html

# Large IoT Incidents



- September 21, 2016
  > **600 Gbps** on Brian Krebs (security researcher) website (Mirai botnet)
- September 30, 2016
  Mirai source code published
- October 21, 2016
  ~**1 Tbps** on DNS provider Dyn
- November 26, 2016
  > **900 000** routers of Deutsche Telekom attacked and offline
- February, 2018
  > **1.35 Tbps** attack on GitHub


BUGS
SPACE RANGER
LIGHTYEAR
BUGS EVERYWHERE

# Top 10 IoT Bugs

HELPING SECURE THE INTERNET OF THINGS WITH THE

OWASP

INTERNET OF THINGS TOP 10

VULNERABILITY CATEGORIES

# Top 10 IoT Bugs

1. Insecure Web Interface

Default usernames and passwords

# Top 10 IoT Bugs

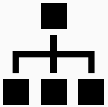


1. Insecure Web Interface
2. Insufficient Authentication

Weak passwords

# Top 10 IoT Bugs

1. Insecure Web Interface
2. Insufficient Authentication
3. Insecure Network Services



Unnecessary ports open

# Top 10 IoT Bugs



1. Insecure Web Interface
2. Insufficient Authentication
3. Insecure Network Services
4. Lack of Transport Encryption

SSL/TLS not available

# Top 10 IoT Bugs



1. Insecure Web Interface
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5. Privacy Concerns

Collected information not properly protected

# Top 10 IoT Bugs



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6. Insecure Cloud Interface

Interfaces with security vulnerabilities

# Top 10 IoT Bugs



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6. Insecure Cloud Interface
7. Insecure Mobile Interface

No account lockout mechanisms

# Top 10 IoT Bugs



1. Insecure Web Interface
2. Insufficient Authentication
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4. Lack of Transport Encryption
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6. Insecure Cloud Interface
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8. Insufficient Security Configurability

Encryption is not available

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8. Insufficient Security Configurability
9. Insecure Software/Firmware

Updates are not signed

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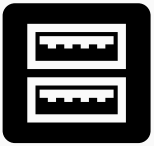
9. Insecure Software/Firmware
10. Poor Physical Security



Unnecessary external ports like USB

# Summary

The 90s called...

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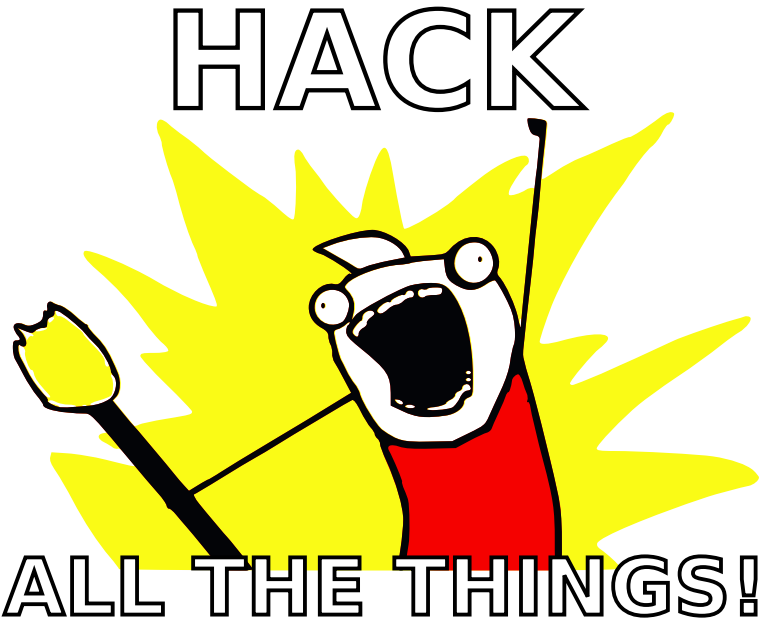
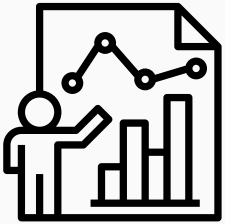
The 90s called...

...they want their bugs back!


HACK
ALL THE THINGS!

# Infrastructure



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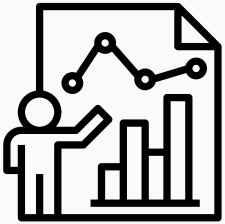

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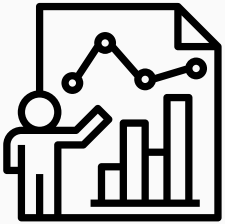

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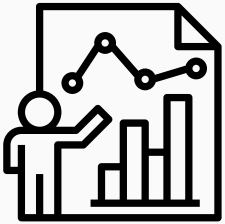

- There are 15 challenges
- Different difficulties (the more points, the harder)
- 4 different categories
- Play on your own or as team

# https://ctf.attacking.systems


## pwn

| Warm Up | Secure Webserver | Debug Shell I | Debug Shell II |
|---|---|---|---|
| 10 | 20 | 50 | 80 |

| diJIT Integrator | diJIT Plot |
|---|---|
| 100 | 150 |

## misc

| RTFM | Weird Architecture | Secure Router | Let's Play a Game |
|---|---|---|---|
| 5 | 20 | 50 | 50 |

## forensics

| Printer Update | Random Blob |
|---|---|
| 50 | 50 |

## crypto

| Flight Radar | Lightweight Crypto | Encrypted Blob |
|---|---|---|
| 30 | 30 | 50 |

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- Flags are usually in a text file `flag.txt` on the device
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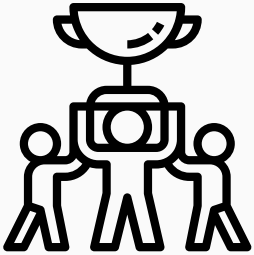
- Goal is to get the flag and submit it to the CTF system

# Timeline



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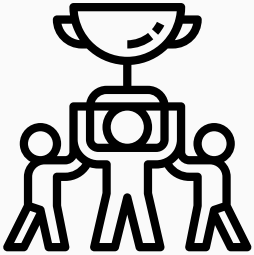

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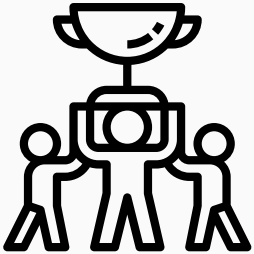

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- Best player/team gets a price

# How to Start

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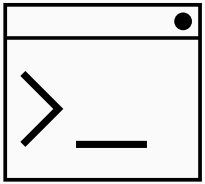
- Solve the hacklet by connecting to the hacklet

# How to Connect



- Hacklets are accessible over the network



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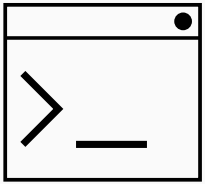

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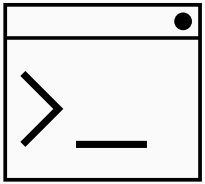

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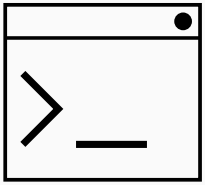
- For example on Linux/Mac in the shell:

```
netcat hacklets2.attacking.systems 8000
```



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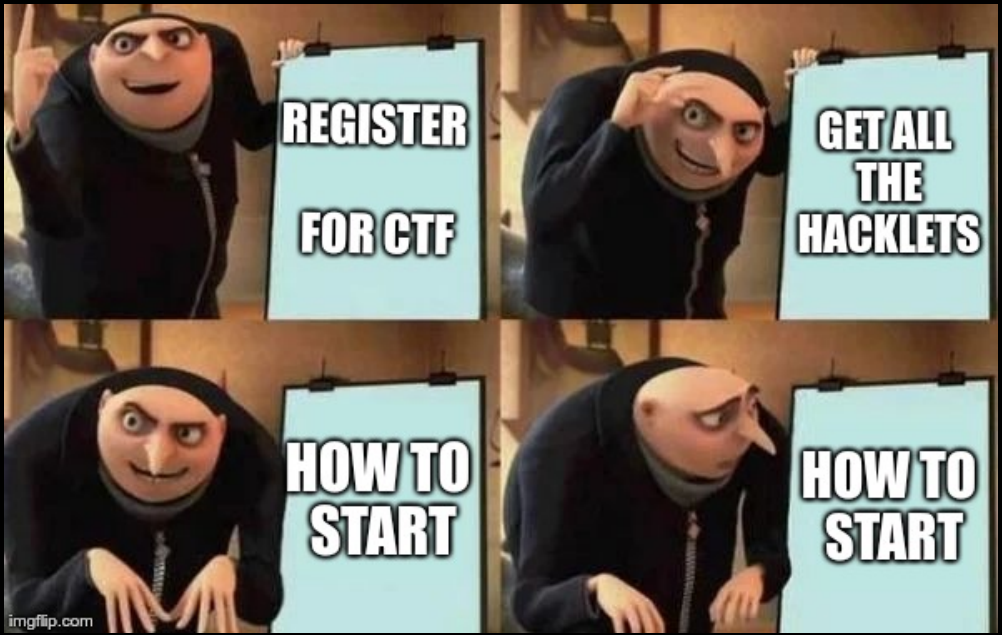
-  Vulnerable binaries which you have to exploit
-  Basically finding/reconstructing hidden/deleted stuff
-  (Bad) Cryptography you have to break
-  Random and fun hacklets which do not fit into any category (often no programming required)


REGISTER
FOR CTF
GET ALL
THE
HACKLETS
HOW TO
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HOW TO
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imgflip.com

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- Useful Linux tool: `file` – determines the file type

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# Readable Information



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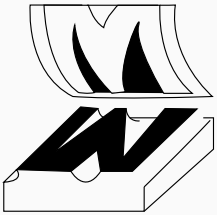

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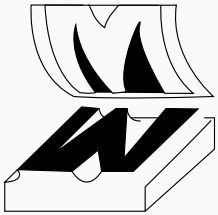

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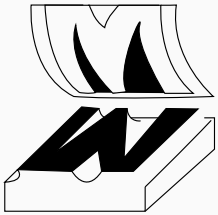

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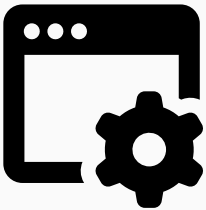

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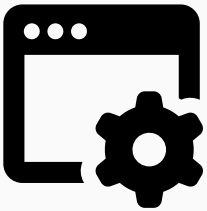

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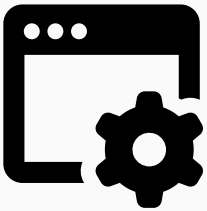

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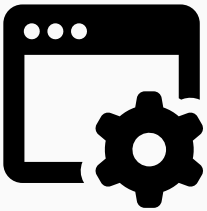

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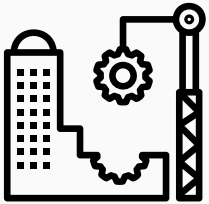

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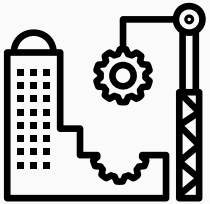

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- GUI disassembler: cutter
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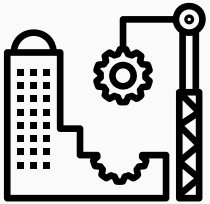

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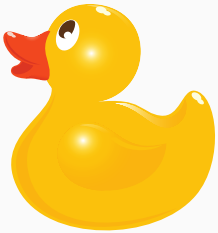

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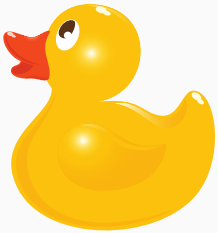

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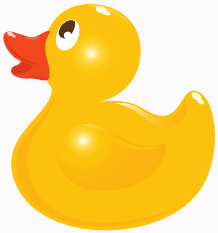

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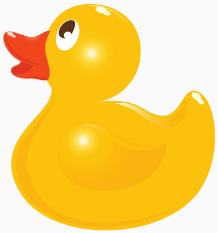
- Usually we talk to humans
- If none available/interested: use a rubber duck!



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- Additionally: Slides from our lecture "Security Aspects in Software Development"
  `https://teaching.iaik.tugraz.at/sase/slides`

# A Challenge a Day Keeps the Boredom Away

# Questions?