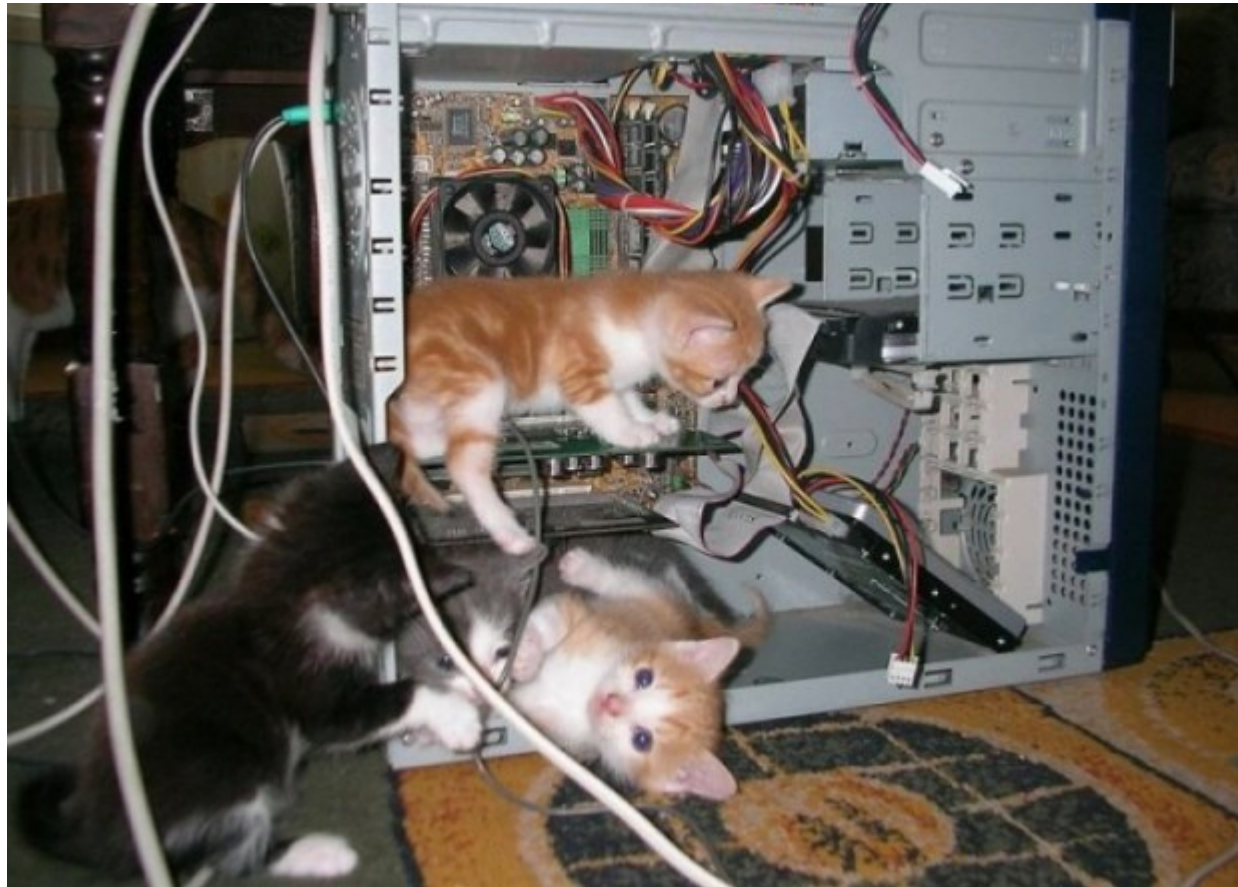


# Engineering Security



<https://outflux.net/slides/2014/uiuc/engsec.pdf>

Reflections | Projections 2014

Kees Cook <kees@outflux.net>

(pronounced "Case")



# Overview

- Who am I?
- My path
- What I learned along the way
- Security is fundamental to technology
- The future

# Who is this guy?

UIUC CS Student



Now working at Google  
on Chrome OS



# My Path



# Consulting

- System Administrator for hire
  - Solaris
  - AIX
- Free Software projects
  - Text paging (Sendpage)
  - Video editing (GOPchop)



# Open Source Development Lab

- OSDL
  - hipster Linux Foundation



- DefCon CTF
  - <http://nopsr.us/ctf2006/overview.html>

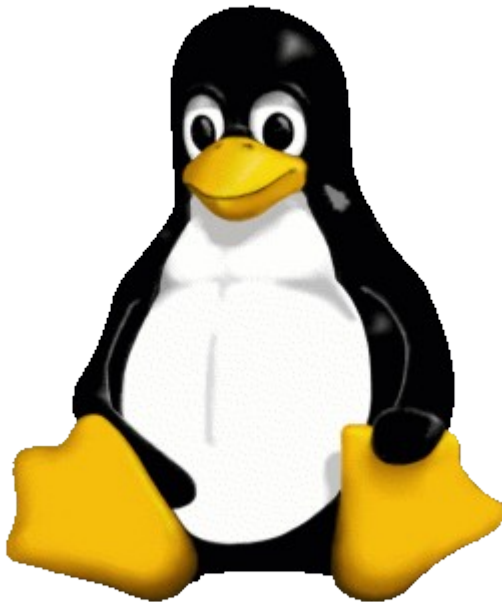


# Ubuntu

- Canonical (Ubuntu)
- Debian
- Linux Kernel



ubuntu



debian

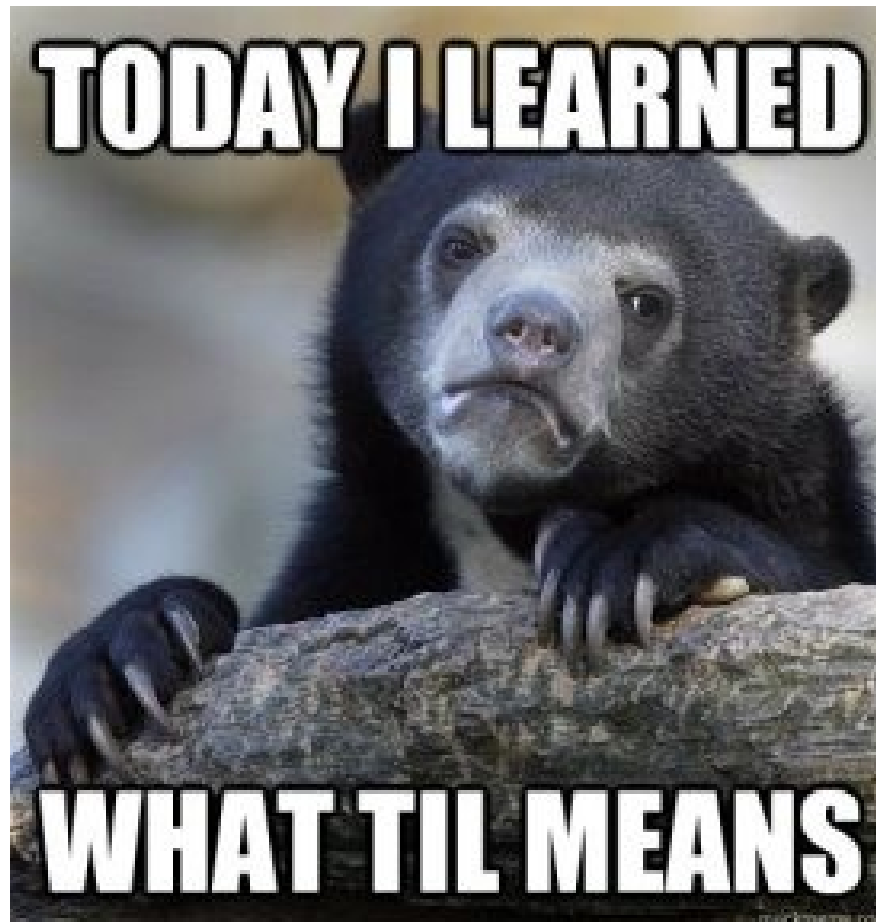
# Google

- Chrome OS  
Security Engineer
- Upstream Linux kernel
  - “seccomp” subsystem maintainer
  - member of the security flaw response team





# What I learned along the way



# Fall in love

- Free Software
  - efficient, evolutionary
- Artificial Intelligence
  - surprising, subtle
- Security Vulnerabilities
  - unrelenting magic



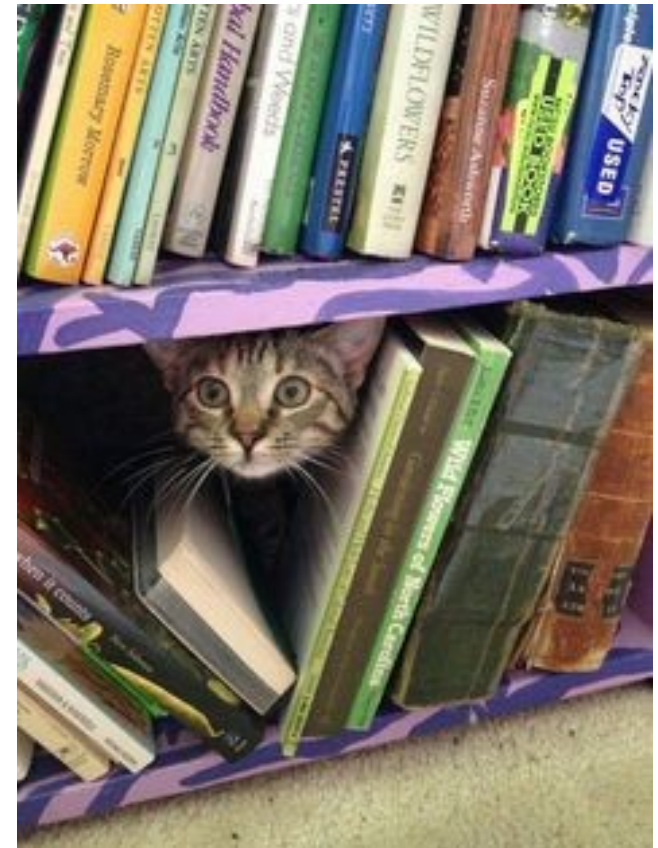
# Practice what you love



- Free Software
  - Yup, good stuff
- Turns out I'm not built for designing AI
  - Problems annoyed me instead of energizing me
- Turns out I have an eye for breaking software
  - Not something anyone was teaching formally

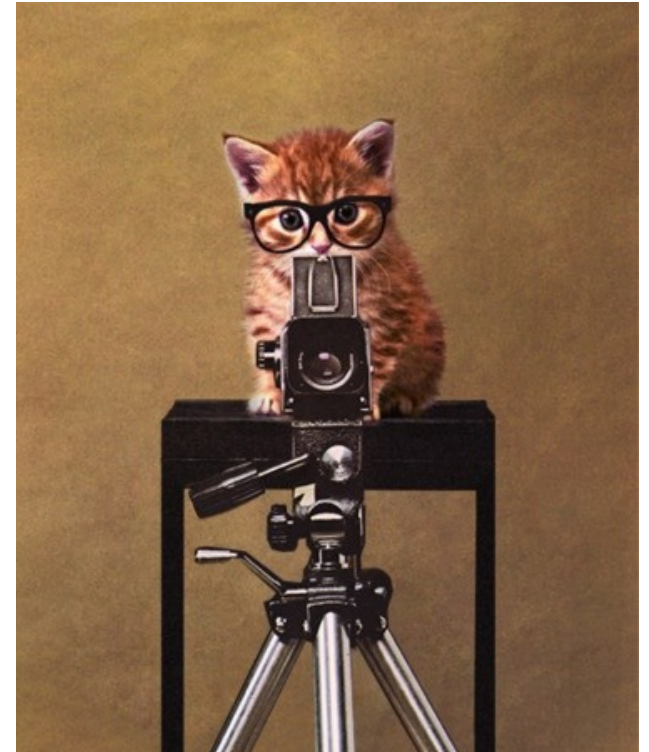
# Look up from your books

- My career didn't exist when I was in school
  - “Software Security Engineering”
- Foundation is critical, but keep an eye out
  - School taught me about writing software, but I spent my own time breaking it too



“... but what I really want to do is  
direct”

- Be happy
  - ... doing what I love
- Improve the world
  - ... by making technology secure
- Get paid
  - ... to write Free Software



# Technology is security

- Used as a lever
  - we can do so much more
  - comes at a cost
  - we delegate control over information and actions
- Does precisely what it is told
  - not always what we meant it to do
- We must trust technology
  - To be trusted, it must be secure



# Responsible for Lives

- Medical equipment
  - pace makers, insulin pumps, ...
- Trusted communication channels



Your account could be at risk of state-sponsored attacks

About the security threat

If you were directed to this page from a warning displayed above your Gmail inbox, we believe that state-sponsored attackers may be attempting to compromise your account or computer.

# Terrible analogy: Bullet Knowledge

If software vulnerabilities are bullets...



Offensive security is  
a machine gun



Defensive security is  
body armor



# Offensive Security

- Find and exploit technology vulnerabilities
  - Leaves everyone else vulnerable
  - Makes technology less trustworthy
  - Slows innovation
- Right there in the name



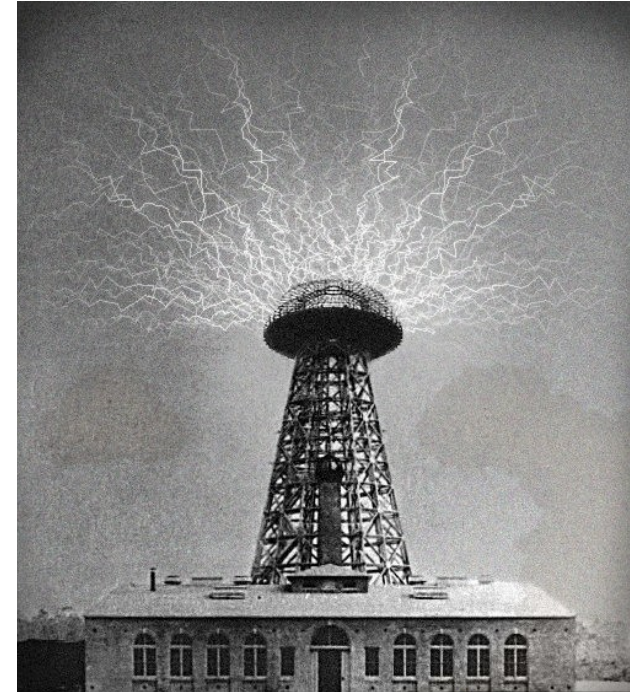
# Defensive Security

- Makes everyone safer
- Encrypt everything
  - Stay ahead of the quantum computers...
- Assume technology will be attacked, abused
  - Get creative, don't underestimate the attacker
- Use Free Software, open designs
- Adhere to safe coding standards
- Test all the pieces



# The future is radios

- Personal communication
  - Cell phones, laptops, ...
- Home/health monitoring
  - Fitbit, Nest, electric meters, ...
- Vehicular
  - Tire pressure, Tesla Motors, drones, ...
- “Internet of Things”
  - besides security, what about reliability, efficiency, modifiability?
- Go get your radio license!



# Thoughts?

<https://outflux.net/slides/2014/uiuc/engsec.pdf>

kees@outflux.net

keescook@chromium.org

keescook@google.com